

UTKAL UNIVERSITY

SYLLABUS FOR ARTS(HONS/PASS) CHOICE BASED CREDIT SYSTEM FOR UNDER GRADUATE PROGRAMME FOR AFFILIATED COLLEGES UNDER UTKAL UNIVERSITY W.E.F. ADMISSION BATCH 2016-2017

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**Regulation for Under Graduate Programme
(BA/B.Com/B.Sc- Honours/Regular) under CBCS Pattern of Utkal
University w. e. f. Admission Batch (2016-2017) for Affiliated
Colleges**

(Applicable to Autonomous Colleges/ Affiliated Colleges/DDCE)

1. ELIGIBILITY

- 1.1. Higher Secondary / +2 / Senior Secondary or any other equivalent examination passed from any Board / Council established by the Govt. of India or any State Govt. or any other equivalent examination recognized by Central Board of Secondary Education/ Council of Higher Secondary Education, Govt. of Odisha/ Dept of Higher Education / Dept. of Industry or any other Dept of Govt. of Odisha or Utkal University. Those joining B.Sc. Programme must have passed the above examination under the faculty of Science/ Technology / Engineering/ Pharmacy etc. There shall be no such restriction for joining BA/ B.Com stream.
- 1.2. Students ordinarily may be selected for admission through Entrance Test, Group Discussion and Personal Interview and / or a combination of these with due weightages to career to be decided by the Autonomous College or Director, Higher Education. DDCE would admit students on first come first serve basis. The Govt. of Odisha may lay down admission process for colleges under its control.
- 1.3. Admission Policy would be decided by the Academic Council of the respective Autonomous Colleges and for affiliated colleges Government will decide the admission policy.
- 1.4. Directorate of Distance & Continuing Education would decide its own admission policy.

2. DURATION

- 2.1 At least three years of six semesters in toto. In case of professional courses the duration may be more as per the direction of regulatory bodies established under Law.
- 2.2 Odd semester is from June to December (i.e., 1st, 3rd & 5th semester).
The examination shall be held normally in the month of November - December.
- 2.3 Even semester is from January to June (i.e., 2nd, 4th & 6th semester).
The examination shall be held normally in the month of May - June. However the Final Semester shall be conducted in April and result shall be published by end of May.
- 2.4 A student would be required to complete the course within six academic years from the date of admission.
- 2.5 A student may opt for fast track of completing all the six semesters in two years provided she/he has at least 2 (two) years industry / organizational experience after +2. Such permission would be granted at the discretion of the Principal of the Autonomous Colleges and DDCE. This clause shall not be applicable to affiliated, non autonomous colleges.

3. Compulsory Registration for 1st Semester:

- Registration for 1st semester is compulsory. A candidate admitted to +3 Courses but not registered for 1st semester examination, his/her admission will be automatically cancelled.
- A candidate may take a blank Semester: A blank Semester has to be clubbed with next Odd or Even Semester as the case may be i.e. 2nd, 4th and 6th / 1st, 3rd and 5th. The Hostel policy for blank semester is to be decided by colleges as per their suitability. Hostel accommodation cannot be claimed as a right for a blank semester. (Blank semester is not to be confused as repetition due to failure).

- 75% attendance for non DDCE students is a requirement for being eligible to appear at Examination Up to 15% waiver may be granted by the College Principal at discretion on Health Ground or participation in sports , cultural activities, NCC and NSS activities etc.
- A student may clear backlog papers within 6 years. Improvement if any has to be completed within 4 years.
- A student may register for extra credit i.e. register for additional papers under the same faculty or outside the faculty under an autonomous college or DDCE provided they are in a position to facilitate such teaching.

4. WEIGHTAGE DISTRIBUTION (PERCENTAGE) FOR EVALUATION:

Theory Subjects

Mid Term Test-I	Mid Term Test-II	Term End	Total
10	10	80	100

Subjects with Practical

Unit Test-I	Unit Test-II	Term End		Total
		A-Theory	B-Practical	
10	10	50	30(20+10-Record)	100

Dissertation/ Project

Identification of problem	Review of Literature	Methodology	Findings	Analysis	Viva-voce	Total
10	10	10	25	25	20	100

For the DDCE unit tests, quizzes, presentation, seminar etc. may not be introduced immediately.

5. GRADING SYSTEM

Grade		Mark Secured from 100	Grade Points
Outstanding	'O'	90-100	10
Excellent	'A+'	80-89	9
Very Good	'A'	70-79	8
Good	'B+'	60-69	7
Above average	'B'	50-59	6
Fair	'C'	40-49	5
Pass	'D'	30-39	4
Failed	'F'	Below 30	

N.B. A Candidate has to secure 30% or above to pass in each of the Papers.

- The candidate obtaining Grade-F is considered failed and will be required to clear the back paper(s) in the subsequent examinations within the stipulated time.
- The candidate securing 'B' Grade and above in Core/Honours papers in aggregate will be awarded Honours.
- The candidate securing 'B+' Grade and above in aggregate in first appearance will be awarded Honours with Distinction/Distinction (for pass/regular course).
- Any candidate filling the forms for appearing in back papers/improvement shall not be awarded Distinction.

- 5.2 A transitory letter grade I (carrying points 2) shall be introduced for cases where the results are incomplete. This grade shall automatically be converted into appropriate grade(s) as and when the results are complete.
- 5.3 A student's level of competence shall be categorized by a GRADE POINT AVERAGE to be specified as :

SGPA - Semestre Grade Point Average

CGPA - Cumulative Grade Point Average

- (a) **POINT** - Integer equivalent of each letter grade
- (b) **CREDIT** - Integer signifying the relative emphasis of individual course item(s) in a semester as indicated by the Course structure and syllabus.

CREDIT POINT - (b) X (a) for each course item

CREDIT INDEX - Σ CREDIT POINT of course items

GRADE POINT AVERAGE - $\frac{\text{CREDIT INDEX}}{\Sigma \text{CREDIT}}$

SEMESTER GRADE POINT AVERAGE (SGPA) = $\frac{\text{CREDIT INDEX}}{\Sigma \text{CREDIT}}$ for a Semester

CUMULATIVE GRADE POINT AVERAGE (CGPA) =

$$\frac{\text{CREDIT INDEX of all previous Semester up to the 6}^{\text{th}} \text{ Semester}}{\Sigma \text{CREDIT}}$$

- 5.4 In addition to the points marks/ percentage would also be awarded and shall also be reflected in the Mark Sheet.
- 5.5 The details of grading system shall be printed on the backside of University Mark-sheet.

6. REPEAT EXAMINATION

- 6.1 A student has to clear back papers (i.e., in the paper/papers one has failed) by appearing at subsequent semester examinations within six years from the date of admission.
- 6.2 A student may appear improvement (repeat) in any number of papers in the immediate subsequent examination. The higher marks shall be retained.
- 6.3 Improvement has to be completed with 4-Yrs from the date of admission.

7. HARD CASE RULE

- 7.1 2% of grace mark on the aggregate mark subject to maximum of 5 (five) marks in single paper shall be given. This shall be applicable in each semester.
- 7.2 0.5 (point five percent) grace mark can be given for award of B Grade in each semester provided grace mark under 7.1 has not been awarded.

8. EXAMINATION QUESTION PATTERN (SUGGESTIVE)

8.1 The end semester examination will be of three hours irrespective of marks.

8.2 **For subject without having practical** full marks are 100 per paper out of which 20 marks is allotted for Mid-Semester Examination (Internal) and 80 marks for end semester examination.

The question papers shall be divided into two parts such as Group- A & Group-B.

Group- A will carry 10 short questions of two marks each .The answer should be within two sentences.

There shall be 5 long type questions in Group –B with one alternative each have to be attempted and all questions shall be of equal value (12 marks X 5).

For subject with practical full marks are 100 per paper out of which 20 marks is allotted for Mid- Semester Examination, 50 is for End Semester Examination and 30 is for practical .

The question papers shall be divided into two parts such as Group- A & Group-B.

Group- A will carry 10 short questions of one mark each. The answer should be within two sentences.

There shall be 5 long-type questions with one alternative each have to be attempted for subjects having practical. The questions shall be of equal value (8 Marks x 5)

Practical will carry 30 marks out of which 10 will be for records.

a. Model answers for long questions should be between 700 - 1000 words.

9. Each Dept shall have a designated Teacher in-charge of Examination to be decided by the Principal in addition to the Controller of Examinations of the College (applicable to autonomous colleges).

10. The Internal Evaluation would be the sole responsibility of Teacher offering the course.

11. Suitable modifications may be made by the Autonomous Colleges keeping in view the UGC Guideline for Autonomous Colleges, University Guidelines from time to time and State Govt. Guidelines from time to time.

BROAD PRINCIPLES OF CREDIT TRANSFER

➤ There should be a small group to consider all cases of credit transfer . The group should consists of the following

Chairman - Chairman P.G Council (for University affiliated colleges) /
Director, DDCE for DDCE/ Principals of the Autonomous College/Controller
of Examinations, Utkal University.

Convener - Dy. Controller of Examination for University affiliated colleges
Faculty member of DDCE for DDCE, Controller of Examination of respective
Autonomous colleges for autonomous colleges.

Members - Four teachers to be nominated by the Chairman, P.G. Council/ Director,

DDCE/ Principal of Autonomous Colleges as the case may be.

Waiver for courses covered under other colleges notwithstanding differences in detailed course can be granted. Papers which one has not studied even though they are prescribed for earlier semesters can be covered by the students.

- **OTHER BROAD PRINCIPLES:**

Student transferred after 1st semester examination cannot be given position or medal under autonomous colleges. Students who have failed / remained absent / appeared for improvement shall not be eligible for University Gold medal or Rank. Students who have been granted credit waiver under credit transfer system can't be awarded Gold medal or position.

COURSE STRUCTURE

DETAILS OF COURSES UNDER B.A.(HONOURS)

Course	*Credits	
	Theory+ Practical	Theory + Tutorial
<hr/>		
<u>I. Core Course (6 Credits)</u>		
(14 Papers)	14X4= 56	14X5=70
Core Course Practical / Tutorial*		
(14 Papers)	14X2=28	14X1=14
<u>II. Elective Course (6 Credits)</u>		
(8 Papers)		
A.1. Discipline Specific Elective	4X4=16	4X5=20
(4 Papers)		
A.2. Discipline Specific Elective		
Practical / Tutorials*	4 X 2=8	4X1=4
(4 Papers)		
B.1. Generic Elective/Interdisciplinary	4X4=16	4X5=20
(4 Papers)		
B.2. Generic Elective		
Practical / Tutorials*	4 X 2=8	4X1=4
(4 Papers)		
□ Optional Dissertation or project work in place of one Discipline Specific elective paper (6 credits) in 6th Semester		

III. Ability Enhancement Courses

1. Ability Enhancement Compulsory Courses (AECC)

(2 Papers of 4 credits each) 2 X 4=8 2 X 4=8 Environmental Science

English/Hindi/MIL Communication

2. Skill Enhancement Courses (SEC)

(Minimum 2, Max. 4)

2 X 4=8

2 X 4=8

(2 Papers of 2 credits each)

Total credit= 148 Total credit= 148

Institute should evolve a system/policy about ECA/ General Interest/Hobby/Sports/NCC/NSS/related courses on its own.

***wherever there is a practical there will be no tutorial and vice-versa.**

SCHEME FOR CHOICE BASED CREDIT SYSTEM IN BA(HONOURS)

	CORE COURSE (14)	Ability Enhancement Compulsory Course (AECC) (2)	Skill Enhancement Course (SEC) (2)	Elective: Discipline Specific DSE (4)	Elective: Generic (GE) (4)
I	C 1	Environmental Science			GE-1
	C 2				
II	C 3	MIL Communication (Odia/Hindi)			GE-2
	C 4				
III	C 5		SEC -1(English Communication)		GE-3
	C 6				
	C 7				
IV	C 8		SEC -2		GE-4
	C 9				
	C 10				
V	C 11			DSE-1	
	C 12			DSE -2	
VI	C 13			DSE -3	
	C 14			DSE -4	

DETAILS OF COURSES UNDER B.A (REGULAR/PASS)

Course	*Credits	
	Paper+ Practical	Paper + Tutorial
<u>I. Core Course (6 Credits)</u>		
(12 Papers)	12X4= 48	12X5=60
Two papers – English		
Two papers – Hindi/MIL		
Four papers – Discipline 1.		
Four papers – Discipline 2.		
Core Course Practical / Tutorial*	12X2=24	12X1=12
(12 Practicals)		
<u>II. Elective Course (6 Credits)</u>		
(6 Papers)	6x4=24	6X5=30
Two papers- Discipline 1 specific		
Two papers- Discipline 2 specific		
Two papers- Inter disciplinary		
Two papers from each discipline of choice and two papers of interdisciplinary nature.		
Elective Course Practical / Tutorials*	6 X 2=12	6X1=6
(6 Practical/ Tutorials*)		
Two papers- Discipline 1 specific		
Two papers- Discipline 2 specific		
Two papers- Generic (Inter disciplinary)		
Two papers from each discipline of choice including papers of interdisciplinary nature.		
<input type="checkbox"/> Optional Dissertation or project work in place of one elective paper (6 credits) in 6th Semester		
<u>III. Ability Enhancement Courses</u>		
1. Ability Enhancement Compulsory Courses (AECC)		
(2 Papers of 4 credits each)	2 X 4=8	2 X 4=8
Environmental Science		
English/Hindi/MIL Communication		
2. Skill Enhancement Courses (SEC)	4 X 4=16	4 X 4=16
(4 Papers of 4 credits each)		
	Total credit= 132	Total = 132
Institute should evolve a system/policy about ECA/ General Interest/Hobby/Sports/NCC/NSS/related courses on its own.		
*wherever there is a practical there will be no tutorial and vice-versa.		

SCHEME FOR CHOICE BASED CREDIT SYSTEM IN B.A.REGULAR/PASS)

	CORE COURSE (12)	Ability Enhancement Compulsory Course (AECC) (2)	Skill Enhancement Course (SEC) (2)	Discipline Specific Elective DSE (4)	Generic Elective GE (2)
I	English/Hindi/Odia MIL-1	Environmental Science			
	DSC- 1 A				
	DSC- 2 A				
II	Hindi/MIL/ English-1	MIL Communication (Odia/Hindi)			
	DSC- 1 B				
	DSC- 2 B				
III	English/Hindi/Odia MIL-2		SEC -1 (English Communication)		
	DSC- 1 C				
	DSC- 2 C				
IV	Hindi/MIL/ Odia English-2		SEC -2		
	DSC- 1 D				
	DSC- 2 D				
V			SEC -3	DSE-1 A	GE-1
				DSE-2 A	
VI			SEC -4	DSE-1 B	GE-2
				DSE-2 B	

B.A/B.Sc. (Honours) Anthropology

CBCS: BA (Hons.), B.Sc (Hons.)

Core courses = 14 papers of 6 Credit each: 100 marks each (5 Units in each course) 1400

Discipline Specific Elective (DSE)= 3 papers of 6 credit each: 100 marks each
(5 Units in each course) And Project Report of 6 Credit: 100 Marks (Project 75 + Viva 25) 400

Generic Electives (GE) = 4 papers of 6 credit each: 100 marks each (5 units in each course) 400

Ability Enhancement Compulsory Course (AECC) = 2 papers of 4 credit each: 50 marks each 100
(English Communication / MIL / Environmental Science)

Skill Enhancement Courses (SEC) = 2 papers of 4credit each: 50 marks each 100

Sem I: 2 Core Courses, 1 AECC, 1 GE= 4 papers= 350 marks

Sem II: 2 Core Courses, 1 AECC, 1 GE= 4 papers= 350 marks

Sem III: 3 Core Courses, 1 SEC, 1 GE= 5 papers= 450 marks

Sem IV: 3 Core Courses, 1 SEC, 1 GE= 5 papers= 450 marks

Sem V: 2 Core Courses, 2 DSE = 4 papers= 400 marks

Sem VI: 2 Core Courses, 1 DSE, Project Report = 4 papers= 400 marks

Total = 26 papers = 2400 marks (148 Credits)

For papers with Practical Component : Theory - 70 (Mid Sem 20 + End Sem 50) ;
Practical - 30 (End Sem). There will be no mid sem exam for Practical paper.

For papers with no Practical: 100 marks paper = 20 (Mid Sem) +80 (End Sem); 50 marks Paper = 10
(Mid Sem) + 40 (End Sem)

Subjects with Practical:

Each of the 14 core courses, 4 Discipline specific elective courses And 4 Generic Elective papers will have minimum 40 Theory classes (Lectures) of 1 hour duration and minimum 20 Practical classes (normally practical classes at Hons level are of 2 hours duration each).

Subjects without Practical:

Each of the 14 core courses, 4 Discipline specific elective courses and 4 Generic Elective papers (100 marks each) will have minimum 50 Theory classes (Lectures) of 1 hour duration and minimum 10 tutorial classes. Ability enhancement (compulsory) and 2 Ability enhancement (Skill based) papers will have minimum 20 classes (Lectures) each of 1 hour duration.

CBCS: BA (Pass.)

Core Courses = 12 papers, AECC= 2 papers, SEC = 4 papers, DSE = 4 papers, GE= 2 papers: 24 papers (2100 Marks - 132 credits)

To complete this programme, a student has to take 4 Core Courses each in 2 disciplines of choice and two core papers each in English and MIL respectively.

CBCS: B.Sc (Pass)

Core Courses = 12 papers, AECC= 2 papers, SEC = 4 papers, DSE = 6 papers: 24 papers (2100 Marks- 132 credits)

To complete this programme, a student has to take 4 Core papers each in 3 disciplines of choice.

Core Courses

Semester-1	C1: Introduction to Biological Anthropology	C2: Introduction to Socio-cultural Anthropology	
Semester-2	C3: Archaeological Anthropology	C4: Fundamentals of Human Origin & Evolution	
Semester-3	C5: Tribes and Peasants in India	C6: Human Ecology	C7: Biological Diversity in Human Populations
Semester-4	C8: Theories of Culture and Society	C9: Human Growth and Development	C10: Research Methods
Semester-5	C11: Prehistoric Archaeology of India	C12: Anthropology in Practice	
Semester-6	C13: Forensic Anthropology	C14: Anthropology of India	

B.A./B.Sc. in Anthropology

S.No.	Core Paper	Theory	Practical
C1.	Introduction to Biological Anthropology	√	√
C2.	Introduction to Socio-cultural Anthropology	√	√
C3.	Archaeological Anthropology	√	√
C4.	Fundamentals of Human Origin & Evolution	√	√
C5.	Tribes and Peasants in India	√	√
C6.	Human Ecology	√	√
C7.	Biological Diversity in Human Populations	√	√
C8.	Theories of Culture and Society	√	√
C9.	Human Growth and Development	√	√
C10.	Research Methods	√	√
C11.	Prehistoric Archaeology of India	√	√
C12.	Anthropology in Practice	√	√
C13.	Forensic Anthropology	√	√
C14.	Anthropology of India	√	√

S.No.	Elective courses	Theory	Practical
DSE1.	Physiological Anthropology	√	√
DSE2.	Sports and Nutritional Anthropology	√	√
DSE3.	Human Genetics	√	√
DSE4.	Neuro Anthropology	√	√
DSE5.	Forensic Dermatoglyphics	√	√

DSE6.	Paleoanthropology	√	√
DSE7.	Anthropology of Religion, Politics and Economy	√	√
DSE8.	Tribal Cultures of India	√	√
DSE9.	Human Population Genetics	√	√
DSE10.	Visual Anthropology	√	√
DSE11.	Fashion Anthropology	√	√
DSE12.	Demographic Anthropology	√	√
DSE13.	Urban Anthropology	√	√
DSE14.	Anthropology of Health	√	√
DSE15.	Linguistic Anthropology	√	√

Note: Student will write dissertation on the basis of 20 days Field Work in the nearby locality on any branch of Anthropology in 6th Semester. She/He will be supervised by one Teacher/teachers.

Generic Elective (GE)

For B.Sc. in Anthropology: Chemistry, Botany, Zoology, Geology, Geography, Bio-Technology, Environmental Science, Psychology, Statistics, Marine Science, BCA

For B.A. in Anthropology: History, Political Science, Economics, Psychology, Geography, Sociology, Home Science, Sanskrit, Odia, Philosophy, BBA and BBA (Health Care management), Tourism Administration

Ability enhancement Elective (skill based) (SEC)

SEC1. Public Health and Epidemiology

SEC 3. Media Anthropology

SEC 2. Business and Corporate Anthropology

SEC 4. Tourism Anthropology

SEC 5. Museology and Cultural Resource Management

CORE PAPERS

Credits: Papers X (Theory + Practical) = 14 X (4+2) = 84

C 1. Introduction to Biological Anthropology

Theory

Credit- 4

Unit I: History and development of understanding human variation and evolutionary thought; Theories of evolution; Human variation and evolution in ancient times pre-19th and post-19th Century; Theories of evolution. Lamarckism, Neo Lamarckism, Darwinism, Synthetic theory, Mutation and Neo-Mutation theory.

Unit II: History of Physical Anthropology and development of Modern Biological anthropology, aim, scope and its relationship with allied disciplines; Difference in the approaches of modern and traditional Biological Anthropology, with emphasis on human evolution.

Unit III: Non human primates in relation to human evolution Classification and characteristics of living primates; Comparative anatomy and behaviour of human and non-human primates; Significance of non-human primate study in Biological Anthropology.

Unit IV: Structure and function of an animal cell; cell theory and cell division. Essentials of Genetics; Landmarks in the history of genetics, principles in human genetics Mendel's Laws of inheritance and its application to man; Concept of race & UNESCO Statement on Race; A comparative account of various races of the world.

Practical**Credit-2****Somatometry**

- | | |
|--------------------------------|---------------------------------------|
| 1. Maximum head length | 9. Physiognomic facial height |
| 2. Maximum head breadth | 10. Morphological facial height |
| 3. Minimum frontal breadth | 11. Physiognomic upper facial height |
| 4. Maximum bizygomatic breadth | 12. Morphological upper facial height |
| 5. Bigonial breadth | 13. Head circumference |
| 6. Nasal height | 14. Stature |
| 7. Nasal length | 15. Sitting height |
| 8. Nasal breadth | 16. Body weight |

Somatoscopy

- | | | | |
|--------------|----------------|----------------|----------------|
| 1. Head form | 2. Hair form | 3. Facial form | 4. Eye form |
| 5. Nose form | 6. Hair colour | 7. Eye colour | 8. Skin colour |

Suggested Readings

1. Jurmain R., Kilgore L., Trevathan W., Ciochon R.L. (2012). Introduction to Physical Anthropology Wadsworth Publ., USA
2. Kroeber A. L. (1948). Anthropology. Oxford & IBH Publishing Co., New Delhi.
3. Stanford C., Allen J.S. and Anton S.C. (2010). Exploring Biological Anthropology. The Essentials. Prentice Hall Publ, USA.
4. Statement on Race: Annotated Elaboration and Exposition of the Four Statements on Race (1972). Issued by UNESCO. Oxford University Press.

C 2. Introduction to Socio-cultural Anthropology**Theory****Credit- 4**

Unit I: Anthropological perspective and orientation; Scope and relevance of Social Anthropology; Relationship of Social Anthropology with other disciplines.

Unit II: Concepts of society and culture; status and role; groups and institution, social stratification, and civil society.

Unit III: Social organization; social structure; social function; social system.

Unit IV: Theory and practice of ethnographic fieldwork; survey method; comparative and historical methods.

Practical**Credit- 2**

Methods and Techniques of Social Anthropology: The practical will include the following techniques and methods in collection of data in Social Anthropology.

1. Observation
2. Interview
3. Questionnaire and Schedule
4. Case study
5. Life history

Suggested Readings

1. Beattie J. (1964). *Other Cultures*. London: Cohen & West Limited.
2. Bernard H.R. (1940). *Research Methods in Cultural Anthropology*. Newbury Park: Sage Publications.
3. Davis K. (1981). *Human Society*. New Delhi: Surjeet Publications.
4. Delaney C. (2004). 'Orientation and disorientation' In *Investigating Culture: An Experiential Introduction to Anthropology*. Wiley-Blackwell.
5. Ember C. R. et al. (2011). *Anthropology*. New Delhi: Dorling Kindersley.
6. Ferraro G. and Andreatta S. (2008). In *Cultural Anthropology: An Applied Perspective*. Belmont: Wadsworth.
7. Haviland, Prins, Walrath, McBride (2007). *Introduction to Anthropology*. Cengage Learning India Pvt. Ltd., New Delhi
8. Haviland, Prins, Walrath, McBride (2008). *Cultural Anthropology*. Cengage Learning India Pvt. Ltd., New Delhi
9. Karen O'reilly. (2012). 'Practical Issues in Interviewing' *Ethnographic Methods*. Abingdon: Routledge
10. Lang G. (1956). 'Concept of Status and Role in Anthropology: Their Definitions and Use. *The American Catholic Sociological Review*, 17(3): 206-218
11. O'reilly K. (2012). *Ethnographic Methods*. Abingdon: Routledge.
12. Parsons T. (1968). *The Structure of Social Action*. New York: Free Press
13. Rapport N. and Overing J. (2004). *Key Concepts in Social and Cultural Anthropology*. London: Routledge.
13. Royal Anthropological Institute of Great Britain and Ireland (1971). 'Methods' In *Notes and Queries on Anthropology*. London: Routledge & Kegan Paul Ltd.

C3. Archaeological Anthropology

Theory

Credit- 4

Unit I: Introduction, Definition and scope of archaeological anthropology; Relation with other disciplines; Methods of studying archaeological anthropology.

Unit II: Methods of Estimation of Time and Reconstruction of the Past; Absolute dating methods: Radiocarbon¹⁴ dating (C¹⁴), Potassium-Argon, Fission Track Dating; Relative dating methods: Stratigraphy, Palaeontology, Palynology.

Unit III: Geochronology of Pleistocene Epoch; Glacial and Interglacial; Pluviation and Inter Pluviation; Different types of geoclimatic events.

Unit IV: Understanding Culture; Technique of tool manufacture and estimation of their relative efficiency; Classification of tools: primary and combination fabrication techniques; Earliest evidence of culture in the world: Konso, Olorgesaille, Olduvai Gorge Pirro Nord, Damanisi, Attirampakkam, Isampur, Kuliana.

Practical

Credit- 2

Typo-technological Analysis of Prehistoric Tools: Identification, Interpretation and Drawings of the tool Types

1. Core Tool Types
2. Flake Tool Types
3. Blade Tool Types
4. Microlithic Tool Type
5. Neolithic Tool Type

Suggested Readings

1. Allchin and Allchin (1993). *The Rise of Civilization of India and Pakistan*. Cambridge University Press
2. Bhattacharya D.K. (1978). *Emergence of Culture in Europe*, Delhi, B.R. Publication.

3. Bhattacharya D.K. (1979). *Old Stone Age Tools and Techniques*. Calcutta, K.P. Bagchi Company
4. Bhattacharya D.K. (1996). *Palaeolithic Europe*. Netherlands, Humanities Press.
5. Champion et al. (1984). *Prehistoric Europe*. New York, Academic Press.
6. Fagan B.M. (1983). *People of Earth: An Introduction*. Boston, Little, Brown & Company.
7. Phillipson D. W. (2005). *African Archaeology*. Cambridge, Cambridge University Press.
8. Renfrew, C. and Paul Bahn (1996) *Archaeology: Theories, Methods, and Practice*, Thames and Hudson,
9. Sankalia H.D. (1964). *Stone Age Tools*. Poona Deccan College

C 4. Fundamentals of Human Origin & Evolution

Theory

Credit- 4

Unit-I: Primate origins and radiation with special reference to Miocene hominoids: Ramapithecus, distribution, features and their phylogenetic relationships.

Unit-II: Australopithecines: distribution, features and their phylogenetic relationships. Appearance of genus Homo (*Homo habilis*) and related finds. *Homo erectus* from Asia, Europe and Africa: Distribution, features and their phylogenetic status.

Unit-III: The origin of *Homo sapiens*: Fossil evidences of Neanderthals and Archaic *Homo sapiens*.

Unit-IV: Origin of modern humans (*Homo sapiens sapiens*): Distribution and features; Multiregional and Out of Africa theory ; Hominisation process .

Practical (Any two)

Credit- 2

- | | |
|--|-------------------------|
| 1. Craniometry: Maximum cranial length | Maximum cranial breadth |
| Maximum bizygomatic breadth | Maximum frontal breadth |
| Minimum frontal breadth | Nasal height |
| Nasal breadth | Bi-mastoid breadth |
| Greatest occipital breadth | Upper facial height |
| Cranial index | Nasal index |
2. Osteometry: Measurements of long bones: lengths, minimum/least circumference and caliber index
 3. Identification of casts of fossils of family hominidae: Drawing and comparison of characteristics.

Suggested Readings

1. Buettner-Janusch, J. (1966). *Origins of Man: Physical Anthropology*. John Wiley & Sons, Inc., New York, London, Sydney.
2. Conroy, G.C. (1997). *Reconstructing Human Origins: A Modern Synthesis*. W. W. Norton & Company, New York, London.
3. Howell F.C. (1977). *Horizons of Anthropology*. Eds. S. Tax and L.G. Freeman, Aldine Publishing House, Chicago.
4. Nystrom P. and Ashmore P. (2011). *The Life of Primates*. PHI Learning Private Limited, New Delhi.
5. Seth P. K. and Seth S. (1986). *The Primates*. Northern Book Centre, New Delhi, Allahabad.
6. Singh I. P. and Bhasin M.K. (1989). *Anthropometry: A Laboratory Manual on Biological Anthropology*. Kamla-Raj Enterprises, Chawri Bazar, Delhi.
7. Standford C.; Allen J.S. and Anton S.C. (2012). *Biological Anthropology: The Natural History of Mankind*. PHI Learning Private Limited, New Delhi.
8. Swindler D. R. (2009). *Introduction to the Primates*. Overseas Press India Pvt. Ltd., New Delhi.

C 5. Tribes and Peasants in India

Theory

Credit- 4

Unit I: Definition and Concept of Tribe; Problems of nomenclature, distribution and classification; Features of tribes in India.

Unit II: Tribes in India. The history of tribal administration; Constitutional safeguards; Draft, National Tribal Policy, Issues of acculturation assimilation and integration; Impact of development schemes and programme on tribal life.

Unit III: Concept of Indian Village; The concept of peasantry; Approaches to the study of peasants – economic, political and cultural. Characteristics of Indian village: social organization; economy and changes. Caste system and its changes in the Indian society.

Unit IV: Ethnicity Issues: Tribal and peasant, movements; Identity issues.

Practical

Credit- 2

Reading of Ethnography: Students are required to read and analyze any two of the ethnographies (as listed below) and prepare a report based upon it. The report should clearly link up the study with the concept of tribe and peasantry and delineate clearly the concept used in the text.

1. Research questions/objectives of the study and their relevance.
2. Theoretical schema.
3. Methods and techniques used in the study.
4. Key findings and their significance in the context of the objectives of the study.
5. Critical analysis of the finding on the basis of contemporary available resources.

List of Ethnographies:

- Walker A. (1986). *The Todas*. Delhi : Hindustan Publishing Corporation Verrier Elwin (1992). *The Muria and their Ghotul*. USA: Oxford University Press.
- Malinowski M. (1922). *Argonauts of the Western Pacific*. London: Routledge and Kegan Paul Ltd.
- Furer-Haimendorf C.V. (1939). *The Naked Nagas*. London: Methuen and Co.
- Evans-Pritchard E.E. (1940). *The Nuer: A Description of the Modes of Livelihood and Political Institutions of a Nilotic People*. Oxford : Clarendon Press.
- Majumdar D. N. (1950). *Affairs of tribes*. Lucknow: Universal Publishers Ltd.
- Dube S.C. (1955). *Indian Village*. London: Routledge and Kegan Paul Ltd.
- Berreman G.D. (1963). *Hindus of the Himalayas*. Berkeley: California University Press.

Suggested Readings

1. Gupta D. (1991). *Social Stratification*. Oxford University Press: Delhi.
2. Madan V. (2002). *The Village in India*. Oxford University Press: Delhi.
3. Nathan D. (1998). *Tribe-Caste Question*. Simla: IAS.
4. National Tribal Policy (draft). (2006). Ministry of Tribal Affairs. Government of India.
5. Patnaik S.M. (1996). *Displacement, Rehabilitation and Social change*. Inter India Publication, Delhi.
6. Shah G. (2002). *Social Movement and the State*. Delhi: Sage.
7. Shanin T. (1987). *Peasants and Peasantry*. New York, Blackwell.
8. Vidyarthi L.P. and Rai B.K. (1985) *Tribal Culture in India*, New Delhi, Concept Publishing Company.
9. Wolf E. (1966). *Peasants*. NJ, Prentice Hall.

C 6. Human Ecology

Credit- 4

Theory

Unit 1: Concepts in Ecology: Definition, ecosensitivity adaptation, acclimation, acclimatization, biotic and abiotic component.

Unit II: Methods of studying human ecology. Adaptation to various ecological stresses: heat, cold and high altitude; Ecological rules and their applicability to human populations.

Unit III: Culture as a tool of adaptation; Various modes of human adaptation in pre-state societies; (i) Hunting and food gathering (ii) Pastoralism and (iii) Shifting cultivation and Agriculture and peasantry.

Unit VI: Ecological themes of state formation: i. Neolithic revolution, ii. Hydraulic Civilization, Impact of urbanization and industrialization on Man.

Practical

Credit- 2

Biological Dimensions

Size and Shape Measurements

- | | |
|---------------------------------|---------------------------------|
| 1. Stature | 5. Total Lower Extremity Length |
| 2. Sitting Height | 6. Nasal Breadth |
| 3. Body Weight | 7. Nasal Height |
| 4. Total Upper Extremity Length | |

Size and Shape Indices (Any two)

- | | |
|----------------------------|--|
| 1. Body Mass Index | 4. Relative Upper Extremity Length |
| 2. Ponderal Index | 5. Relative Total Lower Extremity Length |
| 3. Relative Sitting Height | 6. Nasal Index |

Cultural Dimensions

1. Make a research design pertaining to any environmental problem and do a project based on it.

Suggested Reading

1. Human ecology: biocultural adaptation in human communities. (2006) Schutkowski, H. Berlin. Springer Verlag.
2. Human ecology and cognitive style: comparative studies in cultural and physical adaptation. (1976).Berry, J.B. New York: John Wiley.
3. Human ecology. (1964) Stapledon. Faber & Faber.
4. Studies in Human Ecology. (1961) Theodorson, G.A. Row, Peterson & Company Elmsford, New York.
5. Human ecology: (1973) Problems and Solutions. Paul R. Ehrlich, Anne H. Ehrlich and John P. Holdress.W.H. Freeman & Company, San Francisco.
6. Cohen, Yehudi A. 1968. Man in adaptation; the cultural present. Chicago: Aldine Pub. Co.
7. Redfield, Robert. (1965). Peasant society and culture an anthropological approach to civilization. Chicago [u.a.]: Univ. of Chicago Press.
8. Symposium on Man the Hunter, Richard B. Lee, and Irvan DeVore. 1969. Man the hunter. Chicago:Aldine Pub. Co.
9. Dave Deeksha & S.S. Katewa (2012). Text Book of Environmental Studies. Cengage Learning India Pvt. Ltd., Delhi
10. Eugene P. Odum and Gary W. Barrett (2004). Fundamentals of Ecology. Cengage Learning; 5 edition.

C 7. Biological Diversity in Human Populations

Theory

Credit- 4

Unit I: Concept of Biological Variability; Race, Hardy-Weinberg Law; Sources of Genetic Variation; Structuring Genetic Variation; Interpretation of Human Variation, Genetic Polymorphism (Serological,

Unit II: Role of Bio-cultural Factors: Human Adaptability Cultural Biology; Bio-cultural factors influencing the diseases and nutritional status; Evolution of Human diet, biological perspectives of ageing process among different populations.

Unit III: Demographic Perspective Demographic Anthropology; Sources of Demographic Data, Demographic Processes, Demographic profile of Indian populations and its growth structure; Inbreeding and Consanguinity – Biological consequences of inbreeding, frequency of inbreeding in world populations; Methods of counselling.

Unit IV: Genetic diversity among Indian Population A critical appraisal of contribution of Risley, Guha, Rickstett and Sarkar towards understanding ethnic elements in the Indian populations.

Practical (Any Two)

Credit- 2

1. Craniometric Measurements (Skull & Mandible)
2. Determination of B, O; and Rh blood groups of ten subjects.
3. Analysis and interpretation of finger ball pattern types, palmar main lines and pattern index; Finger print classification and development of chance prints and statistical treatment of the data collected (Ten Subjects)
4. Collection of demographic data from secondary sources.

Suggested readings:

1. Baker P.T. and J.S. Weiner (ed.) (1996) *The Biology of Human Adaptability*. Oxford & New York, Oxford University Press.
2. Bhende A. and T. Kantikar (2006) *Principles of Population Studies*. Himalayan Publishing House, Mumbai
3. Bogin B. (1999). *Pattern of Human Growth*. 2nd edition CUP.
4. Cameron Noel and Barry Bogin (2012) *Human Growth and development*. Second edition, Academic Press Elsevier.
5. Eckhardt R.B.(1979) *The Study of Human Evolution*. McGrand Hill Book Company, USA.
6. Frisancho R. (1993) *Human Adaptation and Accommodation*. University of Michigan press
7. Harrison G.A., Tanner, J.M., Pilbeam, D.R., Baker, P.T. (1988) *Human Biology*. Oxford University Press.
8. Jurmain Robert Lynn kilgore Wenda Trevathan and Ciochon (2010). *Introduction to Physical Anthropology*. Wadsworth Publishing, USA.
9. Kapoor A.K. and Satwanti Kapoor (ed) (1995). *Biology of Highlanders*. Jammu, Vinod Publisher & Distributor.
10. Kapoor A.K. and Satwanti Kapoor (eds) (2004) *India's Elderly-A Multidisciplinary Dimension*. Mittal Publication, New Delhi.
11. Klepinge L.L. (2006). *Fundamentals of Forensic Anthropology*. John Willey & Sons.,New Jersey.
12. Malhotra K.C. and B. Balakrishnan(1996) *Human Population Genetics in India*.
13. Malina Robert M., Claude. Bouchard, Oded. Bar-Or. (2004) Growth, and Physical Activity. *Human Kinetics*.
14. Stanford C., Allen, S.J. and Anton, C.S. (2013): *Biological Anthropology*. 3rd edition, Pearson, USA.

C8. Theories of Culture and Society

Theory

Credit- 4

Unit I: Emergence of Anthropology: Interface with evolutionary theory and colonialism, changing

perspectives on Evolutionism, Diffusionism and Culture area theories.

Unit II: Emergence of Fieldwork tradition; Historical Particularism, American Cultural Tradition.

Unit III: Durkheim and Social integration; Functionalism and Structural-functionalism and British Social Anthropology.

Unit IV: Structuralism: Claude Levi-Strauss and Edmund Leach; Symbolism and Interpretative approach.

Practical

Credit- 2

As a part of the practical following exercises will be undertaken by the students so as to enable them to connect the theories they learn with things of everyday living.

1. To identify a topic relating to contemporary issue and formulate research questions and clearly identify the theoretical perspectives from which they are derived.
2. Identification of variables of a study.
3. Various types of hypotheses.
4. Formulation of hypothesis.
5. Distinction between hypothesis testing and exploratory research.
6. Identification of universe and unit of study with justifications.
7. Choice of appropriate research technique and method in the context of theoretical framework.
8. Data collection and analysis

Suggested Readings

1. Applebaum H.A. (1987) *Perspectives in Cultural Anthropology*. Albany: State University of New York.
2. Barnard A. (2000). *History and Theory in Anthropology*. Cambridge: Cambridge University.
3. McGee R.J. and Warms R.L. (1996) *Anthropological Theories: An Introductory History*.
4. Moore M. and Sanders T. (2006). *Anthropology in Theory: Issues in Epistemology*, Malden, MA: Blackwell Publishing.

C 9. Human Growth and Development

Theory

Credit- 4

Unit I: Concept of human growth, development, differentiation and maturation; Evolutionary perspective on human growth (including living primates and fossil human ancestors).

Unit II: Prenatal (conception till birth) and postnatal (birth till senescence) period of growth, pattern of normal growth curves, variation from normal growth (canalization, catch-up growth and catch-down growth), ethnic and gender differences in growth curves, secular trend.

Unit III: Bio-cultural factors (genetic, social, and ecological factors) influencing patterns of growth and variation, methods and techniques to study growth, significance/ applicability of growth studies

Nutritional epidemiology-concept of balanced diet, impact of malnutrition (over and under) with special reference to obesity, Kwashiorkor and Marasmus. Assessment of nutritional status.

Unit IV: Human physique and body composition – models and techniques; gender and ethnic differences; Somatotyping and human physique with reference to Sheldon, Parnell, Heath and Carter methods.

Practical (Any two)

Credit- 2

1. Growth status: Somatometry (stature, body weight, mid upper arm circumference etc), assessment of chronological age, percentile, z-score, height for age, weight for age, BMI for age

2. Obesity assessment: General (BMI, body fat %, Conicity index, body adiposity indices) and regional adiposity indices (WC, WHR, WHtR)
3. Estimation of body composition (fat percentage and muscle mass) with skinfold thickness and bioelectric impedance
4. Nutritional assessment through dietary pattern and anthropometric indices

Suggested Readings

1. Bogin B. (1999) Patterns of human growth. Cambridge University Press.
2. Frisancho R. (1993) Human Adaptation and Accommodation. University of Michigan Press.
3. Cameron N and Bogin B. (2012) Human Growth and Development. Second edition, Academic press Elsevier.
4. Harrison GA and Howard M. (1998). Human Adaptation. Oxford University Press.
5. Harrison GA, Tanner JM, Pibeam DR, Baker PT. (1988). Human Biology. Oxford University Press.
6. Jurmain R, Kilgore L, Trevathan W. Essentials of physical anthropology. Wadsworth publishing.
7. Kapoor AK and Kapoor S. (1995) Biology of Highlanders. Vinod Publisher and Distributor.
8. Kathleen K. (2008). Encyclopedia of Obesity. Sage.
9. Malina RM, Bouchard C, Oded B. (2004) Growth, Maturation, and Physical Activity. Human Kinetics.
10. McArdle WD, Katch FI, Katch VL. (2001) Exercise Physiology: Energy, Nutrition, and Human Performance.
11. Singh I, Kapoor AK, Kapoor S. (1989). Morpho-Physiological and demographic status of the Western Himalayan population. In Basu and Gupta (eds.). Human Biology of Asian Highland Populations in the global context.
12. Sinha R and Kapoor S. (2009). Obesity: A multidimensional approach to contemporary global issue. Dhanraj Publishers. Delhi.

C10. Research Methods

Theory

Credit- 4

Unit I: Field work tradition in Anthropology; Ethnographic approach, contribution of Malinowski, Boas and other pioneers; cultural relativism, ethnocentrism, etic and emic perspectives, comparative and historical methods, techniques of rapport establishment identification of representative categories of informants, maintenance of field diary and logbook.

Unit II: Research Design; Review of literature, conceptual framework, formulation of research problem, formulation of hypothesis, sampling, tools and techniques of data collection: Survey method, Observation, Questionnaire, Schedule, Interview, Case study, Life history and Genealogy; data analysis and report writing-Chapterization, preparing a text for submission and publication, concepts of preface, notes (end and footnotes), glossary, prologue and epilogue, appendix, bibliography(annotated) and references cited, review and index.

Unit III: Ethics and Politics of Research; Identify, define, and analyze ethical issues in the context of human subject research; Ethical importance of consent, privacy and confidentiality in research; Issues of academic fraud and plagiarism, conflicts of interest, authorship and publication.

Unit IV: Bio-Statistics; Guiding ideals and critical evaluation of major approaches in research methods, basic tenets of qualitative research and its relationship with quantitative research; Types of variables, presentation and summarization of data (tabulation and illustration). Descriptive statistics- Measures of Central Tendency, Measure of Variation, Skewness and Kurtosis, Variance and standard deviation, Normal and binomial distribution; Tests of Inference- Variance ratio test, Student's 't' tests, Chi-square test.

Practical

Credit- 2

1. Construction of Genealogy & Pedigree Analysis.
2. Observation: Direct, Indirect, Participant, Non-participant, Controlled
3. Questionnaire and Schedule, Interview- Unstructured, Structured, Key informant interview, Focussed Group Discussion, and Free listing, pile sorting
4. Case study and life history

Suggested Readings

Garrard E and Dawson A. What is the role of the research ethics committee? Paternalism, inducements, and harm in research ethics. *Journal of Medical Ethics* 2005; 31: 419-23.

Bernard H.R. *Research Methods in Anthropology, Qualitative and Quantitative Approaches*. Jaipur: Rawat Publications. 2006.

Madrigal L. *Statistics for Anthropology*. Cambridge: Cambridge University Press. 2012.

Zar JH. *Biostatistical Analysis*. Prentice Hall. 2010.

Michael A. *The Professional Stranger*. Emerald Publishing. 1996.

Bernard R. *Research Methods in Anthropology: Qualitative and Quantitative Approaches*. AltaMira Press. 2011.

Emerson RM, Fretz RI and Shaw L. *Writing Ethnographic Fieldnotes*. Chicago, University of Chicago Press. 1995.

Lawrence NW. *Social Research Methods, Qualitative and Quantitative Approaches*. Boston: Allyn and Bacon. 2000.

O'reilly K. *Ethnographic Methods*. London and New York: Routledge. 2005.

Patnaik S.M. *Culture, Identity and Development: An Account of Team Ethnography among the Bhil of Jhabua*. Jaipur: Rawat Publications. 2011.

Pelto PJ and Pelto GH. *Anthropological Research, The Structure of Inquiry*. Cambridge: Cambridge University Press. 1978.

Sarantakos S. *Social Research*. London: Macmillan Press. 1998.

C11. Prehistoric Archaeology of India

Theory

Credit- 4

Unit I: Pleistocene chronology of India; Palaeolithic cultures in India.

Palaeolithic cultures in India: Lower Palaeolithic cultures – evidences from Kashmir Valley and Peninsular India), Middle Palaeolithic culture in India, Upper Palaeolithic culture in India (characteristic features, major tool types, important sites, chronology with stratigraphic evidences). Some important sites of Odisha may be discussed on the above cultural periods.

Unit II: Mesolithic cultures in India.

Mesolithic cultures in India (characteristic features, major tool types, important regions and sites, chronology with stratigraphic evidences (some important sites of Odisha may be discussed on above cultural periods).

Unit III: Neolithic cultures in India.

Neolithic culture in India (characteristic features, major tool types, important regions and sites, chronology with stratigraphic evidences (some important sites of Odisha may be discussed on above cultural periods).

Unit IV: Rock art of India.

Prehistoric Art in India with special reference to Central India and Odisha.

Practical

Credit 2

1. Identification of tools:
 - (a) Hand axe varieties, chopper/chopping tools

- (b) Cleaver varieties
 - (c) Side scraper varieties
 - (d) Knives (e) Burins (f) End scrapers (g) Borer (h) Microlithic tools
 - (i) Bone tools
2. Identification of lithic technology.

Suggested Reading:

1. Agarwal, D. P. 1984, *Archaeology of India*. New Delhi: Select Book Services Syndicate.
2. Allchin, Briget. and Raymond Allchin, 1982. *The Rise of Civilization in India and Pakistan*. Cambridge: Cambridge University Press.
3. Allchin, B. and R. Allchin, 1997. *Origins of Civilization: The Prehistory and Early Archaeology of South Asia*. New Delhi. Viking by Penguin Books India (P) Ltd.
4. Bhattacharya, D. K. 1990, *An Introduction to Prehistoric Archaeology*. Delhi; Hindustan Publishing Corporation
5. Bhattacharya, D. K. 2001. *An Outline of Indian Prehistory*. Delhi: Palaka Prakashan.
6. Chakrabarti, D.K. 2001. *India: An Archaeological History: Palaeolithic Beginning to Early Historic Foundation*. New Delhi: Oxford University press.
7. Jain, V.K. 2009, *Prehistory and Protohistory of India*. New Delhi: D.K. Printworld (P) Ltd.
8. Paddayya, K. (Ed.), 2002, *Recent Studies in Indian Archaeology*. New Delhi.
9. Pappu R. S. 2001, *Aheulian Culture in Peninsular India-- An Ecological Perspective*, New Delhi: D.K. Printworld (P) Ltd.
10. Rammi Reddy, V. 1987, *Elements of Prehistory*. New Delhi: Mittal Publications.
11. Rammi Reddy, V. 1989, *Palaeolithic and Mesolithic Cultures*. New Delhi: Mittal Publications.
12. Rammi Reddy, V. 1991, *Neolithic and Post-Neolithic Cultures*. New Delhi: Mittal Publications.
13. Sankalia, H.D. 1974. *Prehistory and Protohistory of India and Pakistan*. Pune: Deccan College.
14. Sankalia (1982) *Stone Tool Type and Technology*. Delhi, B.R. Publication.
15. Settar, S. and R. Korisettar (Ed), 2001, *Indian Archaeology in Retrospect*, Vol.1: PREHISTORY Archaeology of South Asia. New Delhi: Manohar in association with Indian Council of Historical Research.

C12. Anthropology in Practice

Theory

Credit- 4

Unit I: Academic Anthropology; Academics and Practitioners: Differences, Structure, Activities, Controversies and Issues: Applied Anthropology, Action Anthropology and Development Anthropology.

Unit II: Role of Anthropology in Development; Anthropology and Public Policy, Need Assessment and Community Development, Anthropology of NGO's, Business Anthropology, Environment and Community Health, Social and economic sustainability, Cultural resource management.

Unit III: Future Dynamics in Anthropology; Trends in Anthropology: Anthropology of Tourism, Anthropology in Census; Designing And Fashion, Visual Anthropology.

Unit IV: Biosocial anthropology in practice; Bio-social elements of human development at national and international level, application of conceptual framework of Forensic Anthropology in judicial settings both criminal and civil, Population Dynamics and relationship between population growth and various aspects of culture such as means of subsistence, kinship, social complexity, social stratification and political organization, Bio-social counselling of an individual or population.

Practical

Credit- 2

1. The students will visit a NGO or corporate office or census office in Odisha and its

- adjoining areas and write principal observations on the same.
2. Write a project on constitutional provisions or evaluation of any development project/report.
3. Draw a scene of crime and identify the various evidences in a portrayed crime scene.
4. Write a project on Religious Tourism / Tribal Tourism / Health Tourism / Fashion / Human Rights / Ecotourism.
5. Write a project on the demographic profile from secondary data.
6. Collect data on bio-social problem and design counselling and give the analysis and interpretation.

Suggested Readings

1. Arya A and Kapoor AK. (2012). Gender and Health Management in Afro-Indians. Global Vision Publishing House, New Delhi.
2. Kertzer DI and Fricke T. (1997). Anthropological Demography. University of Chicago Press.
3. Basu, A. and P. Aaby (1998). The Methods and the Uses of Anthropological Demography. 329 pp. Oxford, Clarendon Press
4. Carter A. (1998). Cultural Models and Demographic Behavior. In The Methods and the Uses of Anthropological Demography edited by Basu A and Aaby P. Oxford: Clarendon Press. pp 246-268.
5. Census of India (2001, 2011) and National Family Health Survey (2006,2010).
6. Ervic, Alexander M., (2000). Applied Anthropology: Tools and Perspectives for Contemporary Practise, Boston, MA: Allyn and Bacon.
7. Erwin A. (2004). Applied Anthropology Tools and Practice, Allyn and Bacon.
8. Gupta S and Kapoor AK. (2009). Human Rights among Indian Populations: Knowledge, Awareness and Practice. Gyan Publishing House, New Delhi.
9. Willen SS. (2012). Anthropology and Human Rights: Theoretical Reconsiderations and Phenomenological Explorations. Journal of Human Rights. 11:150–159.
10. Goodale M. (2009). Human Rights: An Anthropological Reader. Wiley Blackwell.
11. Gupta S and Kapoor AK. (2007). Human Rights, Development and Tribe. In : Genes, Environment and Health – Anthropological Perspectives. K. Sharma, R.K. Pathak, S. Mehra and Talwar I (eds.). Serials Publications, New Delhi.
12. Margaret AG. (2003). Applied Anthropology: A Career-Oriented Approach, Boston, MA: Allyn and Bacon.
13. Halbar BG and Khan CGH. (1991). Relevance of Anthropology – The Indian Scenario. Rawat Publications, Jaipur.
14. Kapoor AK (1998). Role of NGO's in Human Development : A Domain of Anthropology. J Ind Anthropol Soc; 33:283-300.
15. Kapoor AK and Singh D. (1997). Rural Development through NGO's. Rawat Publications, Jaipur.
16. Klepinger LL (2006). Fundamentals of Forensic Anthropology. Wiley-Liss Publications
17. Kumar RK and Kapoor AK. (2009). Management of a Primitive Tribe: Role of Development Dynamics. Academic Excellence, Delhi.
18. Mehrotra N and Patnaik SM. (2008). Culture versus Coercion: The Other Side of Nirmal Gram Yojna, Economic and Political weekly. pp 25-27.
19. Mishra RC (2005). Human Rights in a Developing Society, Mittal Publications, Delhi.
20. Noaln RW. (2002). Anthropology in Practice: Building a Career outside the Academy. Publishing Lynne Reinner.
21. Patnaik SM (1996). Displacement, Rehabilitation & Social Change. Inter India Publications, New Delhi.
22. Patnaik SM (2007). Anthropology of Tourism: Insights from Nagaland. The Eastern Anthropologist. 60(3&4):455-470
23. Srivastav OS (1996). Demographic and Population Studies. Vikas Publishing House,

India

24. Vidyarthi LP and BN Sahay (2001). Applied Anthropology and Development in India, National Publishing House, New Delhi.

25. Vidyarthi LP. (1990). Applied Anthropology in India – Principles, Problems and Case Studies. Kitab Mahal, U.P.

26. Vidyarthi V (1981). Tribal Development and its Administration. Concept Publishing Company, New Delhi.

C13. Forensic Anthropology

Theory

Credit- 4

Unit-I: Introduction to Forensic Anthropology: Definition, Brief History, Scope, Applications and Integration of Forensic Anthropology.

Unit-II: Basic Human Skeletal Biology, Identification of Human and Non-Human Skeletal Remains, Ancestry, age, sex and stature estimation from bones, Discovery and Techniques for recovering skeletal Human Remains.

Unit-III: Personal Identification, Complete and Partial Identification, Methods of Identification in Living Persons: Somatometry, Somatoscopy, Occupational Marks, Scars, Bite Marks, Tattoo Marks, Fingerprints, Footprints, Lip Prints, Nails, Handwriting, Deformities and Others.

Unit-IV: Serology: Identification and Individualization of bloodstain, urine, semen and saliva. Patterns of Bloodstains; Individualization: Forensic Odontology-Tooth Structure and Growth, Bite Marks, Facial Reconstruction, DNA Profiling.

Practical

Credit- 2

1. Study of Human Long Bones. Estimation of age, sex and stature from bones.
2. Somatometric and Somatoscopic Observation on living persons.
3. Identification of bloodstain, urine, semen and saliva.
4. Examination of Fingerprints and Handwriting.

Suggested Readings:

1. Bass W.M. (1971). Human Osteology: A Laboratory and Field manual of the Human Skeleton. Columbia: Special Publications Missouri Archaeological Society.
2. Black S. and Ferguson E. (2011). *Forensic Anthropology 2000 to 2010*. CRC Press, London.
3. Byers, S. N. (2008). Forensic Anthropology. Boston: Pearson Education LTD.
4. Gunn A. (2009) *Essential Forensic Biology* (2nd ed). Chichester: Wiley-Blackwell
5. Modi, R. B. J. P. (2013). *A Textbook of Medical Jurisprudence and Toxicology*. Elsevier.
6. Reddy V. R. (1985). Dental Anthropology, Inter-India Publication, New Delhi.
7. Spencer, C. (2004). Genetic Testimony: A Guide to Forensic DNA Profiling, Pearson, New Delhi.
8. Vats Y., Dhall J.K. and Kapoor A.K. (2011). Gender Variation in Morphological Patterns of Lip Prints among some North Indian Population. *J. Forensic Odontology*, 4: 11-15.
9. Wilkinson, C. (2004). *Forensic facial reconstruction*. Cambridge University Press.

C 14. Anthropology of India

Theory

Credit- 4

Unit I: Origin, history and development of Anthropology in India, approaches to study Indian society and culture- traditional and contemporary Racial and linguistic elements in Indian population Understanding the diversity of Indian social structure - concept of Varna, Jati, Caste, Ashram or purusharatha, gender hierarchies - their economic and cultural impact, origin and evolution of social structures and their underlying philosophies; Contribution of contemporary biological, social and archaeological anthropologists in India.

Unit II: Aspects of Indian Village –social organisation, agriculture and impact of market economy on villages; Tribal situation in India- biogenetic variability, linguistic and socio-economic characteristics; Problems of tribal peoples, land-alienation, indebtedness, lack of educational facilities, shifting-cultivation, migration, forests and tribal unemployment, health and nutrition, tribal movement and quest for identity

Unit-III: Developmental projects- tribal displacements and rehabilitation problem; Impact of culture-contact, urbanization and industrialization on tribal and rural Population ; Basic concepts -Great tradition and little tradition, sacred complex, Universalization and parochialization, Sanskritization and Westernization, Dominant caste, Tribe-caste; continuum, Nature-Man-Spirit complex, pseudotribalism.

Unit IV: Problems of exploitation and deprivation of scheduled caste/ tribe and Other Backward Classes. Constitutional Provisions for the Scheduled caste and scheduled tribes, Evaluation and Development of Indian Population; Human Rights, Protection and enforcement of human rights, Human rights of special category and marginal groups, Emerging trends of human rights with respect to terrorism, globalization and environment.

Practical

Credit- 2

1. Identify various traits/variables which can be used in racial classification and comment on its relevance.
2. Review a book/edited volume on Indian social structure such as caste, religion, tribe or rural population and give its salient features.
3. Explore the biological diversity of any population group considering a minimum of five genetic traits.
4. Highlight the contributions of any two contemporary Indian anthropologists.

Suggested Reading

1. Nicholas D. (2001). Castes of Mind: Colonialism and the Making of Modern India. Princeton University Press.
2. Bernard CS. (2000). India: The Social Anthropology of Civilization. Delhi: Oxford University Press.
3. Bhasin MK, Watter H and Danker-Hopfe H. (1994). People of India – An Investigation of Biological variability in Ecological, Ethno-economic and Linguistic Groups. Kamla Raj Enterprises, Delhi
4. Lopez DS. (1995). Religions of India in Practice. Princeton University Press
5. Gupta D. Social Stratification. Delhi: Oxford University Press.
6. Karve I. (1961). Hindu Society: An Interpretation. Poona : Deccan College
7. Guha BS. (1931). The racial attributes of people of India. In: Census of India, 1931, vol I, Part III (BPO, Simla)
8. Trautmann TR (2011). India: Brief history of Civilization. Oxford University Press : Delhi
9. Vidyarthi LP and Rai BK. (1976). The tribal culture of India. Concept Publishing Co, Delhi.
10. Haddon AC. (1929). Races of man. Cambridge University, London.
11. Kapoor A.K. (1992). Genetic Diversity among Himalayan Human Populations. M/S Vinod Publishers, Jammu
12. Majumdar DN. (1901). Races and Culture of India. Asia Publishing House, Bombay

13. Dube SC. (1992). Indian Society. National Book Trust, India : New Delhi.
14. Dumont L. (1980). Homo Hierachicus. University of Chicagon Press.
15. Guha B.S. (1931). The racial attributes of people of India. In : Census of India, 1931, vol I, Part III (BPO, Simla)
16. Malhotra K.C. (1978). Morphological Composition of people of India. J. Human Evolution.

ELECTIVE COURSES (DSE)

Credits: Any four papers = Theory + Practical = (4+2)*4 = 24
(Including one Project Report)

DSE1. Physiological Anthropology

Theory

Credit- 4

Unit I: Fundamentals of work physiology- homeostasis; metabolism and energy and systems; exercise, respiratory system and haemodynamics (blood pressure, pulse rate, heart rate and oxygen- transporting system, blood flow ,Hb, heamatocrit etc).

Unit II: Acute physiological adjustments during transition from resting homeostasis to sub-maximal and maximal exercise; chronic physiological adaptations to exercise training; age, sex and population variation in the physiological characteristics.

Unit III: Cardio-vascular and respiratory endurance, physical working capacity and physical fitness- evaluation of response and assessment; relationship of body measurements with cardio-vascular and respiratory functions, aerobic and anaerobic exercise training, health related fitness in gender and ethnic group; Principles of effective physical conditioning techniques.

Unit IV: Impact of smoking, alcohol, drug, pollution and occupation on cardio-respiratory functions; physical performance and environmental stress, chronic diseases, malnutrition, lifestyle disease Factors affecting physical performance and capacity, relation between physique, body composition, nutrition and performance; Ageing and health related aspects of exercise.

Practical (Any two)

Credit- 2

1. Cardiovascular function (Blood pressure, heart rate, pulse rate)
2. Respiratory function (Tidal volume, vital capacity, forced vital capacity, minute ventilation etc.)
3. Haemoglobin estimation
4. Step-test
5. Treadmill test

Suggested Readings:

1. McArdle WD, Katch FI and Katch VL. (2010). Exercise Physiology: Nutrition, Energy, and Human Performance. Lippincott Williams & Wilkins.
2. Powers SK and Howley ET. (2007). Exercise Physiology: Theory and Application to Fitness and Performance. McGraw-Hill.
3. Sherwood L. (2008). Human Physiology: From Cells to Systems. Brooks Cole.
4. Case RM. (1985). Variations in Human Physiology. Manchester University Press.
5. Vander AJ, Sherman JH and Dorothys L. (1978). Human Physiology: The Mechanisms of Body Functions. Mc Graw-Hill Education.
6. Nageswari KS and Sharma S. (2006). Practical workbook of Human Physiology. Jaypee Brothers, Medical Publisher.
7. Wildmaier EP, Raff H, Strang KT. (2014). Vander's Human Physiology: The Mechanisms of Body. Mc Graw Hill Education.
8. Hale T. (2003). Exercise Physiology. England :John Wiley & Sons Inc.

DSE 2. Sports and Nutritional Anthropology

Theory

Credit- 4

Unit I: Anthropology of sports- Physical fitness, component of physical fitness.

Unit II: Physical conditioning, training-techniques and physiological effects, environmental effects on physical performance: effect of heat stress, cold stress and high altitude on physiological response and performance.

Unit III: Body composition and Athletes, sports selection and monitoring.

Unit IV: Human biological variability, health and nutrition; doping and performance; cultural constructions and physiologic implications of food across time, space and society; an integrated bio-behavioural perspective towards food preference.

Practical (Any two)

Credit-2

1. Assessment of daily nutrient intake (Weighing method)
2. Evaluate association of nutritional status and physical performance
3. Demonstrate cultural perspective for preference of specific food of a population

Suggested Readings

1. Stinson S. (1992). Nutritional Adaptation. Annual Review of Anthropology 21:143- 170.
2. Brughart R. (1990). The Cultural Context of Diet, Disease and the Body. In Diet and Disease in Traditional and Developing Societies. GA Harrison and JC Waterlow, eds. P. 307-325. Cambridge University Press. Cambridge.
3. Rozin P. (1987). Psychobiological Perspectives on Food Preferences. In Food and Evolution: Toward a Theory of Food Habits. M. Harris and EB Ross (eds.). Temple University Press. Philadelphia, pp. 181-205.
4. Quandt SA. (1987). Methods for Determining Dietary Intake. In Nutritional Anthropology. FE Johnston, ed. Pp. 67-84. Liss. NY.
5. Ulijasek SJ and Strickland SS. (1993). Introduction. In Nutritional Anthropology: Prospects and Perspectives. Pp. 1-5. Smith Gordon. London.

DSE 3. Human Genetics

Theory

Credit- 4

Unit I: Structure, Function and Inheritance of the human genome- gene, DNA structure and replication, DNA repair and recombination, gene expression, coding and non-coding region.

Unit II: Expression of genetic information: from Transcription to Translation – the relationship between genes and protein, transcriptions; transcription and RNA processing, encoding genetic information, decoding the codons: the role of transfer RNAs.

Unit III: Methods of Genetic Study in Human: Pedigree analysis and expressivity; Chromosomal Basis of Genetic Disorders (Karyotypes and identification of chromosome variation; Nucleic Acid Hybridization Assays, cytogenetic mapping), Genetic mapping (Microsatellite and other DNA polymorphisms), LOD score; sequencing strategies (PCR based Sanger sequencing to Exome sequencing), concept of non-

mendelian inheritance and complex diseases.

Unit IV: Genomic Diversity & Human Evolution Genomic Variation: Genomic Polymorphisms (SNPs, VNTR, CNVs, etc); haplotypes and haplogroups; genotype-phenotype correlations, epigenetics Peopling of the Indian Subcontinent: Evidence from mtDNA and Y-chromosome; evolutionary genetics; Molecular evolution; DNA sequence variation and human origins.

Practical (Any two)

Credit-2

1. Blood Collection, transportation and storage in field
2. DNA Extraction from whole blood
3. DNA Quantification, Aliquoting and sample preparation
4. PCR and electrophoresis
5. Gel Documentation

Suggested Readings:

1. Strachan T and Read AP. (2004). Human Molecular Genetics. Garland Science
2. Brown TA. (2007). Genomes. Garland Science.
3. Griffiths AJF. (2002). Modern Genetic Analysis: Integrating Genes and Genomes. WH Freeman Press.
4. Griffiths AJF, Wessler SR, Carroll SB, Doebley J. (2011). An Introduction to Genetic Analysis. Macmillan Higher Education.
5. Cavalli-sforza LL, Menozzi P, Piazza A (1994). History and Geography of Human Genes. Princeton University.
6. Cummings Michael R. (2009). Human Genetics. Cengage Learning India Pvt. Ltd, Delhi.
7. Cummings MR (2011). Human Heredity: Principles and Issues. Brooks/Cole, Cengage Learning
8. Giblett, ER. (1969). Genetic Markers in Human Blood. Blackwell Scietific, Oxford.
9. Jobling M, Hurls M and Tyler-Smith C. (2004). Human Evolutionary Genetics: Origins, Peoples & Disease. New York: Garland Science.
10. Lewis R. (2009). Human Genetics: Concepts and Application. The McGraw–Hill Companies, Inc.
11. Patch C. (2005). Applied Genetics in Healthcare. Taylor & Francis Group
12. Snustad .D.P. and Simmons M.J. (2006). Principles of Genetics, Fourth Edition, John Wiley & Sons USA
13. 14. Verma, P.S. and V.K. Aggarwal (1974). Cell Biology, Genetic, Molecular Biology, Evolution and Ecology. S.Chand and Company Pvt. Ltd., New Delhi.
14. Vogel F. and Motulsky A.G. (1996). Human Genetics. Springer, 3rd revised edition.

DSE 4. Neuro Anthropology

Theory

Credit- 4

Unit 1: Enculturation and Behaviour; Neuroanthropology Holism, The Basics of Neuroanthropology; The Nature of Variation; Overview of Brain, Neural Systems & Their Interconnections; Niche construction Theory; Evolution and the Brain, Social Cognitive Development, Culture and Socialization.

Unit 2: Balancing Between Cultures; Human Capacities, Skills and Variation; Male embodiment in subsistence societies; Overcoming Mind/Body Dualism;

Unit 3: War and Dislocation: Neuroanthropological model of trauma; Autism,theory of mind and religious development; Cultural consonance, Consciousness and Depression. Neuroconstructivism and Embodied Learning; Human Development: A Biocultural Process; Enculturation and Memory; The Neuroanthropology of Stress; The Neuroanthropology of PTSD (Post traumatic stress disorder); Psychiatry in Neuroanthropological Perspective. Addiction and Neuroanthropology

Practical (Any two)

Credit-2

1. Case Studies on Human behavior, Capacities, Skills, and Variation (or, a case study report on understanding addiction using neuroanthropology)
2. Prepare a report on socio-cultural and biological perspective of human behaviour and inter-individual variation.
3. Somatometric measurements of human skull and relation with neural activity.
4. Class blog participation : Once every week, each student will be responsible for finding one source in the popular/lay press that's related to the topic for that week (e.g., from newspapers, news magazines, science magazines), and introducing a brief online discussion about what it says and why it's relevant
5. A report on Disorder, and its case study on any disorder and a report in neuroanthropological perspective.

Suggested Reading:

Downey, (2008) Balancing between Cultures, in The Encultured Brain. J. of Neuroanthropology

Downey, (2010) 'Practice without Theory': A Neuroanthropological Perspective on Embodied Learning. JRAI

Miller & Kinsbourne, (2011) Culture and Neuroscience in Development Psychology: Contributions and Challenges. Child Development perspectives. <http://onlinelibrary.wiley.com/doi/10.1111/j.1750-8606.2011.00188.x/abstract>

Worthman, (2010) The Ecology of Human Development: Evolving Models for Cultural Psychology [Required for 500 level, optional for 400 level] <http://jcc.sagepub.com/content/41/4/546.abstract>

Davidson & McEwen, (2012) Social Influences in Neuroplasticity: Stress and Interventions to Promote Well-Being. J. of Nature Neuroscience. <http://www.nature.com/neuro/journal/v15/n5/full/nn.3093.html>

Bonanno et al., (2011) Weighing the Costs of Disaster: Consequences, Risks, and Resilience in Individuals, Families, and Communities. Association for psychological science. Luhrmann, (2012) Beyond the Brain <http://www.wilsonquarterly.com/article.cfm?AID=2196>

Kirmayer & Gold, (2012). Re-Socializing Psychiatry: Critical Neuroscience and the Limits of Reductionism, in Critical Neuroscience. Blackwell Reference online.

Lende and Downey, (2012) The Encultured Brain: An introduction to Neuroanthropology. Cambridge: Massachusetts Institute of Technology Press.

Goldin & Merrick, (2012) Neuroscience or Neurobabble. http://www.stats.org/stories/2012/Neuroscience_Or_Neurobabble_jul16_12.html

Margulies, (2011) The Salmon of Doubt, in Critical Neuroscience.

Lende, (2012). Neuroanthropology, Applied Research, and Developing Interventions. <http://blogs.plos.org/neuroanthropology/2012/05/10/neuroanthropology-applied-research-and->

Buchowski et al.,(2011) Aerobic Exercise Training Reduces Cannabis Craving and Use in Non-Treatment Seeking Cannabis-Dependent Adults
<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0017465>
<http://www.mc.vanderbilt.edu/news/releases.php?release=2044>

Xue et al.,(2012) A Memory Retrieval-Extinction Procedure to Prevent Drug Craving and Relapse. <http://www.sciencemag.org/content/336/6078/241.full>

DSE 5. Forensic Dermatoglyphics

Theory

Credit- 4

Unit-I: Introduction to Dermatoglyphics: History and Development, scope and Applications.

Unit-II: Formation of fingerprint ridges, pattern types and patterns area. Classification of Fingerprints- Henry Classification, Vucetich System, Single-Digit Classification.

Unit-III: Types of Fingerprints: Plastic, Visible and Latent Prints. Conventional and Modern methods for development of latent fingerprints- Silver Nitrate, Ninhydrin, Iodine Fuming, Powder Methods, Metal Deposition Method, Small Particle Reagent and Laser Techniques.

Unit-IV: Basis of Fingerprint Comparison: Class Characteristics and Individual Characteristics, Determination of Identity. Other Dermatoglyphic Patterns: Palm Print, Sole Prints and Toe Prints. Recent advances: Fingerprint and Palmprint Recognition, Automated Fingerprint Identification System.

Practical (Any two)

Credit-2

1. Recording and Study of Finger and Palm Prints
2. Determination of palmar main line formula, Ridge count and indices
3. Comparison of Fingerprints and Palmprints on the basis of class and individual ridge Characteristics
4. Development of latent fingerprints using different chemical and powder methods.

Suggested Readings:

Cowger, J. F. (1992). *Friction ridge skin: comparison and identification of fingerprints* (Vol. 8) CRC Press.

Cummins, H., & Midlo, C. (1961). *Finger prints, palms and soles: An introduction to dermatoglyphics* (Vol. 319). New York: Dover Publications.

Jain, A. K., Flynn, P., & Ross, A. A. (2007). *Handbook of biometrics*. Springer Science & Business Media.

Lee, H. C., Ramotowski, R., & Gaensslen, R. E. (Eds.). (2001). *Advances in fingerprint technology*. CRC press.

Berry, J., & Stoney, D. A. (2001). The history and development of fingerprinting. *Advances in fingerprint Technology*, 2, 13-52.

Mehta, M. K. (1980). Identification of thumb impression and cross examination of fingerprints. N. M. Tripathi Publication, Bombay.

DSE 6. Paleoanthropology

Theory

Credit- 4

Unit I: Dating methods, geological time scale, taphonomy and interpretation of the paleontological and archaeological records, taxonomic and chronological problems of fossils records.

Evolutionary biology: Origins and evolution of stone age technology (Human origins: Development, distribution and fossilized evidence of Australopithecines, Paranthropus (Zinjanthropus), Homo habilis, Homo erectus, Archaic H. sapiens, prehistoric hunter-gatherers, modern pastoral communities, emergence of prehistoric people in Africa).

Unit II: Primate and Non-Primate Models for Early Hominid Behaviour; hominization process- Evolution of hominid-human bipedalism; Primate speciation and extinctions: a geological perspective, adaptive primate radiation, differential rate of somatic evolution.

Unit III: Palaeodemography- reconstruction of population patterns from skeletal analysis, determination of demographic variables in prehistoric populations and post-neolithic population growth, theory and techniques in paleodemography, methodological issues for reconstructing demographic structure, demographic models of mortality and their interpretation.

Unit IV. Palaeopathology- bioarchaeological approach of disease; effects of agriculture, urbanization and slavery on health and disease; colonization and disease with special emphasis on the New World; dispersion of modern humans - molecular and morphological patterns of relationship.

Practical

Credit-2

1. Comparative primate osteology
2. Description and identification of the disarticulated skeleton of non-human primates
3. Identification and description of fossil casts
4. Excursion to a site for seven days for collection of fossil material and its report

Suggested readings

1. Napier JR and Napier PH. (1985). The Natural History of the Primates. Cambridge, MA: The MIT Press
2. Boyd R and Silk JB. (2009). How Humans Evolved. London: WW Norton.
3. Tattersall I. (2009). The Fossil Trail: How We Know What We Think We Know about Human Evolution. New York: Oxford University Press.
4. Waldron T. (2008): Palaeopathology. Cambridge University Press.
5. Cela-conde CJ and Frisancho J. (2007). Human Evolution: Trails from the past. Ayala Oxford University Press.
6. Barnes E. Diseases and Human Evolution. (2005). University of New Mexico Press.
7. Pinhasi R and Mays S (2008). Advances in Human Palaeopathology. Chichester: JohnWiley & Sons, Inc. (PM).
8. Hoppa RD and Vaupel JW. (2002). Paleodemography: Age Distributions from Skeletal Samples. Cambridge University Press.
9. Lansen CS, Matter RM and Gebo DL. (1998). Human Origin: The fossil Record. Waveland Press.
10. Cameron DW and Colin P. Groves CP. (2004). Bone, Stones and Molecules: "Out of Africa" and Human Origins. Elsevier Inc.
11. Stringer C. (2011). The Origin of Our Species. London: Allen Lane.
12. Conroy GC. (2005). Reconstructing Human Origins. WW Norton and Company.

DSE 7. Anthropology of Religion, Politics and Economy

Theory

Credit- 4

Unit I: Anthropological approaches to understand religion- magic, animism, animatism, totemism, naturism; witchcraft and sorcery; Religious specialists: shaman, priests, mystics; Overview of Anthropological Theories of Religion; Religion as the sacrality of ecological adaptation and socialness

Unit II: Economic institutions: principles of production, distribution, and consumption in simple and complex societies; critical examination of relationship between economy and society through neo-classical, substantivist, and neo-marxist approaches, various forms of exchange: barter, trade and market; Forms of currencies; reciprocities: generalized, balanced and negative.

Unit III: Political institutions: concepts of power and authority; types of authority; state and stateless societies; law and justice in simple and complex societies; the prospects for democracy and tolerance among and within the world's diverse civilizations; the meaning and sources of identity in complex contemporary societies; the origins of modern politics, its institutions, and cultures, both Western and non-Western.

Unit IV: Interrelationship between religion, politics and economy; religious conversion and movements, emergence of new religious sects in the global order.

Practical

Credit-2

1. Case study of any of the social institute (religion, economic, political) with respect to culture perspective

Suggested Readings:

2. Durkheim E. (1986). *The elementary forms of the religious life, a study in religious sociology*. New York: Macmillan.
3. Benedict A. (2006). *Imagined Communities: Reflections on the Origin and Spread of Nationalism*. Verso
4. Gledhill J. (2000). *Power and Its Disguises: Anthropological Perspectives on Politics*. 2nd ed. London: Pluto Press.
5. Ellis F. (2000). A framework for livelihood analysis. In *Rural Livelihoods and Diversity in Developing Countries*. Oxford: Oxford University Press.
6. Henrich J, Boyd R, Bowles S, Camerer C, Fehr E, Gintis H, McElreath R, Alvard M et al. (2005). 'Economic Man' in cross-cultural perspective: Behavioral experiments in 15 small-scale societies. *Behavior and Brain Science*. 28(6):795-815;
7. Henrich J. (2002). Decision-making, cultural transmission, and adaptation in economic anthropology. In: J. Ensminger (Ed.), *Theory in Economic Anthropology* (pp. 251-295). Walnut Creek, CA: Altamira Press.
8. Lambek. M. (2008) *A Reader in the Anthropology of Religion*.
9. Eller JD. (2007). *Introducing Anthropology of Religion*. New York: Routledge.
10. Glazier SD. (1997). *Anthropology of Religion: A Handbook*. Westport, CT: Greenwood Press.
11. Frick GD and Langer R. (2010). *Transfer and Spaces*. Harrassowitz (Germany).
12. Evans-Pritchard EE. (1937). *Witchcraft, Oracles and Magic among the Azande*, Oxford: Clarendon Press.
13. Frazer JG. (1978). *The Illustrated Golden Bough*, London: Macmillan.
14. Barbara M. (2011). *Cultural Anthropology*. New Jersey: Pearson Education.
15. Ember CR. (2011). *Anthropology*. New Delhi: Dorling Kindersley.
16. Herskovits MJ. (1952). *Economic Anthropology: A Study in Comparative Economics*. New York: Alfred A Knopf Inc.

17. Malinowski B. (1922) Argonauts of the Western Pacific. London: Routledge.
18. Polyani K. et al (1957), Trade and Market in the Early Empires. Chicago: Henry Regnery Company.
19. Balandier G. (1972). Political Anthropology. Middlesex: Penguin.

DSE 8. Tribal cultures of India

Theory

Credit- 4

Unit I: Concept of tribes and its problematic nature, General and specific characteristics of tribes, Classification and distribution of tribes based on their economy, occupation and religion, Racial elements among the tribes, Scheduled and non-scheduled categories of tribes, Particularly Vulnerable Tribal Groups (PVTGs).

Unit II: Tribe- caste continuum, Gender and Tribe, Distribution of tribes in India.

Unit III: Tribes: Nomenclature- emic and etic differences; Tribal movements, Problems of tribal development.

Unit IV: Forest policies and tribes, Migration and occupational shift, Tribal arts and aesthetics Displacement, rehabilitation and social change Globalization among Indian tribes.

Practical

Credit-2

1. Distribution of Indian Tribes: PVTGs, ST
2. Location of different tribes on the map of India
3. Write an annotated bibliography on any one tribe
4. Write the social structure of any one tribe of India

Suggested Readings:

1. Behera, D.K and Georg pfeffer. Contemporary Society Tribal Studies, Volume I to VII. New Delhi: Concept Publishing Company
2. Georg Pfeffer. Hunters, Tribes and Peasant: Cultural Crisis and Comparison. Bhubaneswar: Niswas.
3. Vidarthy, L.P. and Rai. Applied Anthropology in India.
4. Vidarrthy.L.P. and B.N. Sahay . Applied Anthropology and Development in India. New Delhi: National Publishing House

DSE 9. Human Population Genetics

Theory

Credit- 4

Unit-I Hardy-Weinberg principle; Genotypic and allelic frequencies, assumptions of Hardy-Weinberg equilibrium, its applications and exceptions. Mechanism for dynamics in Gene Frequency mutation, selection (pattern and mechanism), Genetic drift (bottle neck and founder effect), Gene flow/migration, inbreeding (inbreeding co-efficient and its genetic consequences).

Unit II. Ecological Genetics and Polymorphism; phenotypic & genotypic polymorphisms, transient polymorphism, balanced polymorphisms, models explaining the maintenance of genetic polymorphism (Relationship between sickle cell and malaria, X-linked polymorphism, selection due to infectious diseases and its association with blood groups and other).

Unit III: Population structure and admixture in human populations random & non-random mating (positive and negative assortative mating), heritability, linkage disequilibrium, genetic markers utility of genetic markers in forensic, population and disease association studies.

Unit IV: Human evolutionary genetics From Mendel to molecules: A brief history of evolutionary genetics, Epistasis and the conversion of genetic variances, Human-Ape comparisons.

Practical (Any Two)

Credit-2

1. Blood group typing-A1, A2, B, O, MN and Rh (D) blood groups
2. Color Blindness
3. Glucose-6-phosphate dehydrogenase deficiency(G6PD)
4. PTC tasting ability
5. Biochemical markers-DNA isolation and polymerase chain reaction (PCR)

Suggested Readings

1. Brooker R.J. (2012). Genetics: analysis & principles. The McGraw-Hill Companies, Inc 4th ed.
2. Cavalli-Sforza, L.L. and Bodmer, W.F (1971). The Genetics of Human Population. San Francisco: Freeman
3. Cooper DN and Kehrler-Sawatzki H. (2008). Handbook of Human Molecular Evolution. John Wiley & Sons, volume-2.
4. Crawford MH (2007). *Anthropological Genetics Theory, Methods and Applications*. Cambridge University Press
5. Cummings M.R. (2011). Human Heredity: Principles and Issues. Ninth Edition. Brooks/Cole, Cengage Learning
6. Jobling, M.A. Hurler M. and Tyler-Smith C. (2004). *Human Evolutionary Genetics: Origins, Peoples & Disease*. GS. NY
7. Lewis R. (2009). *Human Genetics: Concepts and Applications* 9th Edition. The McGraw-Hill Companies, Inc.
8. Patch C. (2005). *Applied Genetics in Healthcare*. Taylor & Francis Group
9. Relethford J.H. (2012). *Human Population Genetics*. Wiley-Blackwell, USA
10. Snustad .D.P. and Simmons M.J. (2006). *Principles of Genetics*, Fourth Edition, John Wiley & Sons USA, Hoboken NJ
11. Strachan T, Read A.P. (2004). *Human Molecular Genetics*. Garland Science/Taylor & Francis Group.
12. Vogel F. and Motulsky A.G. (1996). *Human Genetics*. Springer, 3rd revised edition.

DSE 10. Visual Anthropology

Theory

Credit- 4

UNIT 1: Introduction to Visual Anthropology. Visual Culture. Photographic and Digital Media: Still, Interactive and Moving. Theory and Representation. Anthropology and Images: Ethnophotography and ethnographic films and mass media.

UNIT 2: Early Ethnographic Photography: Contexts and Trends. Anthropology of Art and Aesthetics; Ethnographic Photography: Conventions and Methodologies.

UNIT 3: Ethnographic Films: Theoretical issues concerning ethnographic film, ethical dimensions of ethnographic film, Interdependency of technology and culture.

UNIT 4: Cinema Studies with emphasis on key feature, documentary and ethnographic films with a focal theme - the examination of the 'language of film'.

This paper deals with analysis of visuals such as photographs and films pertaining to cultural practices dealing with institutions of religion, economy and politics.

Theory and Representation: Anthropology and Images: Ethnophotography and ethnographic films and mass media. Theories of representation, modern media and political advocacy.

Anthropology of Art and Aesthetics: Critical reflection on the relation of images, objects and persons. Objects and images from other societies valued as 'art'.

Ethnographic Film and Cinema Studies: This unit consists of screenings followed by seminars. The emphasis will be on key feature, documentary and ethnographic films with a focal theme- the examination of the 'language of film'.

Practical Implications: Explore traditional and experimental means of using visual and audiovisual media to research, represent and produce anthropological knowledge. Critical engagement with policy and the use of audio-visual and internet based media in advocacy and activism. The students are required to do the following exercises:

1. Basic principles of producing ethnographic films: text and its focus, camera angles, lighting and decision making behind the camera.
2. Analyze the visual data from classical ethnographies signifying how 'otherness' is constituted.
3. A gendered analysis of visuals produced during colonial and postcolonial times.
4. Hypertext and multimedia as analytic end points.
5. Collection, reporting and analysis of photo-ethnographic data.
6. Digital mirror: computer assisted exercises leading to production of ethnographic text.

Suggested Readings

1. Marcus Banks and Howard Morphy, 1998, Rethinking Visual Anthropology
2. David MacDougall Transcultural Cinema, (Princeton, 1999)
3. Ruby, Jay. 1996. "Visual Anthropology." In Encyclopedia of Cultural Anthropology, David Levinson and Melvin Ember, editors. New York: Henry Holt and Company, vol. 4: 1345-1351.
4. Ch. 1, "Reading Pictures," pp. 1-12 [From: Banks, Marcus. 2001. Visual Methods in Social Research. London: Sage.]
5. Ember C.R. et al (2011). Anthropology. New Delhi: Dorling Kinderslay. [Unit II, III, IV (Page: 282-321, 430-438, 464, 469-471)]
6. Banks M. and Ruby J. (2011). Made do Be Seen. Perspectives on the History of Visual Anthropology. University of Chicago Press [Practical]
7. Schneider A. and Wright C. (2010) Between Art and Anthropology: Contemporary Ethnographic Practice. Berg Publishers [Practical]
8. Henley P. (2010). The Adventure of the Real. Jean Rouch and the Craft of ethnographic Cinema. Chicago University Press [Practical]
9. Pink S. (2010). Doing Sensory Ethnography. Sage Publications [Practical]
10. Grimshaw A. and Ravetz A. (2009). Observational Cinema. Anthropology, Film, and the Exploration of Social Life. Indiana University Press [Practical]

DSE 11. Fashion Anthropology

Theory

Credit- 4

Unit I: Theoretical and Ethnographic Approaches to Understanding Fashion and Consumer Society; Colonialism, Dress, and Identity : Colonialism, Consumption, and Civilizing Fashion Anti-colonial Dress,

Clothing Debates in Burma and Africa.

Unit II: Race and Fashion: The 1980s "Japanese Invasion" and 1990s "Asian Chic" Alternative Approaches to Consumerism

Unit III: Gender, Fashion and Consumption in different Human societies, application of fashion in traditional and modern societies, role of religion in fashion.

Unit IV: Globalization and Dress, leather cosmetic relationships, relationship of tribal clans with reference to embroidery color and designs in ethnic group of India.

Practical

Credit-2

1. Identification of Pattern making Garment construction and color dynamics.
2. Sewing and Clothing manufacture practical.
3. Surface ornamentation, Textile crafts and Accessories Design in different ethnic group
4. A comparison of Computer aided design versus traditional designs

Suggested Readings

1. Allman, Jean. *Fashioning Power: Clothing, Politics and African Identities*. Bloomington: Indiana University Press, 2004.
2. Aronson, Lisa. "Body Modification and Art", in the *Berg Encyclopedia of World Dress and Fashion*, Volume 1, Africa. Berg Fashion Library, 2010.
3. Bachu, Parmindar. *Dangerous Designs: Asian Women Fashion the Diaspora Economies*. New York: Routledge, 2004.
4. Bradley Foster, Helen, and Johnson, Donald Clay. *Wedding Dress Across Cultures*. Berg Fashion Library, 2003.
4. Eicher, Joanne B., and Roach-Higgins, Mary Ellen. "Definition and Classification of Dress: Implications for Analysis of Gender Roles." In *Dress and Gender: Making and Meaning*. Oxford: Berg, 1992, 8–28.
5. Eicher, Joanne B., and Sumberg, Barbara. "World Fashion, Ethnic and National Dress", in *Dress and Ethnicity: Change Across Space and Time*. Berg Fashion Library, 1995.
6. El Guindi, Fadwa. *Veil: Modesty, Privacy and Resistance*. Berg Fashion Library, 2003 [1999].
7. Fair, Laura. "Veiling, Fashion, and Social Mobility: A Century of Change in Zamzibar", in *Veiling in Africa*. Bloomington: Indiana University Press, 2013, 15–33.
8. Fee, Sarah. "Anthropology and Materiality." In *The Handbook of Fashion Studies*. London: Bloomsbury, 2013, 301–324.
9. Gott, Suzanne, and Loughran, Kristyne. *Contemporary African Fashion*. Bloomington: Indiana University Press, 2010.
10. Hansen, Karen Tranberg. "The World in Dress: Anthropological Perspectives on Clothing, Fashion, and Culture" in *Annual Review of Anthropology*, 34 (2004): 369–392.
11. Hebdige, Dick. *Subculture: The Meaning of Style*. Routledge, 1979. ISBN: 0415039495
12. Hansen, Karen Tranberg. *Salaula: The World of Secondhand Clothing and Zambia*. Chicago, 2000. ISBN: 0226315819
13. Rooks, Noliwe. *Hair Raising: Beauty, Culture, and African American Women*. Rutgers, 1996. ISBN: 9780813523125
14. Miller, Daniel and Sophie Woodward, eds. *Global Denim*. Berg, 2011. ISBN: 9781847886316
15. Mangieri, Tina. "Fashion, Transnationality, and Swahili Men", in *African Dress: Fashion, Agency, Performance*. London: Bloomsbury, 2013, 153–167.
16. Schneider, Jane. "The Anthropology of Cloth", in *Annual Review of Anthropology*, 16 (1987): 409–448.
17. Smith, Fred T. "Archaeological Evidence", in the *Berg Encyclopedia of World Dress and Fashion*,

Volume 1, Africa. Berg Fashion Library, 2010.

18. Tarlo, Emma, and Moors, Annelies. *Islamic Fashion and Anti-Fashion: New Perspectives from Europe and America*. London: Bloomsbury, 2013.

19. Tarlo, Emma. *Clothing Matters: Dress and Identity in India*. Chicago: University of Chicago Press, 1996.

20. Tarlo, Emma. *Visibly Muslim: Fashion, Politics, Faith*. Berg Fashion Library, 2010.

DSE 12. Demographic Anthropology

Theory

Credit- 4

Unit I: Demographic Anthropology; Introduction, definition and basic concepts Relationship between demography, population studies and anthropology Population Theories: John Graunt, Thomas R. Malthus; Biological theory of population; Theory of demographic transition.

Unit II: Tools of Demographic Data; Measures of population composition, distribution and growth; Measures of fertility; Measures of mortality; Measures of migration.

Unit III: Population of India; Sources of demographic data in India; Growth of Indian population; Demography of Indian tribal and non-tribal groups; Anthropological determinants of population growth; Impact of urbanization on the migration of tribal groups.

Unit IV: National policies; National Population Policy; National Health Policy; National Policy on Reproductive Health Care.

Practical

Credit-2

A student will collect and compile demographic data from different secondary sources on any given topic by the concerned teacher and a project report will be submitted for its evaluation.

Suggested Readings

1. Bhende A. and Kaniikar, T. (2010) *Principles of Population Studies*. Himalaya Publishing House. Mumbai (All Units, It covers most topics)
2. Caldwell J.C. (2006). *Demographic Transition Theory*. Springer.
3. Census of India (2001,2011), SRS bulletin (2013), NFHS (2006), CRS, NSSO (Can be seen from browsing net)
4. Gautam R.K., Kshatriya, G.K. and Kapoor A.K. (2010) *Population Ecology and Family Planning*. Serials publications. New Delhi.
5. Howell N. (1986) Demographic Anthropology. *Ann. Rev. Anthropol.* 15: 219-246
6. Kshatriya G.K. (2000). Ecology and health with special reference to Indian tribes. *Human Ecology special volume* 9:229-245.
7. Kshatriya G.K., Rajesh,G. and Kapoor , A.K. (2010) *Population Characteristics of Desert Ecology*.VDM Verlag Dr. Muller Gmbh and Co., Germany.
8. Misra BD (1982). *An introduction to the study of population*. South Asia publ. ltd. New Delhi.
9. National Population Policy <http://populationcommission.nic.in/npp.htm>
10. Park K. (2000) *Text book of Preventive and Social Medicine*. Banarsidas Bhanot, Jabalpur.
11. Patra P.K. and Kapoor, A.K. (2009) *Demography And Development Dynamics in a Primitive Tribe of Himalayas*. International Book Distributors, Dehradun
12. Riley N.E. and Mc Carthy, J. (2003) *Demography in the Age of the Postmodern*. Cambridge University press. UK. Pages 1-13 and 32-98

13. Sharma A.K. (1979) Demographic transition: A Determinant of Urbanization. *Social Change* 9: 13-17.
14. Srivastava O.S. (1996) *Demographic and Population Studies*. Vikas Publishing House, India
15. Zubrow E.B.W. (1976) *Demographic anthropology. Quantitative approaches*. University of New Mexico Press, Albuquerque.
16. <http://human-nature.com/dm/chap3.html>
17. <http://biography.yourdictionary.com/john-graunt>
18. <http://www.marathon.uwc.edu/geography/demotrans/demtran.htm>

DSE 13. Urban Anthropology

Theory

Credit- 4

Unit 1 : Emergence of urban anthropology; Introduction, Extension of the anthropological interest in peasants and rural areas, Origins of Cities and Early Sociological Approaches, Urban planning and design

Unit 2: Political economy; Rural-urban migration, kinship in the city, problems that arise from urbanism, poverty and social stratification

Unit 3: Class approach; Culture of Poverty and the Underclass Approach, Comparison between relations function in an urban setting versus function in a rural setting, Race and Class in Urban Ethnography, Urban Dystopia

Unit 4: Urban Inequality and Disasters; Poverty, extended family for urban natives versus migrants, Global Cities and the Production of Space, Community study and urban ecology, Urban Space, Postmodern and Hypermodern City; Contemporary urban issues: Suburbs, Exurbs and Urban Decline.

Practical

Credit-2

1. Visit city life among business community and appreciate the role of culture with politics and economics.
2. Media-popular culture behaviour
3. Photo shoot in any city life, Creating captions and texts relating to urban anthropology findings.

Suggested readings

1. <http://www.oxfordbibliographies.com/>
2. Cities, classes and the social order. Anthony Leeds, Roger Sanjek
3. Childe, V. Gordon. 1950. "Urban Revolution." *Town Planning Review*
4. Low Reader Part V: "The Postmodern City" in Low pp. 317-377;
5. Dear and Flusty "Anthropological Fieldwork in Cities", "The anthropology of Cities: Some Methodological Issues".

DSE 14. Anthropology of Health

Theory

Credit- 4

Unit-1: Defining Health and Illness in Cross-Cultural Perspective; Looking at "health," "illness," and related concepts in Western culture, including sociological "sick role" models, Some important variations in the process of seeking health care Morbidity, Mortality, Epidemiology: Meaning, scope and methods. Epidemiology of common communicable diseases: Malaria, Tuberculosis, Leprosy, Diabetes, Cardiovascular disease and Sexually Transmitted Diseases (STDs), HIV/AIDS.

Unit – 2: Women's Health, Sex, Family Planning, and Maternal-Infant Health; Reproductive life, child Birth, Family planning adoption, male dominance, Nursing and early nurture, hyper-menstruation and its corollaries; Chronic Disease, Injury, Stress, and Mental Health; Relationship between mental health, chronic disease, and injury, Understanding Stress and Its Effects Cross-Culturally, Mental Disorders and Related Phenomena, diseases associated with specific sociocultural and environmental contexts: Kuru, osteomalacia, sickle cell anaemia. Adaptations to Health Threats: Genetic Vulnerability and Resistance & Environment, Developmental and Cultural Adaptations to adverse Conditions.

Unit – 3: Variations in Health Care Systems: A Comparative Perspective; Health promotion and health care delivery programmes; Family welfare programmes. Child health and nutrition programmes. Reproductive health awareness; Healing and Healers in Cross-Cultural Perspectives; Shaman, Magic, Witchcraft and Sorcery; Folk healers and alternative medicine: Types of healers and healing, Problems in evaluating efficacy, Sources of dissatisfaction with mainstream medicine.

Unit – 4: Legal Aspects & Future Prospects for Health; Rules and regulations of international health policy, Medico- Legal Problems in relation to health administration, International health organization / NGOs, Medical Ethics, Critical issues in global health.

Practical

Credit-2

1. Make a Schedule on Health and Demography.
2. Calculation of Infant Sex ratio, Fertility rate, Total fertility rate, Mortality rate, Birth rate, crude birth rate, crude death rate, Mortality rate, life expectancy, immigration rate, population growth rate.
3. Identification and Characteristics of Various diseases.
4. Case Studies of Traditional and Modern healers.

Suggested Readings

- Rajesh Khanna and A.K. Kapoor. 2007. *Ethnic Groups and Health Dimensions*. Discovery Publishing House, New Delhi.
- Chin, James, M.D., M.P.H. (ed.) 2000. *Control of Communicable Diseases Manual*. 17th Edition. American Public Health Association. *Anyone interested in field work in less developed areas should own this book for reference.*
- Helman, Cecil G. 2001. *Culture, Health, and Illness*. 4th ed. London: Arnold. *This book is written for health care practitioners and clearly explains the relevance of culture to health.*
- Mann, Jonathon M., et al. (eds.) 1999. *Health and Human Rights*. New York: Routledge.
- Albrecht, Gary L., Ray Fitzpatrick, and Susan C. Scrimshaw (eds.) 2000. *The Handbook of Social Studies in Health and Medicine*, SAGE Publications.
- Bannerman, Robert, J. Burton, and Ch'en Wen-Chieh (eds.) 1983. *Traditional Medicine and Health Care Coverage*. Geneva: World Health Organization.
- Chen, Lincoln C. Arthur Kleinman, and Norma C. Ware 1994. *Health and Social Change in International Perspective*. Harvard University Press.
- Coreil, Jeannine and J. Dennis Mull (eds.) 1990. *Anthropology and Primary Health Care*, Boulder: Westview Press.
- Hahn, Robert A. 1999. *Anthropology in Public Health. Bridging Differences in Culture and Society*. New York: Oxford University Press.
- Helman, Cecil G. 1994. *Culture, Health, and Illness*. 3rd ed. Oxford: Butterworth- Heinemann.
- Inhorn, Marcia C. and Peter J. Brown 1997. *The Anthropology of Infectious Disease. International health Perspectives*. Gordon and Breach Publishers.
- Koop, C. Everett, Clarence E. Pearson, and M. Roy Schwartz (eds.) 2001. *Critical Issues in Global Health*. San Francisco: Jossey-Bass. A Wiley Company.

Mayer, Kenneth H. and H.F. Pizer (eds.) 2000. The Emergence of AIDS. The Impact on Immunology, Microbiology, and Public Health. Washington, D.C.: American Public Health Association.

Nichter, Mark and Mimi Nichter 1996. Anthropology and International Health. Asian Case Studies. Gordon and Breach Publishers.

Paul, Benjamin D. (ed.) 1955. Health, Culture, and Community. Case Studies of Public Reactions to Health Programs.

Williams, Cicely D., Naomi Baumslag, and Derrick B. Jelliffe 1994. Mother and Child Health. Delivering the Services. 3rd Edition. New York: Oxford University Press

Basch, Paul F. Textbook of International Health 1999. New York: Oxford University Press.

Tsui, Amy O., Judith N. Wasserheit, and John G. Haaga (eds.) 1997. Reproductive Health in Developing Countries. Washington, D.C.: National Academy Press.

DSE 15. Linguistic Anthropology

Theory

Credit- 4

Unit-1: Concept and Scope of Linguistic Anthropology; Linguistic Anthropology and other Behavioural Sciences; Universals of Language, Types: Descriptive and Historical Linguistic; Origin and Evolution of Language; Language, Dialect and Idiolects: Definitions and Interrelations; Socio-Linguistics.

Unit-2: Language as a System: Phonetic Sub System, Morphophonemic Sub System, Syntactic Sub System and Semantic Sub System; Language and Culture: Cultural Influence on Language and Linguistic; Influence on Culture Sapir–Whorf Hypothesis; Linguistic and Culture Change.

Unit-3: Classification of Languages: Typological and Genealogical; Functional study of Languages; India as a Linguistic Area; Standard languages and Nationalism; speech variation and the study of Indian civilization.

Unit-4: Languages and the Analysis of Social Laws; Language and Social Structure; Structural Analysis in Linguistics and Anthropology; Language and Communication: Verbal and Non-Verbal (Signs and Symbols); Communication and Sociability; Language and Speech.

Practical

Credit-2

Report writings

Education policies in India

Multilingual Education

Tribal Languages

Suggested Readings

1. Ardver ,E.(ed) Social Anthropology and Language
2. Bloomfield, L. Language
3. Bright, W. Socio-linguistics
4. Burling, R. Man's Many voices-Language in its Cultural Context
5. Gleason, H.A. An Introduction to Descriptive Linguistics
6. Gumperz and The Ethnography of Communication Hymas(eds.)
7. Hockett,C.F. A Course in Modern Linguistics
8. Hoiyer, H. (ed) Language in Culture
9. Hymes, D.(ed) Language in Culture and Society

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|----------------------|---|
| 10. Lehmann, H.P. | Historical Linguistics |
| 11. Levi Strauss, C. | Structural Anthropology (Selected chapters) |
| 12. Mishra, K.K. | Anthropological Linguistics |
| 13. Sapir, E. | Language |

Note: Student will write dissertation on the basis of 20 days Field Work in the nearby locality on any branch of Anthropology in 6th Semester. She/ He will be supervised by one Teacher/ teachers.

Generic Elective Course (GE)

Credits: Any four papers = Theory + Practical = $(4+2)*4 = 24$

For B.Sc. in Anthropology, a student shall have the option to choose from the following subjects: Chemistry, Botany, Zoology, Geology, Geography, Bio-Technology, Environmental Science, Psychology, Statistics, Marine Science, BCA

For B.A. in Anthropology, a student shall have the option to choose from the following subjects: History, Political Science, Economics, Psychology, Geography, Sociology, Home Science, Sanskrit, Odia, Philosophy, BBA and BBA (Health Care management), Tourism Administration

Ability Enhancement (Compulsory Course)

Credits: Two Papers = $2*4=8$

Ability enhancement elective (skill based) Course

Credits: Any two papers = Theory + Practical = $2*4= 8$

SEC 1. Public health and epidemiology

Theory

Credit- 2

Unit I: Principles of Epidemiology in Public Health: Public health and Anthropology; Overview of epidemiology methods used in research studies to address disease patterns in community and clinic-based populations, distribution and determinants of health-related states or events in specific populations, and strategies to control health problems

Unit II: Environmental Health; Effects of biological, chemical, and physical agents in environment on health (water, air, food and land resources); ecological model of population health; current legal framework, policies, and practices associated with environmental health and intended to improve public health. Psychological, Behavioural, and Social Issues in Public Health: behavioural science theory and methods to understanding and resolving public health problems

Unit III: Management of Health Care Program and Service Organizations; Techniques and procedures for monitoring achievement of a program's objectives, generating evidence of program effectiveness, assessing impacts in public health settings; evaluate framework that leads to evidence-based decision-making in public health.

Unit IV: Epidemiology of disease; Contemporary methods for surveillance, assessment, prevention, and control of infectious and chronic diseases, disabilities, HIV/AIDS; understanding etiology; determining change in trend over time; implementation of control measures

Practical

Credit-2

1. Draw appropriate inferences from provided epidemiologic data through statistical analysis
2. Assesses the health status of populations and their related determinants

3. Analyzes information relevant to specific public health policy issues
4. Development of health promotion model for health problem

Suggested reading

1. Gordis L. (2004). Epidemiology. Third edition. Philadelphia: Elsevier Saunders.
2. Remington PL, Brownson RC, and Wegner MV. (2010). Chronic Disease Epidemiology and Control. American Public Health Association.
3. Pagano M and Gauvreau K. (2000). Principles of Biostatistics. Belmont, CA: Wadsworth.
4. Turnock B. (2011). Public health. Jones & Bartlett Publishers.
5. Edberg M. (2013). Essentials of Health Behavior. Social and Behavioral Theory in Public Health. Second Edition, Jones and Bartlett Publishers.
6. Griffith JR and White KR. (2010). The Well-Managed Healthcare Organization. Health Administration Press: Chicago, IL.
7. Kovner AR, McAlearney AS, Neuhauser D. (2013). Health Services Management: Cases, Readings, and Commentary. 10th Ed. Chicago, IL: Health Administration Press.
8. Lee LM. (2010). Principles and Practice of Public Health Surveillance. Oxford University Press
9. Turnock B. (2011). Essentials of Public Health. Jones & Bartlett Publishers
10. Merson M, Black RE, Mills A. (2006). International Public Health: Diseases, Programs, Systems and Policies. Jones & Bartlett Learning.
11. Aschengrau A and Seage GR. (2008). Essentials of Epidemiology in Public Health. Boston, Massachusetts.

SEC 2. Business and Corporate Anthropology

TheoryCredit-2

Unit 1: History of Business and corporate Anthropology; Subject Matter of Business Anthropology: Organizational Anthropology, Marketing and Consumer Behaviour, Design Anthropology, Globalization and International communication.

Unit 2: Applied anthropology in industry; application of the ethnography in business Management: organizational ethnography, stages and advantages of ethnographic approach, ethical issues in ethnographic research.

Unit 3: Anthropology and consumer behaviour: cultural meaning to consumer behaviour; Anthropological approach to consumer behaviour: values and consumer behaviour, Heros and consumer behaviour, Rituals and consumer behaviour, Symbols and consumer behaviour.

Unit 4: Globalization. Regional Cooperation. and International Business: Cultural dimensions in international business: Hofstede and Ferraro; Cross-cultural Business Etiquette and Sensitivity in international communication

Practical

Credit-2

1. Visit a corporate sector and write a short report Case study
2. Study of interaction pattern in corporate sector with reference to ethnicity
3. Make a schedule on the structure of the corporate/MNC
4. Make a brief report only on one dimension of the corporate sector and give your assessment

Suggested Readings

1. Jordan, Ann T. Business Anthropology. Waveland Press, Long Grove, Illinois.
2. Whyte, W.F. 1948 Incentives for Productivity: The Case of the Bundy Tubing Company Applied Anthropology 7(2):1-16
3. Gardner, Burleigh B. 1978 Doing Business with Management. In Applied Anthropology in America, Elizabeth M. Eddy and William Partridge (Eds.). New York: Columbia University Press. Pp.245- 260.
4. Handbook of Anthropology in Business by Rita M Denny.
5. Advanced reading in Business Anthropology edited by Robert Guang Tian, Daming Zhu, Alfons van Marrewijk.

SEC 3. Media Anthropology

Theory Credit-2

Unit 1: Introduction to Media Anthropology; Audiences, Consumption and Identity Formation: The Social and Material Life of Cinema; Television and the Cultural Politics of Nation, Media as Material Objects.

Unit 2: The Cultural Work of Mass Media Production: Producing “Bollywood”.

Unit 3: Producing Reality – Journalism and Advertising; News as Social Practice; the Local and the Global in Advertising.

Unit 4: Small Media: Materiality, Circulation, Everyday Life & Social Transformations; Indigenous Media and Cultural Activism; The Social and Material Lives of Cell Phones; Media as Social Infrastructure – The Case of Facebook; Learning from New Media; The Possibilities & Constraints of YouTube.

Practical

Credit-2

1. Visit to Mass Media Company and submit a report on any one dimension.
2. Making a schedule and testing the same in the field with focus on either cinema or television
3. Describe the components of mass media in its different parts
4. Submit a report on the behavioural pattern of media people.

Suggested readings

1. Rothenbuhler, Eric W; Coman, Mihai. Media Anthropology. 2005. California, Sage.
2. Askew, K and R.R. Wilk (Eds.). 2002. The Anthropology of Media- a Reader. Blackwell Publishers Ltd, USA.
3. Brauchler, B and J. Postill (Eds.). 2010. Theorising Media and Practice. Berghahn Books.

SEC 4. Tourism Anthropology

Theory

Credit-2

Unit I: Tourism- anthropological issues and theoretical concerns, tourist as ethnographer; pilgrimage and Authenticity Issues.

Unit II: Interconnections between tourism history and the rise of the socio-cultural study of tourism including temporary migration, colonial exploration, pilgrimage, visiting relatives, imagined and remembered journeys, and tourism.

Unit III: understand the implications of tourism as a major mechanism of cross-cultural interaction; role of

symbolism, semiotics, and the imagination in tourism; tourism and the commodification of culture or cultural degradation.

Unit IV: understand the global and local political economy of contemporary tourism, particularly in relation to international development; explore dynamic relationships between heritage-making enterprises, revival and preservation projects, the international flow of capital; role of museums and other branches of the cultural industries" (including music, art, and food) in tourism economies; tourism and global mobility; Ecotourism and sustainable development.

Practical

Credit-2

1. Visit a place, identify a population and write a short report Case study
2. Make a brief report only on one dimension of the tourism sector and give your assessment

Suggested Readings

1. Chambers E. (2000). *Native Tours: The Anthropology of Travel and Tourism*. Prospect Heights: Waveland.
2. Crick M. (1995). *The Anthropologist as Tourist: An Identity in Question*. In Lanfant MF, Allcock JB, Bruner EM (eds.) *International Tourism: Identity and Change*. London: Sage. pp. 205-223.
3. Dann GMS, Nash D and Pearce PL. (1988). *Methodology in Tourism Research*. *Annals of Tourism Research*. 15:1-28.
4. Gmelch SB. (2004). *Tourists and Tourism: A Reader*. Long Grove: Waveland.
5. Graburn NHH. (1977). *Tourism: The Sacred Journey*. Hosts and Guests: *The Anthropology of Tourism*. Valene L. Smith, ed. Philadelphia: University of Pennsylvania Press. Pp. 33-47.
6. Dann G. (2002). *The Tourist as a Metaphor of the Social World*. Wallingford: CAB International.
7. Nash D. (1996). *Anthropology of Tourism*. New York: Pergamon.
8. Kirshenblatt-Gimblett B. (1998). *Destination Culture: Tourism, Museums, and Heritage*. University of California Press.
9. Lippard LR. (1999). *On the Beaten Track: Tourism, Art and Place*. New Press.
10. Picard M and Wood R. (1997). *Tourism, Ethnicity, and the State in Asian and Pacific Societies*. University of Hawai Press.
11. Crick M. (1994). *Anthropology and the Study of Tourism: Theoretical and Personal Reflections*. In Crick M (eds.). *Resplendent Sites, Discordant Voices: Sri Lankans and International Tourism*. Chur, Switzerland: Harwood Publishers.
12. Wood R. (1997). *Tourism and the State: Ethnic Options and the Construction of Otherness*. In Picard and Wood *Tourism, Ethnicity and the State in Asian and Pacific Societies*. University of Hawai Press. Otherness. In Picard and Wood *Tourism, Ethnicity and the State in Asian and Pacific Societies*. University of Hawai Press.
13. Richard B. (1992). *Alternative Tourism: The Thin Edge of the Wedge*. In Valene Smith and Eadington *Tourism* (eds.). *Alternatives: Potentials and Problems in the Development of Tourism*. University of Pennsylvania Press.
14. Hitchcock. (1997). *Cultural, Economic and Environmental Impacts of Tourism Among the Kalahari*. In Chambers E (eds.) *Tourism and Culture: An Applied Perspective*. SUNY Press.

SEC5. Museology and Cultural Resource Management

Theory

Credit-2

Unit-I Museum, Museology and New Museology

Museum and Museology: Meaning, Definition, Nature and Scope; Classification of Museums in India--National Museum, State Museum, University Museum, Specialized Museums in India.
New Museology: Concept and scope, New Museum Movement

Unit-II Museum Administration, Acquisition, Display and Documentation:

Museum Administration: Staff

Acquisition and Arrangement of Specimens: Modes and ways of Acquisition of Museum Specimens, Principles of Display and Arrangement in Museums(including lighting)

Documentation and Labels of Museum Specimens: Methods of Documentation, Documentation of Ethnographic and Archaeological Specimens,

Unit-III Management of Cultural Resources in Museum (Storage, Security and Conservation)

Museum Storage: Location of the storage, Storage Furniture, Lighting and Ventilation in Storage, Methods of Storage, Visual Storage.

Security in Museum: Security Risks of Museum Objects, Preventive Measures.

Conservation of Cultural Resources in Museum: Causes of Decay and Deterioration, Care and Handling, Cleaning and Repairing, Packing and Shifting of Museum Objects; Preservation of Organic and Inorganic Objects in Museums.

Unit-IV Educational and Extension Activities of Museum

Museum Education, Tourism and Museums, Travelling Exhibition, Museum Library and Publication, Public Relations, Museum and Communities

Practical

Credit-2

1. Development of Computer based Documentation; Museum Labels; Dioramas, Models and Charts; Museum Photography.
2. Cleaning and Repairing, Packing and Shifting of Museum Objects; Preservation of Organic and Inorganic Objects in Museums.

Suggested Readings:

1. Agrawal, O. P. and Shashi Dhawan 1985 Control of Biodeterioration in Museums. National Research Laboratory for Conservation of Cultural Property, Lucknow.
2. Agrawal, O. P. and Mandana Barkeshli 1997 Conservation of Books, Manuscripts and Paper Documents. INTACH, Indian Council of Conservation Institutes, Lucknow.
3. Aiyappan, A. and S.T. Satyamurti (Ed), 1960, Handbook of Museum Technique, Government Museum, Madras.
4. Banerjee, N. R. 1990, Museum and Cultural Heritage in India. Agamkala Prakashan, Delhi.
5. Basa, K.K., Md. Rehan, R.K. Gupta 2007, Museology A Comprehensive Bibliography and Webliography, Serial Publications, New Delhi.
6. Basa, K. K. 2010 Museums in India: From Colonial Constructs to Post-Colonial Engagements. Jhargram: INCAA Publications
7. Behera, B.K. and S.K. Mohanty, 2007, Museology and Museum Management in India, Mayur Publications, Bhubaneswar, Orissa.
8. Bhatnagar, A.1999, Museum, Museology and New Museology, Sandeep Prakashan, New Delhi.
9. Diwvedi, V. P. and G.N. Pant(Ed) 1980, Museum and Museology: New Horizon, Agam Kala Prakashan, New Delhi.
10. Ghoshmaulik, S.K. and K. K. Basa (Ed) 2001, Understanding Heritage: Role of Museum, Academic staff Collage, Utkal University, Bhubaneswar, India.
11. Nair, S. M., 1970. Bio-Deteriorations of Museum Materials, Agam Kala Prakashan, New Delhi.
12. Nigam, M. L., 1985 Fundamentals of Museology, Deva Publications, Hyderabad.

13. Sarkar, H. 1981, Museums and Protection of Monuments and Antiquities in India, Sandeep Prakashan, New Delhi.
14. Stone, P.G. and B. L. Molyneaur 1994, The Present Past: Heritage Museums and Education, Routledge, London.
15. Thompson, J.M. (Ed.) 1992, Manual of Curatorship: A Guide to Museum Practice, Butterworth-Heinemann Ltd. Oxford.

CBCS: BA, B.Sc (Regular/Pass) in Anthropology

Core courses = 14 papers of 6 Credit each: 100 marks each (5 Units in each course) 1400

Ability Enhancement Compulsory Course (AECC) = 2 papers of 4 credit each: 50 marks each 100
(English Communication / MIL / Environmental Science)

Skill Enhancement Courses (SEC) = 2 papers of 4 credit each: 50 marks each 100

Discipline Specific Elective (DSE) = 3 papers of 6 credit each: 100 marks each
(5 Units in each course) And Project Report of 6 Credit: 100 Marks (Project 75 + Viva 25) 400

Generic Electives (GE) = 4 papers of 6 credit each: 100 marks each (5 units in each course) 400

Sem I: 2 Core Courses, 1 AECC, 1 GE= 4 papers= 350 marks

Sem II: 2 Core Courses, 1 AECC, 1 GE= 4 papers= 350 marks

Sem III: 3 Core Courses, 1 SEC, 1 GE= 5 papers= 450 marks

Sem IV: 3 Core Courses, 1 SEC, 1 GE= 5 papers= 450 marks

Sem V: 2 Core Courses, 2 DSE = 4 papers= 400 marks

Sem VI: 2 Core Courses, 1 DSE, Project Report = 4 papers= 400 marks

Total = 26 papers = 2400 marks (148 Credits)

For papers with Practical Component: Theory - 70 (Mid Sem 20 + End Sem 50) ;
Practical - 30 (End Sem). There will be no mid sem exam. in practical papers.

For papers with no Practical: 100 marks paper = 20 (Mid Sem) +80 (End Sem); 50 marks Paper = 10 (Mid Sem) + 40 (End Sem)

Subjects with Practical:

Each of the 14 core courses, 4 Discipline specific elective courses And 4 Generic Elective papers will have minimum 40 Theory classes (Lectures) of 1 hour duration and minimum 20 Practical classes (normally practical classes at Hons level are of 2 hours duration each).

Subjects without Practical:

Each of the 14 core courses, 4 Discipline specific elective courses and 4 Generic Elective papers (100 marks each) will have minimum 50 Theory classes (Lectures) of 1 hour duration and minimum 10 tutorial classes. Ability enhancement (compulsory) and 2 Ability enhancement (Skill based) papers will have minimum 20 classes (Lectures) each of 1 hour duration.

CBCS: BA (Pass.) Anthropology

Core Courses = 12 papers, AECC= 2 papers, SEC = 4 papers, DSE = 4 papers, GE= 2 papers: 24 papers (2100 Marks - 132 credits)

To complete this programme, a student has to take 4 Core Courses each in 2 disciplines of choice and two core papers each in English and MIL respectively.

CBCS: B.Sc (Pass) Anthropology

Core Courses = 12 papers, AECC= 2 papers, SEC = 4 papers, DSE = 6 papers: 24 papers
(2100 Marks- 132 credits)

To complete this programme, a student has to take 4 Core papers each in 3 disciplines of choice.

B.A./B.Sc. in Anthropology

S.No.	Core Paper	Theory	Practical
C1.	Introduction to Biological Anthropology	√	√
C2.	Introduction to Socio-cultural Anthropology	√	√
C3.	Archaeological Anthropology	√	√
C14.	Anthropology of India	√	√

S.No.	Elective courses	Theory	Practical
DSE3.	Human Genetics	√	√
DSE7.	Anthropology of Religion, Politics and Economy	√	√
DSE8.	Tribal Cultures of India	√	√
DSE12.	Demographic Anthropology	√	√
DSE13.	Urban Anthropology	√	√
C11.	Prehistoric Archaeology of India	√	√

Generic Elective (GE)

For B.Sc. in Anthropology: Chemistry, Botany, Zoology, Geology, Geography, Bio-Technology, Environmental Science, Psychology, Statistics, Marine Science, BCA

For B.A. in Anthropology: History, Political Science, Economics, Psychology, Geography, Sociology, Home Science, Sanskrit, Odia, Philosophy, BBA, (Health Care management), Tourism Administration

Ability enhancement Elective (skill based) (SEC)

SEC1. Public Health and Epidemiology SEC 3. Media Anthropology
SEC 2. Business and Corporate Anthropology SEC 4. Tourism Anthropology
SEC 5. Museology and Cultural Resource Management

CORE PAPRES

C 1. Introduction to Biological Anthropology

Theory

Credit- 4

Unit I: History and development of understanding human variation and evolutionary thought; Theories of evolution; Human variation and evolution in ancient times pre-19th and post-19th Century; Theories of evolution. Lamarckism, Neo Lamarckism, Darwinism, Synthetic theory, Mutation and Neo-Mutation theory.

Unit II: History of Physical Anthropology and development of Modern Biological anthropology, aim, scope and its relationship with allied disciplines; Difference in the approaches of modern and traditional Biological Anthropology, with emphasis on human evolution.

Unit III: Non human primates in relation to human evolution Classification and characteristics of living primates; Comparative anatomy and behaviour of human and non-human primates; Significance of non-human primate study in Biological Anthropology.

Unit IV: Structure and function of an animal cell; cell theory and cell division. Essentials of Genetics; Landmarks in the history of genetics, principles in human genetics Mendel's Laws of inheritance and its application to man; Concept of race & UNESCO Statement on Race; A comparative account of various races of the world.

Practical

Credit-2

Somatometry

- | | |
|--------------------------------|---------------------------------------|
| 1. Maximum head length | 9. Physiognomic facial height |
| 2. Maximum head breadth | 10. Morphological facial height |
| 3. Minimum frontal breadth | 11. Physiognomic upper facial height |
| 4. Maximum bizygomatic breadth | 12. Morphological upper facial height |
| 5. Bigonial breadth | 13. Head circumference |
| 6. Nasal height | 14. Stature |
| 7. Nasal length | 15. Sitting height |
| 8. Nasal breadth | 16. Body weight |

Somatoscopy

- | | | | |
|--------------|----------------|----------------|----------------|
| 1. Head form | 2. Hair form | 3. Facial form | 4. Eye form |
| 5. Nose form | 6. Hair colour | 7. Eye colour | 8. Skin colour |

Suggested Readings

1. Jurmain R., Kilgore L., Trevathan W., Ciochon R.L. (2012). Introduction to Physical Anthropology Wadsworth Publ., USA
2. Kroeber A. L. (1948). Anthropology. Oxford & IBH Publishing Co., New Delhi.
3. Stanford C., Allen J.S. and Anton S.C. (2010). Exploring Biological Anthropology. The Essentials. Prentice Hall Publ, USA.
4. Statement on Race: Annotated Elaboration and Exposition of the Four Statements on Race (1972). Issued by UNESCO. Oxford University Press.
5. Stein P.L. and B.M. Row. 1974. Physical Anthropology. McGraw-Hill Inc., USA
6. Singh I.P. and M.K. Bhasin. 1989. A Laboratory Manual on Biological Anthropology: Anthropometry. Kamal-Raj Entreprises, Delhi.

C 2. Introduction to Socio-cultural Anthropology

Theory

Credit- 4

Unit I: Anthropological perspective and orientation; Scope and relevance of Social Anthropology; Relationship of Social Anthropology with other disciplines.

Unit II: Concepts of society and culture; status and role; groups and institution, social stratification, and civil society.

Unit III: Social organization; social structure; social function; social system.

Unit IV: Theory and practice of ethnographic fieldwork; survey method; comparative and historical Methods.

Practical

Credit- 2

Methods and Techniques of Social Anthropology: The practical will include the following techniques and methods in collection of data in Social Anthropology.

1. Observation
2. Interview
3. Questionnaire and Schedule
4. Case study
5. Life history

Suggested Readings

1. Beattie J. (1964). *Other Cultures*. London: Cohen & West Limited.
2. Bernard H.R. (1940). *Research Methods in Cultural Anthropology*. Newbury Park: Sage Publications.
3. Davis K. (1981). *Human Society*. New Delhi: Surjeet Publications.
4. Delaney C. (2004). 'Orientation and disorientation' In *Investigating Culture: An Experiential Introduction to Anthropology*. Wiley-Blackwell.
5. Ember C. R. et al. (2011). *Anthropology*. New Delhi: Dorling Kindersley.
6. Ferraro G. and Andreatta S. (2008). In *Cultural Anthropology: An Applied Perspective*. Belmont: Wadsworth.
7. Haviland, Prins, Walrath, McBride (2007). *Introduction to Anthropology*. Cengage Learning India Pvt. Ltd., New Delhi
8. Haviland, Prins, Walrath, McBride (2008). *Cultural Anthropology*. Cengage Learning India Pvt. Ltd., New Delhi
9. Karen O'reilly. (2012). 'Practical Issues in Interviewing' *Ethnographic Methods*. Abingdon: Routledge
10. Lang G. (1956). 'Concept of Status and Role in Anthropology: Their Definitions and Use. *The American Catholic Sociological Review*. 17(3): 206-218
11. O'reilly K. (2012). *Ethnographic Methods*. Abingdon: Routledge.
12. Parsons T. (1968). *The Structure of Social Action*. New York: Free Press
13. Rapport N. and Overing J. (2004). *Key Concepts in Social and Cultural Anthropology*. London: Routledge.
13. Royal Anthropological Institute of Great Britain and Ireland (1971). 'Methods' In *Notes and Queries on Anthropology*. London: Routledge & Kegan Paul Ltd.

C3. Archaeological Anthropology

Theory

Credit- 4

Unit I: Introduction, Definition and scope of archaeological anthropology; Relation with other disciplines; Methods of studying archaeological anthropology.

Unit II: Methods of Estimation of Time and Reconstruction of the Past; Absolute dating methods: Radiocarbon¹⁴ dating (C¹⁴), Potassium-Argon, Fission Track Dating; Relative dating methods: Stratigraphy, Palaeontology, Palynology.

Unit III: Geochronology of Pleistocene Epoch; Glacial and Interglacial; Pluviation and Inter Pluviation; Different types of geoclimatic events.

Unit IV: Understanding Culture; Technique of tool manufacture and estimation of their relative efficiency; Classification of tools: primary and combination fabrication techniques; Earliest evidence of culture in the world: Konso, Olorgesaille, Olduvai Gorge Pirro Nord, Damanisi, Attirampakkam, Isampur, Kuliana.

Practical

Credit- 2

Typo-technological Analysis of Prehistoric Tools: Identification, Interpretation and Drawings of the tool Types

1. Core Tool Types
2. Flake Tool Types
3. Blade Tool Types
4. Microlithic Tool Type
5. Neolithic Tool Type

Suggested Readings

1. Allchin and Allchin (1993). *The Rise of Civilization of India and Pakistan*. Cambridge University Press
2. Bhattacharya D.K. (1978). *Emergence of Culture in Europe*, Delhi, B.R. Publication.
3. Bhattacharya D.K. (1979). *Old Stone Age Tools and Techniques*. Calcutta, K.P. Bagchi Company
4. Bhattacharya D.K. (1996). *Palaeolithic Europe*. Netherlands, Humanities Press.
5. Champion et al. (1984). *Prehistoric Europe*. New York, Academic Press.
6. Fagan B.M. (1983). *People of Earth: An Introduction*. Boston, Little, Brown & Company.
7. Phillipson D. W. (2005). *African Archaeology*. Cambridge, Cambridge University Press.
8. Sankalia H.D. (1964). *Stone Age Tools*. Poona Deccan College
9. Basa, K.K. and P.K. Mohanty (Ed) 2000, *Archaeology of Orissa*, Delhi: Pratibha Prakashan.

C 14. Anthropology of India

Theory

Credit- 4

Unit I: Origin, history and development of Anthropology in India, approaches to study Indian society and culture- traditional and contemporary Racial and linguistic elements in Indian population Understanding the diversity of Indian social structure - concept of Varna, Jati, Caste, Ashram or purusharatha, gender hierarchies - their economic and cultural impact, origin and evolution of social structures and their underlying philosophies; Contribution of contemporary biological, social and archaeological anthropologists in India.

Unit II: Aspects of Indian Village –social organisation, agriculture and impact of market economy on

villages; Tribal situation in India- biogenetic variability, linguistic and socio-economic characteristics; Problems of tribal peoples, land-alienation, indebtedness, lack of educational facilities, shifting-cultivation, migration, forests and tribal unemployment, health and nutrition, tribal movement and quest for identity

Unit-III: Developmental projects- tribal displacements and rehabilitation problem; Impact of culture-contact, urbanization and industrialization on tribal and rural Population ; Basic concepts -Great tradition and little tradition, sacred complex, Universalization and parochialization, Sanskritization and Westernization, Dominant caste, Tribe-caste; continuum, Nature-Man-Spirit complex, pseudotribalism.

Unit IV: Problems of exploitation and deprivation of scheduled caste/ tribe and Other Backward Classes. Constitutional Provisions for the Scheduled caste and scheduled tribes, Evaluation and Development of Indian Population; Human Rights, Protection and enforcement of human rights, Human rights of special category and marginal groups, Emerging trends of human rights with respect to terrorism, globalization and environment.

Practical

Credit- 2

1. Identify various traits/variables which can be used in racial classification and comment on its relevance.
2. Review a book/edited volume on Indian social structure such as caste, religion, tribe or rural population and give its salient features.
3. Explore the biological diversity of any population group considering a minimum of five genetic traits.
4. Highlight the contributions of any two contemporary Indian anthropologists.

Suggested Reading

1. Nicholas D. (2001). *Castes of Mind: Colonialism and the Making of Modern India*. Princeton University Press.
2. Bernard CS. (2000). *India: The Social Anthropology of Civilization*. Delhi: Oxford University Press.
3. Bhasin MK, Watter H and Danker-Hopfe H. (1994). *People of India – An Investigation of Biological variability in Ecological, Ethno-economic and Linguistic Groups*. Kamla Raj Enterprises, Delhi
4. Lopez DS. (1995). *Religions of India in Practice*. Princeton University Press
5. Gupta D. *Social Stratification*. Delhi: Oxford University Press.
6. Karve I. (1961). *Hindu Society: An Interpretation*. Poona : Deccan College
7. Guha BS. (1931). The racial attributes of people of India. In: *Census of India, 1931, vol I, Part III (BPO, Simla)*
8. Trautmann TR (2011). *India: Brief history of Civilization*. Oxford University Press : Delhi
9. Vidyarthi LP and Rai BK. (1976). *The tribal culture of India*. Concept Publishing Co, Delhi.
10. Haddon AC. (1929). *Races of man*. Cambridge University, London.
11. Kapoor A.K. (1992). *Genetic Diversity among Himalayan Human Populations*. M/S Vinod Publishers, Jammu
12. Majumdar DN. (1901). *Races and Culture of India*. Asia Publishing House, Bombay
13. Dube SC. (1992). *Indian Society*. National Book Trust, India : New Delhi.
14. Dumont L. (1980). *Homo Hierarchicus*. University of Chicago Press.
15. Guha B.S. (1931). The racial attributes of people of India. In : *Census of India, 1931, vol I, Part III (BPO, Simla)*
16. Malhotra K.C. (1978). *Morphological Composition of people of India*. J. Human Evolution.
17. Bailey, F.G. 1960. *Tribe, Caste and Nation: A Study of Political Activity and Political Change in Highland Orissa*, UK: Manchester University Press.

ELECTIVE COURSES (DSE)

DSE 3. Human Genetics

Theory

Credit- 4

Unit I: Structure, Function and Inheritance of the human genome- gene, DNA structure and replication, DNA repair and recombination, gene expression, coding and non-coding region.

Unit II: Expression of genetic information: from Transcription to Translation – the relationship between genes and protein, transcriptions; transcription and RNA processing, encoding genetic information, decoding the codons: the role of transfer RNAs.

Unit III: Methods of Genetic Study in Human: Pedigree analysis and expressivity; Chromosomal Basis of Genetic Disorders (Karyotypes and identification of chromosome variation; Nucleic Acid Hybridization Assays, cytogenetic mapping), Genetic mapping (Microsatellite and other DNA polymorphisms), LOD score; sequencing strategies (PCR based Sanger sequencing to Exome sequencing), concept of non-mendelian inheritance and complex diseases.

Unit IV: Genomic Diversity & Human Evolution Genomic Variation: Genomic Polymorphisms (SNPs, VNTR, CNVs, etc); haplotypes and haplogroups; genotype-phenotype correlations, epigenetics Peopling of the Indian Subcontinent: Evidence from mtDNA and Y-chromosome; evolutionary genetics; Molecular evolution; DNA sequence variation and human origins.

Practical (Any two)

Credit-2

1. Blood Collection, transportation and storage in field
2. DNA Extraction from whole blood
3. DNA Quantification, Aliquoting and sample preparation
4. PCR and electrophoresis
5. Gel Documentation

Suggested Readings:

1. Strachan T and Read AP. (2004). Human Molecular Genetics. Garland Science
2. Brown TA. (2007). Genomes. Garland Science.
3. Griffiths AJF. (2002). Modern Genetic Analysis: Integrating Genes and Genomes. WH Freeman Press.
4. Griffiths AJF, Wessler SR, Carroll SB, Doebley J. (2011). An Introduction to Genetic Analysis. Macmillan Higher Education.
5. Cavalli-sforza LL, Menozzi P, Piazza A (1994). History and Geography of Human Genes. Princeton University.
6. Cummings Michael R. (2009). Human Genetics. Cengage Learning India Pvt. Ltd, Delhi.
7. Cummings MR (2011). Human Heredity: Principles and Issues. Brooks/Cole, Cengage Learning
8. Giblett, ER. (1969). Genetic Markers in Human Blood. Blackwell Scietific, Oxford.
9. Jobling M, Hurls M and Tyler-Smith C. (2004). Human Evolutionary Genetics: Origins, Peoples & Disease. New York: Garland Science.
10. Lewis R. (2009). Human Genetics: Concepts and Application. The McGraw–Hill Companies, Inc.
11. Patch C. (2005). Applied Genetics in Healthcare. Taylor & Francis Group
12. Snustad .D.P. and Simmons M.J. (2006). Principles of Genetics, Fourth Edition, John Wiley & Sons USA
13. 14. Verma, P.S. and V.K. Aggarwal (1974). Cell Biology, Genetic, Molecular Biology, Evolution and Ecology. S.Chand and Company Pvt. Ltd., New Delhi.

DSE 7. Anthropology of Religion, Politics and Economy

Theory

Credit- 4

Unit I: Anthropological approaches to understand religion- magic, animism, animatism, totemism, naturism; witchcraft and sorcery; Religious specialists: shaman, priests, mystics; Overview of Anthropological Theories of Religion; Religion as the sacrality of ecological adaptation and socialness

Unit II: Economic institutions: principles of production, distribution, and consumption in simple and complex societies; critical examination of relationship between economy and society through neo-classical, substantivist, and neo-marxist approaches, various forms of exchange: barter, trade and market; Forms of currencies; reciprocities: generalized, balanced and negative.

Unit III: Political institutions: concepts of power and authority; types of authority; state and stateless societies; law and justice in simple and complex societies; the prospects for democracy and tolerance among and within the world's diverse civilizations; the meaning and sources of identity in complex contemporary societies; the origins of modern politics, its institutions, and cultures, both Western and non-Western.

Unit IV: Interrelationship between religion, politics and economy; religious conversion and movements, emergence of new religious sects in the global order.

Practical

Credit-2

1. Case study of any of the social institute (religion, economic, political) with respect to culture perspective

Suggested Readings:

2. Durkheim E. (1986). The elementary forms of the religious life, a study in religious sociology. New York: Macmillan.
3. Benedict A. (2006). Imagined Communities: Reflections on the Origin and Spread of Nationalism. Verso
4. Gledhill J. (2000). Power and Its Disguises: Anthropological Perspectives on Politics. 2nd ed. London: Pluto Press.
5. Ellis F. (2000). A framework for livelihood analysis. In Rural Livelihoods and Diversity in Developing Countries . Oxford: Oxford University Press.
6. Henrich J, Boyd R, Bowles S, Camerer C, Fehr E, Gintis H, McElreath R, Alvard M et al. (2005). 'Economic Man' in cross-cultural perspective: Behavioral experiments in 15 small-scale societies. Behavior and Brain Science. 28(6):795-815;
7. Henrich J. (2002). Decision-making, cultural transmission, and adaptation in economic anthropology. In: J. Ensminger (Ed.), Theory in Economic Anthropology (pp. 251-295). Walnut Creek, CA: Altamira Press.
8. Lambek. M. (2008) A Reader in the Anthropology of Religion.
9. Eller JD. (2007). Introducing Anthropology of Religion. New York: Routledge.
10. Glazier SD. (1997). Anthropology of Religion: A Handbook. Westport, CT: Greenwood Press.
11. Frick GD and Langer R. (2010). Transfer and Spaces. Harrassowitz (Germany).
12. Evans-Pritchard EE. (1937). Witchcraft, Oracles and Magic among the Azande, Oxford: Clarendon Press.
13. Frazer JG. (1978). The Illustrated Golden Bough, London: Macmillan.
14. Barbara M. (2011). Cultural Anthropology. New Jersey: Pearson Education.
15. Ember CR. (2011). Anthropology. New Delhi: Dorling Kindersley.
16. Herskovits MJ. (1952). Economic Anthropology: A Study in Comparative Economics. New York:

Alfred A Knopf Inc.

17. Malinowski B. (1922) *Argonauts of the Western Pacific*. London: Routledge.

18. Polanyi K. et al (1957), *Trade and Market in the Early Empires*. Chicago: Henry Regnery Company.

19. Balandier G. (1972). *Political Anthropology*. Middlesex: Penguin.

DSE 8. Tribal cultures of India

Theory

Credit- 4

Unit I: Concept of tribes and its problematic nature, General and specific characteristics of tribes, Classification and distribution of tribes based on their economy, occupation and religion, Racial elements among the tribes, Scheduled and non-scheduled categories of tribes, Particularly Vulnerable Tribal Groups (PVTGs).

Unit II: Tribe- caste continuum, Gender and Tribe, Distribution of tribes in India.

Unit III: Tribes: Nomenclature- emic and etic differences; Tribal movements, Problems of tribal development.

Unit IV: Forest policies and tribes, Migration and occupational shift, Tribal arts and aesthetics Displacement, rehabilitation and social change Globalization among Indian tribes.

Practical

Credit-2

1. Distribution of Indian Tribes: PVTGs, ST
2. Location of different tribes on the map of India
3. Write an annotated bibliography on any one tribe
4. Write the social structure of any one tribe of India

Suggested Readings:

1. Behera, D.K and Georg pfeffer. Contemporary Society Tribal Studies, Volume I to VII. New Delhi: Concept Publishing Company
2. Georg Pfeffer. Hunters, Tribes and Peasant: Cultural Crisis and Comparison. Bhubaneswar: Niswas.
3. Vidarthy, L.P. and Rai. Applied Anthropology in India.
4. Vidarrthy.L.P. and B.N. Sahay . Applied Anthropology and Development in India. New Delhi: National Publishing House

DSE 12. Demographic Anthropology

Theory

Credit- 4

Unit I: Demographic Anthropology; Introduction, definition and basic concepts Relationship between demography, population studies and anthropology Population Theories: John Graunt, Thomas R. Malthus; Biological theory of population; Theory of demographic transition.

Unit II: Tools of Demographic Data; Measures of population composition, distribution and growth; Measures of fertility; Measures of mortality; Measures of migration.

Unit III: Population of India; Sources of demographic data in India; Growth of Indian population; Demography of Indian tribal and non-tribal groups; Anthropological determinants of population growth; Impact of urbanization on the migration of tribal groups.

Unit IV: National policies; National Population Policy; National Health Policy; National Policy on Reproductive Health Care.

Practical

Credit-2

A student will collect and compile demographic data from different secondary sources on any given topic by the concerned teacher and a project report will be submitted for its evaluation.

Suggested Readings

1. Bhende A. and Kaniikar, T. (2010) *Principles of Population Studies*. Himalaya Publishing House. Mumbai (All Units, It covers most topics)
2. Caldwell J.C. (2006). *Demographic Transition Theory*. Springer.
3. Census of India (2001,2011), SRS bulletin (2013), NFHS (2006), CRS, NSSO (Can be seen from browsing net)
4. Gautam R.K., Kshatriya, G.K. and Kapoor A.K. (2010) *Population Ecology and Family Planning*. Serials publications. New Delhi.
5. Howell N. (1986) Demographic Anthropology. Ann. Rev. Anthropol. 15: 219-246
6. Kshatriya G.K. (2000). Ecology and health with special reference to Indian tribes. *Human Ecology special volume* 9:229-245.
7. Kshatriya G.K., Rajesh,G. and Kapoor , A.K. (2010) Population Characteristics of Desert Ecology.VDM Verlag Dr. Muller Gmbh and Co., Germany.
8. Misra BD (1982). *An introduction to the study of population*. South Asia publ. ltd. New Delhi.
9. National Population Policy <http://populationcommission.nic.in/npp.htm>
10. Park K. (2000) *Text book of Preventive and Social Medicine*. Banarsidas Bhanot, Jabalpur.
11. Patra P.K. and Kapoor, A.K. (2009) *Demography And Development Dynamics in a Primitive Tribe of Himalayas*. International Book Distributors, Dehradun
12. Riley N.E. and Mc Carthy, J. (2003) *Demography in the Age of the Postmodern*. Cambridge University press. UK. Pages 1-13 and 32-98
13. Sharma A.K. (1979) Demographic transition: A Determinant of Urbanization. *Social Change* 9: 13-17.
14. Srivastava O.S. (1996) *Demographic and Population Studies*. Vikas Publishing House, India
15. Zubrow E.B.W. (1976) *Demographic anthropology. Quantitative approaches*. University of New Mexico Press, Albuquerque.
16. <http://human-nature.com/dm/chap3.html>
17. <http://biography.yourdictionary.com/john-graunt>
18. <http://www.marathon.uwc.edu/geography/demotrans/demtran.htm>

DSE 13. Urban Anthropology

Theory

Credit- 4

Unit 1 : Emergence of urban anthropology; Introduction, Extension of the anthropological interest in peasants and rural areas, Origins of Cities and Early Sociological Approaches, Urban planning and design

Unit 2: Political economy; Rural-urban migration, kinship in the city, problems that arise from urbanism, poverty and social stratification

Unit 3: Class approach; Culture of Poverty and the Underclass Approach, Comparison between relations function in an urban setting versus function in a rural setting, Race and Class in Urban Ethnography, Urban Dystopia

Unit 4: Urban Inequality and Disasters; Poverty, extended family for urban natives versus migrants, Global Cities and the Production of Space, Community study and urban ecology, Urban Space, Postmodern and Hypermodern City; Contemporary urban issues: Suburbs, Exurbs and Urban Decline.

Practical

Credit-2

1. Visit city life among business community and appreciate the role of culture with politics and economics.
2. Media-popular culture behaviour
3. Photo shoot in any city life, Creating captions and texts relating to urban anthropology findings.

Suggested readings

1. <http://www.oxfordbibliographies.com/>
2. Cities, classes and the social order. Anthony Leeds, Roger Sanjek
3. Childe, V. Gordon. 1950. "Urban Revolution." Town Planning Review
4. Low Reader Part V: "The Postmodern City" in Low pp. 317-377;
5. Dear and Flusty "Anthropological Fieldwork in Cities", "The anthropology of Cities: Some Methodological Issues".

DSE . Prehistoric Archaeology of India

Theory

Credit- 4

Unit I: Pleistocene chronology of India; Palaeolithic cultures in India.

Palaeolithic cultures in India: Lower Palaeolithic cultures – evidences from Kashmir Valley and Peninsular India), Middle Palaeolithic culture in India, Upper Palaeolithic culture in India (characteristic features, major type tools, important sites, chronology with stratigraphic evidences). Some important sites of Odisha may be discussed on above cultural periods.

Unit II: Mesolithic cultures in India.

Mesolithic cultures in India (characteristic features, major type tools, important regions and sites, chronology with stratigraphic evidences (some important sites of Odisha may be discussed on above cultural periods).

Unit III: Neolithic cultures in India.

Neolithic culture in India (characteristic features, major type tools, important regions and sites, chronology with stratigraphic evidences (some important sites of Odisha may be discussed on above cultural periods).

Unit IV: Rock art of India.

Prehistoric Art in India with special reference to Central India and Odisha.

Practical

Credit 2

1. Identification of tools:
 - (a) Hand axe varieties, chopper/chopping tools
 - (b) Cleaver varieties
 - (c) Side scraper varieties
 - (d) Knives e) Burins
 - (f) End scrapers
 - (g) Borer
 - (h) Microlithic tools
 - (i) Bone tools
2. Identification of lithic technology.

Suggested Reading:

10. Agarwal, D. P. 1984, *Archaeology of India*. New Delhi: Select Book Services Syndicate.
11. Allchin, Briget. and Raymond Allchin, 1982. *The Rise of Civilization in India and Pakistan*. Cambridge: Cambridge University Press.
12. Allchin, B. and R. Allchin, 1997. *Origins of Civilization: The Prehistory and Early Archaeology of South Asia*. New Delhi. Viking by Penguin Books India (P) Ltd.
13. Bhattacharya, D. K. 1990, *An Introduction to Prehistoric Archaeology*. Delhi; Hindustan Publishing Corporation
14. Bhattacharya, D. K. 2001. *An Outline of Indian Prehistory*. Delhi: Palaka Prakashan.
15. Chakrabarti, D.K. 2001. *India: An Archaeological History: Palaeolithic Beginning to Early Historic Foundation*. New Delhi: Oxford University press.
16. Jain, V.K. 2009, *Prehistory and Protohistory of India*. New Delhi: D.K. Printworld (P) Ltd.
17. Paddayya, K. (Ed.), 2002, *Recent Studies in Indian Archaeology*. New Delhi.
18. Pappu R. S. 2001, *Aheulian Culture in Peninsular India-- An Ecological Perspective*, New Delhi: D.K. Printworld (P) Ltd.
10. Rammi Reddy, V. 1987, *Elements of Prehistory*. New Delhi: Mittal Publications.
11. Rammi Reddy, V. 1989, *Palaeolithic and Mesolithic Cultures*. New Delhi: Mittal Publications.
12. Rammi Reddy, V. 1991, *Neolithic and Post-Neolithic Cultures*. New Delhi: Mittal Publications.
13. Sankalia, H.D. 1974. *Prehistory and Protohistory of India and Pakistan*. Pune: Deccan College.
14. Sankalia (1982) *Stone Tool Type and Technology*. Delhi, B.R. Publication.
15. Settar, S. and R. Korisettar (Ed), 2001, *Indian Archaeology in Retrospect*, Vol.1: PREHISTORY Archaeology of South Asia. New Delhi: Manohar in association with Indian Council of Historical Research.

Generic Elective Course (GE)

Credits: Any four papers = Theory + Practical = (4+2)*4 = 24

For B.Sc. in Anthropology, a student shall have the option to choose from the following subjects: Chemistry, Botany, Zoology, Geology, Geography, Bio-Technology, Environmental Science, Psychology, Statistics, Marine Science, BCA

For B.A. in Anthropology, a student shall have the option to choose from the following subjects: History, Political Science, Economics, Psychology, Geography, Sociology, Home Science, Sanskrit, Odia, Philosophy, BBA and BBA (Health Care management), Tourism Administration

Ability Enhancement (Compulsory Course)

Credits: Two Papers = $2 \times 4 = 8$

Ability enhancement elective (skill based) Course

Credits: Any two papers = Theory + Practical = $2 \times 4 = 8$

SEC 1. Public health and epidemiology

Theory

Credit- 2

Unit I: Principles of Epidemiology in Public Health: Public health and Anthropology; Overview of epidemiology methods used in research studies to address disease patterns in community and clinic-based populations, distribution and determinants of health-related states or events in specific populations, and strategies to control health problems

Unit II: Environmental Health; Effects of biological, chemical, and physical agents in environment on health (water, air, food and land resources); ecological model of population health; current legal framework, policies, and practices associated with environmental health and intended to improve public health. Psychological, Behavioural, and Social Issues in Public Health: behavioural science theory and methods to understanding and resolving public health problems

Unit III: Management of Health Care Program and Service Organizations; Techniques and procedures for monitoring achievement of a program's objectives, generating evidence of program effectiveness, assessing impacts in public health settings; evaluate framework that leads to evidence-based decision-making in public health.

Unit IV: Epidemiology of disease; Contemporary methods for surveillance, assessment, prevention, and control of infectious and chronic diseases, disabilities, HIV/AIDS; understanding etiology; determining change in trend over time; implementation of control measures

Practical

Credit-2

1. Draw appropriate inferences from provided epidemiologic data through statistical analysis
2. Assesses the health status of populations and their related determinants
3. Analyzes information relevant to specific public health policy issues
4. Development of health promotion model for health problem

Suggested reading

1. Gordis L. (2004). Epidemiology. Third edition. Philadelphia: Elsevier Saunders.
2. Remington PL, Brownson RC, and Wegner MV. (2010). Chronic Disease Epidemiology and Control. American Public Health Association.
3. Pagano M and Gauvreau K. (2000). Principles of Biostatistics. Belmont, CA: Wadsworth.
4. Turnock B. (2011). Public health. Jones & Bartlett Publishers.
5. Edberg M. (2013). Essentials of Health Behavior. Social and Behavioral Theory in Public Health. Second Edition, Jones and Bartlett Publishers.
6. Griffith JR and White KR. (2010). The Well-Managed Healthcare Organization. Health Administration Press: Chicago, IL.
7. Kovner AR, McAlearney AS, Neuhauser D. (2013). Health Services Management: Cases, Readings, and Commentary. 10th Ed. Chicago, IL: Health Administration Press.

8. Lee LM. (2010). Principles and Practice of Public Health Surveillance. Oxford University Press
9. Turnock B. (2011). Essentials of Public Health. Jones & Bartlett Publishers
10. Merson M, Black RE, Mills A. (2006). International Public Health: Diseases, Programs, Systems and Policies. Jones & Bartlett Learning.
11. Aschengrau A and Seage GR. (2008). Essentials of Epidemiology in Public Health. Boston, Massachusetts.

SEC 2. Business and Corporate Anthropology

TheoryCredit-2

Unit 1: History of Business and corporate Anthropology; Subject Matter of Business Anthropology: Organizational Anthropology, Marketing and Consumer Behaviour, Design Anthropology, Globalization and International communication.

Unit 2: Applied anthropology in industry; application of the ethnography in business Management: organizational ethnography, stages and advantages of ethnographic approach, ethical issues in ethnographic research.

Unit 3: Anthropology and consumer behaviour: cultural meaning to consumer behaviour; Anthropological approach to consumer behaviour: values and consumer behaviour, Heros and consumer behaviour, Rituals and consumer behaviour, Symbols and consumer behaviour.

Unit 4: Globalization. Regional Cooperation. and International Business: Cultural dimensions in international business: Hofstede and Ferraro; Cross-cultural Business Etiquette and Sensitivity in international communication

Practical

Credit-2

1. Visit a corporate sector and write a short report Case study
2. Study of interaction pattern in corporate sector with reference to ethnicity
3. Make a schedule on the structure of the corporate/MNC
4. Make a brief report only on one dimension of the corporate sector and give your assessment

Suggested Readings

1. Jordan, Ann T. Business Anthropology. Waveland Press, Long Grove, Illinois.
2. Whyte, W.F. 1948 Incentives for Productivity: The Case of the Bundy Tubing Company Applied Anthropology 7(2):1-16
3. Gardner, Burleigh B. 1978 Doing Business with Management. In Applied Anthropology in America, Elizabeth M. Eddy and William Partridge (Eds.).New York: Columbia University Press. Pp.245- 260.
4. Handbook of Anthropology in Business by Rita M Denny.
5. Advanced reading in Business Anthropology edited by Robert Guang Tian, Daming Zhu, Alfons van Marrewijk.

SEC 3. Media Anthropology

TheoryCredit-2

Unit 1: Introduction to Media Anthropology; Audiences, Consumption and Identity Formation: The Social and Material Life of Cinema; Television and the Cultural Politics of Nation, Media as Material Objects.

Unit 2: The Cultural Work of Mass Media Production: Producing “Bollywood”.

Unit 3: Producing Reality – Journalism and Advertising; News as Social Practice; the Local and the Global in Advertising.

Unit 4: Small Media: Materiality, Circulation, Everyday Life & Social Transformations; Indigenous Media and Cultural Activism; The Social and Material Lives of Cell Phones; Media as Social Infrastructure – The Case of Facebook; Learning from New Media; The Possibilities & Constraints of YouTube.

Practical

Credit-2

1. Visit to Mass Media Company and submit a report on any one dimension.
2. Making a schedule and testing the same in the field with focus on either cinema or television
3. Describe the components of mass media in its different parts
4. Submit a report on the behavioural pattern of media people.

Suggested readings

1. Rothenbuhler, Eric W; Coman, Mihai. Media Anthropology. 2005. California, Sage.
2. Askew, K and R.R. Wilk (Eds.). 2002. The Anthropology of Media- a Reader. Blackwell Publishers Ltd, USA.
3. Brauchler, B and J. Postill (Eds.). 2010. Theorising Media and Practice. Berghahn Books.

SEC 4. Tourism Anthropology

Theory

Credit-2

Unit I: Tourism- anthropological issues and theoretical concerns, tourist as ethnographer; pilgrimage and Authenticity Issues.

Unit II: Interconnections between tourism history and the rise of the socio-cultural study of tourism including temporary migration, colonial exploration, pilgrimage, visiting relatives, imagined and remembered journeys, and tourism.

Unit III: understand the implications of tourism as a major mechanism of cross-cultural interaction; role of symbolism, semiotics, and the imagination in tourism; tourism and the commodification of culture or cultural degradation.

Unit IV: understand the global and local political economy of contemporary tourism, particularly in relation to international development; explore dynamic relationships between heritage-making enterprises, revival and preservation projects, the international flow of capital; role of museums and other branches of the cultural industries" (including music, art, and food) in tourism economies; tourism and global mobility; Ecotourism and sustainable development.

Practical

Credit-2

1. Visit a place, identify a population and write a short report Case study
2. Make a brief report only on one dimension of the tourism sector and give your assessment

Suggested Readings

1. Chambers E. (2000). Native Tours: The Anthropology of Travel and Tourism. Prospect Heights: Waveland.

2. Crick M. (1995). The Anthropologist as Tourist: An Identity in Question. In Lanfant MF, Allcock JB, Bruner EM (eds.) International Tourism: Identity and Change. London: Sage. pp. 205-223.
3. Dann GMS, Nash D and Pearce PL. (1988). Methodology in Tourism Research. Annals of Tourism Research. 15:1-28.
4. Gmelch SB. (2004). Tourists and Tourism: A Reader. Long Grove: Waveland.
5. Graburn NHH. (1977). Tourism: The Sacred Journey. Hosts and Guests: The Anthropology of Tourism. Valene L. Smith, ed. Philadelphia: University of Pennsylvania Press. Pp. 33-47.
6. Dann G. (2002). The Tourist as a Metaphor of the Social World. Wallingford: CAB International.
7. Nash D. (1996). Anthropology of Tourism. New York: Pergamon.
8. Kirshenblatt-Gimblett B. (1998). Destination Culture: Tourism, Museums, and Heritage. University of California Press.
9. Lippard LR. (1999). On the Beaten Track: Tourism, Art and Place. New Press.
10. Picard M and Wood R. (1997). Tourism, Ethnicity, and the State in Asian and Pacific Societies. University of Hawaii Press.
11. Crick M. (1994). Anthropology and the Study of Tourism: Theoretical and Personal Reflections. In Crick M (eds.). Resplendent Sites, Discordant Voices: Sri Lankans and International Tourism. Chur, Switzerland: Harwood Publishers.
12. Wood R. (1997). Tourism and the State: Ethnic Options and the Construction of Otherness. In Picard and Wood Tourism, Ethnicity and the State in Asian and Pacific Societies. University of Hawaii Press. Otherness. In Picard and Wood Tourism, Ethnicity and the State in Asian and Pacific Societies. University of Hawaii Press.
13. Richard B. (1992). Alternative Tourism: The Thin Edge of the Wedge. In Valene Smith and Eadington Tourism (eds.). Alternatives: Potentials and Problems in the Development of Tourism. University of Pennsylvania Press.
14. Hitchcock. (1997). Cultural, Economic and Environmental Impacts of Tourism Among the Kalahari. In Chambers E (eds.) Tourism and Culture: An Applied Perspective. SUNY Press.

SEC5. Museology and Cultural Resource Management

Theory

Credit-2

Unit-I Museum, Museology and New Museology

Museum and Museology: Meaning, Definition, Nature and Scope; Classification of Museums in India--National Museum, State Museum, University Museum, Specialized Museums in India.
New Museology: Concept and scope, New Museum Movement

Unit-II Museum Administration, Acquisition, Display and Documentation:

Museum Administration: Staff

Acquisition and Arrangement of Specimens: Modes and ways of Acquisition of Museum Specimens, Principles of Display and Arrangement in Museums (including lighting)

Documentation and Labels of Museum Specimens: Methods of Documentation, Documentation of Ethnographic and Archaeological Specimens,

Unit-III Management of Cultural Resources in Museum (Storage, Security and Conservation)

Museum Storage: Location of the storage, Storage Furniture, Lighting and Ventilation in Storage, Methods of Storage, Visual Storage.

Security in Museum: Security Risks of Museum Objects, Preventive Measures.

Conservation of Cultural Resources in Museum: Causes of Decay and Deterioration, Care and Handling, Cleaning and Repairing, Packing and Shifting of Museum Objects; Preservation of Organic and Inorganic Objects in Museums.

Unit-IV Educational and Extension Activities of Museum

Museum Education, Tourism and Museums, Travelling Exhibition, Museum Library and Publication, Public Relations, Museum and Communities

Practical

Credit-2

3. Development of Computer based Documentation; Museum Labels; Dioramas, Models and Charts; Museum Photography.
4. Cleaning and Repairing, Packing and Shifting of Museum Objects; Preservation of Organic and Inorganic Objects in Museums.

Suggested Readings:

1. Agrawal, O. P. and Shashi Dhawan 1985 Control of Biodeterioration in Museums. National Research Laboratory for Conservation of Cultural Property, Lucknow.
2. Agrawal, O. P. and Mandana Barkeshli 1997 Conservation of Books, Manuscripts and Paper Documents. INTACH, Indian Council of Conservation Institutes, Lucknow.
3. Aiyappan, A. and S.T. Satyamurti (Ed), 1960, Handbook of Museum Technique, Government Museum, Madras.
4. Banerjee, N. R. 1990, Museum and Cultural Heritage in India. Agamkala Prakashan, Delhi.
5. Basa, K.K., Md. Rehan, R.K. Gupta 2007, Museology A Comprehensive Bibliography and Webliography, Serial Publications, New Delhi.
6. Basa, K. K. 2010 Museums in India: From Colonial Constructs to Post-Colonial Engagements. Jhargram: INCAA Publications
7. Behera, B.K. and S.K. Mohanty, 2007, Museology and Museum Management in India, Mayur Publications, Bhubaneswar, Orissa.
8. Bhatnagar, A. 1999, Museum, Museology and New Museology, Sandeep Prakashan, New Delhi.
9. Diwvedi, V. P. and G.N. Pant (Ed) 1980, Museum and Museology: New Horizon, Agam Kala Prakashan, New Delhi.
10. Ghoshmaulik, S.K. and K. K. Basa (Ed) 2001, Understanding Heritage: Role of Museum, Academic staff Collage, Utkal University, Bhubaneswar, India.
11. Nair, S. M., 1970. Bio-Deteriorations of Museum Materials, Agam Kala Prakashan, New Delhi.
12. Nigam, M. L., 1985 Fundamentals of Museology, Deva Publications, Hyderabad.
13. Sarkar, H. 1981, Museums and Protection of Monuments and Antiquities in India, Sandeep Prakashan, New Delhi.
14. Stone, P.G. and B. L. Molyneaur 1994, The Present Past: Heritage Museums and Education, Routledge, London.
15. Thompson, J.M. (Ed.) 1992, Manual of Curatorship: A Guide to Museum Practice, Butterworth-Heinemann Ltd. Oxford.

**SYLLABUS FOR
B.A. HONOURS AND REGULAR/PASS ECONOMICS
UNDER CHOICE BASED CREDIT SYSTEM**

**Approved by
the Board of Studies of Economics held
on 24 May 2016**



**UTKAL UNIVERSITY
VANI VIHAR, BHUBANESWAR – 751 004
ODISHA, INDIA**

SYLLABUS FOR B.A. (HONORS) ECONOMICS UNDER CHOICE BASED CREDIT SYSTEM OF UTKAL UNIVERSITY, BHUBANESWAR

Course Structure for B.A. (Honours) Economics

There are a total of fourteen economics core courses that students are required to take across six semesters. All the core courses are compulsory. In addition to core courses in economics, a student of B.A. (Honours) Economics will choose four Discipline Specific Elective (DSE) Courses. The DSE Courses are offered in the fifth and sixth semesters and two such courses will be selected by a student from a set of courses specified for each of these semesters (Groups I and II in the attached table). It is recommended that each college should offer at least three DSE Courses in the fifth and sixth semesters to allow the students some minimal element of choice.

Contact Hours: Each course has 5 lectures and 1 tutorial (per group) per week. The size of a tutorial group is 8-10 students.

Note on Course Readings: The nature of several of the courses is such that only selected readings can be specified in advance. Reading lists will be updated and topic-wise readings will be specified at regular intervals, ideally on an annual basis.

Course Structure for B.A. (Honours) Economics

Semester I

1. **Economics Core Course 1:**
Introductory Microeconomics
2. **Economics Core Course 2:**
Mathematical Methods for
Economics I
3. **AECC I:**
Environmental Studies
4. **Generic Elective Course (GE) I**

Semester III

1. **Economics Core Course 5:**
Microeconomics I
2. **Economics Core Course 6:**
Macroeconomics I
3. **Economics Core Course 7:**
Statistical Methods for Economics
4. **Skill Enhancement Course (SEC) I:**
English
5. **GE III**

Semester V

1. **Economics Core Course 11:** Indian
Economy I
2. **Economics Core Course 12:**
Development Economics I
3. **Discipline Specific Electives (DSE)
Course I**
(From List of Group I)
4. **Discipline Specific Electives (DSE)
Course II**
(From List of Group I)

DSE Group I

1. Economic History of India (1857-
1947)
2. Introductory Econometrics
3. Odisha Economy
4. Research Methodology

Semester II

1. **Economics Core Course 3:**
Introductory Macroeconomics
2. **Economics Core Course 4:**
Mathematical Methods for
Economics II
3. **AECC II:**
MIL (Odia / AE)
4. **Generic Elective Course (GE) II**

Semester IV

1. **Economics Core Course 8:**
Microeconomics II
2. **Economics Core Course 9:**
Macroeconomics II
3. **Economics Core Course 10:** Public
Economics
4. **Skill Enhancement Course (SEC) II**
5. **GE IV**

Semester VI

1. **Economics Core Course 13:** Indian
Economy II
2. **Economics Core Course 14:**
Development Economics II
3. **Discipline Specific Electives (DSE)
Course III**
Dissertation / Project
4. **Discipline Specific Electives (DSE)
Course IV**
(From List of Group II)

DSE Group II

1. Environmental Economics
2. International Economics
3. Agricultural Economics

Skill Enhancement Courses (SEC II)

1. Data Analysis and Computer Application
2. Financial Economics

Syllabus for BA Economics (Regular)
Core and Discipline Specific Electives (DSE) Courses

Semester I

Core Economics I:

Principles of Microeconomics I

Semester III

Core Economics III:

Principles of Macroeconomics I

Semester V

Discipline Specific Electives I

One of the following:

1. **DSE 1:** Economic Development and Policy in India
2. **DSE 2:** Economic History of India 1857-1947

Semester II

Core Economics II:

Principles of Microeconomics II

Semester IV

Core Economics IV:

Principles of Macroeconomics II

Semester VI

Discipline Specific Electives II

One of the following:

1. **DSE 3:** Odisha Economy
2. **DSE 4:** Money and Banking

Core Economics Course 1: INTRODUCTORY MICROECONOMICS

Course Description

This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situations.

Module 1: Exploring the subject matter of Economics

The Ten Principles of Economics: How people make decisions; Working of the economy as a whole; Thinking Like an Economist: The economist as Scientist – The scientific method: Observation, Theory and more observation; Role of assumptions; Economic Models; The economist as a policy advisor; Why economists disagree; Graphs in Economics

Module 2: Supply and Demand: How Markets Work, Markets and Welfare

The market forces of demand and supply – Markets and competition; The demand curve – Market vs individual demand curve; Shifts in demand curve; The supply curve – Market vs individual supply curve; Shifts in supply curve; Equilibrium between supply and demand and changes there in; Price elasticity of demand and its determinants; Computing price elasticity of demand; Income and cross elasticity of demand; The price elasticity of supply and its determinants; Computing price elasticity of supply; Consumer Surplus and Producer Surplus; Market efficiency and market failure.

Module 3: The Households

The Budget Constraint; Preferences – representing preferences with indifference curves; Properties of indifference curves; Two extreme examples of indifference curves; Optimisation – Equilibrium; Change in equilibrium due to changes in income, changes in price; Income and substitution effect; Derivation of demand curve; Three applications – Demand for giffen goods, wages and labour supply, Interest rate and household saving.

Module 4: The Firm and Market Structures

Cost concepts; Production and costs; The various measures of cost – Fixed and variable cost, average and marginal cost; Cost curves and their shapes; Costs in the short run and in the long run; Economies and diseconomies of scale. Firms in competitive markets – What is a competitive market; Profit maximisation and the competitive firm's supply curve; The marginal cost curve and the firm's supply decision; Firm's short-run decision to shut down; Firm's long-run decision to exit or enter a market; The supply curve in a competitive market – short run and long run; Monopoly - Why monopolies arise and public policy towards monopolies

Module 5: The Input Markets

The demand for labour – The production function and the marginal product of labour; Value of the marginal product of labour and demand for labour; Shifts in labour demand curve; The supply of labour – the trade-off between work and leisure; Shifts in the labour supply curve; Equilibrium in the labour market; Other factors of production: Land and capital; Linkages among factors of production.

Readings:

1. Principles of Economics, Gregory N Mankiw, 6e Cengage Learning India Private Limited, New Delhi
2. William A McEachern and Simrit Kaur (2012): *Micro Econ: A South-Asian Perspective*, Cengage Learning India Private Limited, New Delhi.
3. Karl E. Case and Ray C. Fair (2007): *Principles of Economics*, 8th Edition, Pearson Education Inc.

Core Economics Course 2: MATHEMATICAL METHODS FOR ECONOMICS I

Course Description

This is the first of a compulsory two-course sequence. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this syllabus. In this course, particular economic models are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.

Module I: Preliminaries

Sets and set operations; relations; functions and their properties; Number systems

Module II: Functions of one real variable

Types of functions- constant, polynomial, rational, exponential, logarithmic; Graphs and graphs of functions; Limit and continuity of functions; Limit theorems

Module III: Derivative of a function

Rate of change and derivative; Derivative and slope of a curve; Continuity and differentiability of a function; Rules of differentiation for a function of one variable; Application- Relationship between total, average and marginal functions

Module IV: Functions of two or more independent variables

Partial differentiation techniques; Geometric interpretation of partial derivatives; Partial derivatives in Economics; Elasticity of a function – demand and cost elasticity, cross and partial elasticity

Module V: Matrices and Determinants

Matrices: concept, types, matrix algebra, transpose, inverse, rank; Determinants: concept, properties, solving problems using properties of determinants, solution to a system of equations - Cramer's rule and matrix inversion method.

Readings:

1. K. Sydsaeter and P. J. Hammond (2002): *Mathematics for Economic Analysis*. Pearson Educational Asia
2. A. C. Chiang and K. Wainwright (2005): *Fundamental Methods of Mathematical Economics*, McGraw Hill International Edition.
3. T. Yamane (2012): *Mathematics for Economists*, Prentice-Hall of India

Generic Elective I: Indian Economy

Course Description: This paper introduces the students to the essentials of Indian economy with an intention of understanding the basic feature of the Indian economy and its planning process. It also aids in developing an insight into the agricultural and industrial development of India. The students will understand the problems and policies relating to the agricultural and industrial sectors of India and current challenges of Indian economy.

Module I: Introduction to Indian Economy

Colonialism & British Rule: Exploitation and under-development in India; Basic features of India Economy; Indian Economy as a developing economy; Demographic trends in India - Size and growth of population, Occupational structure, Sex composition, Age structure and demographic dividend; Causes of population growth and population policy

Module II: Indian Agriculture

Role of agriculture in Indian Economy; Cause of low productivity, Green Revolution and Land Reforms, Agricultural Finance-Sources and Problems; Agricultural Marketing in India

Module III: Industrial Development in India

Role of Industrialisation in Indian Economy; Small Scale & Cottage Industries: Meaning, Role, Problems and Remedies; Industrial Policies of 1948, 1956, 1977 and 1991; Problems of Industrial Development in India; Industrial Sickness

Module IV: Service Sector in India

Growth & Contribution to GDP; Composition and relative importance of service sector; Factors determining growth of the sector; ICT and IT – Spread and Policy; Sustainability of services led growth

Module V: Current Challenges facing Indian Economy

Unemployment – Meaning; important employment Generation programmes, MGNREGS; Inequality in income distribution-Causes thereof; Government policy to check its growth

Basic Readings:

1. Kapila U. *Indian economy since Independence*. Academic Foundation, New Delhi
2. Misra, S. K. and Puri V. K. *Indian Economy — Its Development Experience*. Himalaya Publishing House, Mumbai
3. Dutt R. and Sundharam K. P. M. *Indian Economy*. S. Chand & Company Ltd., New Delhi.
4. Agarawala, A. N. *Indian Economy*, New Age Publications, New Delhi
5. Panagariya, Arvind (2008): *India: the Emerging Giant*, Oxford University Press, New York
6. Acharya, S. and Mohan, R. (Eds.) (2010): *India's Economy: Performance and Challenges*, Oxford University Press, New Delhi.
7. Ahluwalia, I. J. and Little, I. M. D. (Eds.) (1998): *India's Economic Reforms and Development: Essays for Manmohan Singh*, Oxford University Press, New Delhi.

Core Economics Course 3: INTRODUCTORY MACROECONOMICS

Course Description

This course aims to introduce the students to the basic concepts of Macroeconomics. Macroeconomics deals with the aggregate economy. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.

Module I: Basic Concepts

Macro vs. Micro Economics; Why Study Macroeconomics? Limitations of Macroeconomics ; Stock and Flow variables, Equilibrium and Disequilibrium, Partial and General Equilibrium Statics – Comparative Statics and Dynamics ; National Income Concepts – GDP, GNP, NDP and NNP at market price and factor cost; Personal Income and Disposable personal Income; Real and Nominal GDP

Module II: Measurement of Macroeconomic Variables

Output, Income and Expenditure Approaches ; Difficulties of Estimating National Income; National Income Identities in a simple 2- sector economy and with government and foreign trade sectors; Circular Flows of Income in 2, 3 and 4-sector; economies; National Income and Economic Welfare ; Green Accounting.

Module III: Money

Evolution and Functions of Money, Quantity Theory of Money – Cash Transactions, Cash Balances and Keynesian Approaches, Value of Money and Index Number of Prices

Module IV: Inflation, Deflation, Depression and Stagflation

Inflation – Meaning, Causes, Costs and Anti-Inflationary Measures; Classical, Keynesian, Monetarist and Modern Theories of Inflation, Deflation- Meaning, Causes, Costs and Anti-Deflationary Measures, Depression and Stagflation; Inflation vs. Deflation

Module V: Determination of National Income

The Classical Approach - Say's Law, Theory of Determination of Income and Employment with and without saving and Investment; Basics of Aggregate Demand and Aggregate Supply and Consumption- Saving – Investment Functions, The Keynesian Approach – Basics of Aggregate Demand and Aggregate Supply and Consumption, Saving, Investment Functions; The Principle of Effective Demand; Income Determination in a Simple 2-Sector Model; Changes in Aggregate Demand and Income- The Simple Investment Multiplier; Income Determination in a 3-Sector Model with the Government Sector and Fiscal Multipliers

Readings:

1. N. Gregory Mankiw (2010): *Macroeconomics*, 7th edition, Cengage Learning India Private Limited, New Delhi
2. Richard T. Froyen (2005): *Macroeconomics*, 2nd Edition, Pearson Education Asia, New Delhi.
3. Errol D'Souza (2009): *Macroeconomics*, Pearson Education Asia, New Delhi.

Core Economics Course 4: MATHEMATICAL METHODS FOR ECONOMICS II

Course Description

This course is the second part of a compulsory two-course sequence. This part is to be taught in Semester II following the first part in Semester I. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this Syllabus. In this course, particular economic models are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.

Module I: Linear models:

Input- Output Model: Basic concepts and structure of Leontief's open and static Input-Output model; solution for equilibrium output in a three industry model; The closed model

Module II: Second and higher order derivatives:

Technique of higher order differentiation; Interpretation of second derivative; Second order derivative and curvature of a function; Concavity and convexity of functions; Points of inflection

Module III: Differentials and total derivatives:

Differentials and derivatives; Total differentials; Rules of differentials; Total derivatives; Derivatives of implicit functions

Module IV: Single and multivariable optimisation:

Optimum values and extreme values; Relative maximum and minimum; Necessary versus sufficient conditions - First and Second derivative tests; Economic applications thereof, First and second order condition for extremum of multivariable functions; Convex functions and convex sets

Module V: Optimisation with Equality Constraints:

Effects of a constraint; Finding stationary value – Lagrange-Multiplier method (Two variable single constraint case only); First and second order condition; The Bordered Hessian determinant.

Readings:

1. K. Sydsaeter and P. J. Hammond (2002): *Mathematics for Economic Analysis*. Pearson Educational Asia
2. A. C. Chiang and K. Wainwright (2005): *Fundamental Methods of Mathematical Economics*, McGraw Hill International Edition.
3. T. Yamane (2012): *Mathematics for Economists*, Prentice-Hall of India

Generic Elective II: Indian Economy II

Course Description: This paper is the part II of Indian economy deals with the external sector, financial markets in India, Indian Public Finances and Economic Reforms. This paper also throws some light on current challenges of Indian Economy.

Module I: External Sector in India

Trends, Composition & Direction in exports from and imports of India; Problems of Balance of Payment: Causes of deficit in BoP & measures to correct it; Trade Policy- Export Promotion Vs Import Substitution; Foreign Trade Policy of India; WTO and India

Module II: Financial Markets in India

Commercial Banking in India- Nationalisation of Banks; Lead bank scheme and branch expansion; RBI - Functions, Monetary Policy; Development Banking- IFCI, IDBI, SIDBI and NABARD

Module III: Indian Public Finance

Public Expenditure-Growth and Composition, Causes of Growth of Public Expenditure in India: Tax Revenue of Central and State Governments; Concept of VAT; Deficit Financing in India- Revenue, Budget, Fiscal and Primary Deficits; Purpose and Effects of Deficit Financing; India's Fiscal Policy-Objectives

Module IV: Economic Reforms, Globalisation in India, Foreign Capital and MNCs

Genesis of Reforms, Macroeconomic Stabilisation, Structural Reforms, Appraisal
Globalisation and its impact on the Indian Economy; Foreign Capital-Need, Components; MNCs – Reasons for Growth and Appraisal

Module V: Current Challenges Facing Indian Economy

Inflation – Causes, Consequences and Anti-inflationary Policy; Poverty – Poverty line and Estimates, Major Poverty Alleviation Programmes; Environmental Degradation – Growth and Environment; Population Growth and Environment; Environment Policy

Basic Readings:

1. Kapila U. *Indian economy since Independence*. Academic Foundation, New Delhi
2. Misra, S. K. and Puri V. K. *Indian Economy — Its Development Experience*. Himalaya Publishing House, Mumbai
3. Dutt R. and Sundharam K. P. M. *Indian Economy*. S. Chand & Company Ltd., New Delhi.
4. Agarawala, A. N. *Indian Economy*, New Age Publications, New Delhi
5. Panagariya, Arvind (2008): **India: the Emerging Giant**, Oxford University Press, New York
6. Acharya, S. and Mohan, R. (Eds.) (2010): **India's Economy: Performance and Challenges**, Oxford University Press, New Delhi.
7. Ahluwalia, I. J. and Little, I. M. D. (Eds.) (1998): **India's Economic Reforms and Development: Essays for Manmohan Singh**, Oxford University Press, New Delhi.

Core Economics Course 5: MICROECONOMICS I

Course Description

The course is designed to provide a sound training in microeconomic theory to formally analyze the behaviour of individual agents. Since students are already familiar with the quantitative techniques in the previous semesters, mathematical tools are used to facilitate understanding of the basic concepts; this course looks at the behaviour of the consumer and the producer and also covers the behaviour of a competitive firm.

Module I: Consumer Theory I

The market – Constructing a model; Optimisation and equilibrium; The demand curve and the supply curve; Market Equilibrium; The budget constraint and budget set; Changes in budget line; Effect of taxes, subsidy and rationing on budget set; Consumer Preferences – Indifference curves; Case of perfect substitutes, complements, neutrals, satiation, discreet goods; The marginal rate of substitution; Utility – Cardinal utility; Constructing a utility function; Marginal utility and MRS; Optimal choice and consumer demand; Estimating Utility Functions; Implications of the MRS condition; Choosing taxes; Demand – Normal and inferior goods; Income Offer Curve and Engel Curve; Ordinary goods and Giffen goods; The Offer Curve and the demand Curve; The inverse demand function.

Module II: Consumer Theory II

Slutsky Equation – The Substitution and Income Effects; Sign of Substitution Effect; The Total Change in Demand; Rates of Change; The Law of Demand; Another Substitution Effect; Compensated Demand Curves; Consumer's Surplus – Demand for a discrete good; Constructing utility from demand; Other interpretations of consumer's surplus; Approximating continuous demand; Interpreting the change in consumer's surplus; Producer's surplus; Calculating gains and losses

Module III: Production Theory

Marginal Productivity, Isoquant Maps and the Rate of Technical Substitution, Production with One Variable Input (labour) and with Two-Variable Inputs, Returns to Scale, Four Simple Production Function (Linear, Fixed Proportions, Cobb-Duglas, CES), Technical Progress

Module IV: Cost Functions

Definition of Costs, Cost Functions and its Properties, Shift in Cost Curves, Cost in the Short-Run and Long-Run, Long-Run versus Short-Run Cost Curves, Production with Two Outputs – Economies of Scope

Module V: Profit Maximisation

The Nature and Behaviour of Firms, Profit Maximization, Marginal Revenue, Short-Run Supply by Price-Taking Firm, Profit Functions and its Properties

Readings:

1. C. Snyder and W. Nicholson (2012): Microeconomic Theory: Basic Principles and Extensions, 11th Edition, Cengage Learning, Delhi, India.
2. R. S. Pindyck, D. N. Rubinfeld and P. L. Meheta (2009): Microeconomics, 7th Edition, Pearson, New Delhi.
3. H. R. Varian (2010): Intermediate Microeconomics: A Modern Approach, 8th Edition, W.W. Norton and Company/Affiliated East-West Press (India). The workbook by Varian and Bergstrom may be used for problems

Core Economics Course 6: MACROECONOMICS I

Course Description

This course introduces the students to formal modelling of a macro-economy in terms of analytical tools. It discusses various alternative theories of output and employment determination in a closed economy in the short run as well as medium run, and the role of policy in this context. It also introduces the students to various theoretical issues related to an open economy.

Module I: Consumption Function

Consumption – Income Relationship, Propensities to Consume and the Fundamental Psychological Law of Consumption; Implications of Keynesian Consumption Function; Factors Influencing Consumption Function; Measures to Raise Consumption Function; Absolute, Relative, Permanent and Life – Cycle Hypotheses

Module II: Investment Function

Autonomous and Induced Investment, Residential Investment and Inventory Investment, Determinants of Business Fixed Investment, Decision to Invest and MEC, Accelerator and MEI Theories of Investment.

Module III: Demand for and Supply of Money

Demand for Money – Classical, Neoclassical and Keynesian Approaches, The Keynesian Liquidity Trap and its Implications, Supply of Money – Classical and Keynesian Approaches, The Theory of Money Supply Determination and Money Multiplier, Measures of Money Supply in India

Module IV: Aggregate Demand and Aggregate Supply

Derivation of Aggregate Demand and Aggregate Supply Curves in the IS-LM Framework; Nature and Shape of IS and LM curves; Interaction of IS and LM curves and Determination of Employment, Output, Prices and Investment; Changes in IS and LM curves and their Implications for Equilibrium

Module V: Inflation, Unemployment and Expectations, and Trade Cycles

Inflation – Unemployment Trade off and the Phillips Curve – Short run and Long run Analysis; Adaptive and Rational Expectations; The Policy Ineffectiveness Debate; Meaning and Characteristics of Trade Cycles; Hawtrey's Monetary Theory, Hayek's Over-investment Theory and Keynes' views on Trade Cycles

Readings:

1. N. Gregory Mankiw (2010): *Macroeconomics*, 7th edition, Cengage Learning India Private Limited, New Delhi
2. Richard T. Froyen (2005): *Macroeconomics*, 2nd Edition, Pearson Education Asia, New Delhi.
3. Errol D'Souza (2009): *Macroeconomics*, Pearson Education Asia, New Delhi.

Core Economics Course 7: STATISTICAL METHODS FOR ECONOMICS

Course Description

This is a course on statistical methods for economics. It begins with some basic concepts and terminology that are fundamental to statistical analysis and inference. It is followed by a study and measure of relationship between variables, which are the core of economic analysis. This is followed by a basic discussion on index numbers and time series. The paper finally develops the notion of probability, followed by probability distributions of discrete and continuous random variables and introduces the most frequently used theoretical distribution, the Normal distribution.

Module I: Data Collection and measures of central tendency and dispersion

Basic concepts: population and sample, parameter and statistic; Data Collection: primary and secondary data, methods of collection of primary data; Presentation of Data: frequency distribution; cumulative frequency; graphic and diagrammatic representation of data; Measures of Central Tendency: mean, median, mode, geometric mean, harmonic mean, their relative merits and demerits; Measures of Dispersion: absolute and relative - range, mean deviation, standard deviation, coefficient of variation, quartile deviation, their merits and demerits; Measures of skewness and kurtosis.

Module II: Correlation Analysis

Correlation: scatter diagram, sample correlation coefficient - Karl Pearson's correlation coefficient and its properties, probable error of correlation coefficient, Spearman's rank correlation coefficient, partial and multiple correlation.

Module III: Regression Analysis

Two variable linear regression analysis - estimation of regression lines (Least square method) and regression coefficients - their interpretation and properties, standard error of estimate

Module IV: Time Series and Index Number

Time Series: definition and components, measurement of trend- free hand method, methods of semi-average, moving average and method of least squares (equations of first and second degree only), measurement of seasonal component; Index Numbers: Concept, price relative, quantity relative and value relative; Laspeyer's and Fisher's index, family budget method, problems in construction and limitations of index numbers, test for ideal index number.

Module V: Probability theory

Probability: Basic concepts, addition and multiplication rules, conditional probability; Random variables and their probability distribution; Mathematical expectations; Theoretical Distribution: normal distribution - Properties and uses, problems using area under standard normal curve

Recommended books:

1. Jay L. Devore (2010): *Probability and Statistics for Engineering and the Sciences*, Cengage learning, 2010.
2. S. C. Gupta (): *Fundamentals of Statistics*, Himalaya Publishing House, Delhi
3. Murray R. Spiegel (): *Theory & Problems of Statistics*, Schaum's publishing Series.

Core Economics Course 8: MICROECONOMICS II

Course Description

This course is a sequel to Microeconomics I. The emphasis will be on giving conceptual clarity to the student coupled with the use of mathematical tools and reasoning. It covers Market, general equilibrium and welfare, imperfect markets and topics under information economics.

Module I: Firm Supply and Equilibrium

Market Environments; Pure competition ; Supply decision of a competitive firm and Exceptions; Inverse Supply Function; Profits and Producer's Surplus; Long Run Supply Curve of a Firm; Long Run Average Costs; Short Run and Long Run Industry Supply; Industry Equilibrium in Short and Long Run; Meaning of Zero Profits; Economic Rent.

Module II: General equilibrium, efficiency and welfare

The Edgeworth Box; Trade; Pareto Efficient Allocations; Existence of equilibrium and efficiency; The Welfare Theorems and their implications; The Firm; Production and the Welfare Theorems ; Production possibilities, comparative advantage and Pareto efficiency

Module III: Monopoly

Barriers to Entry, Profit Maximization and Output Choice, Monopoly and resource Allocation, Monopoly, Product Quality and Durability, Price Discrimination, Second Degree Price Discrimination through Price Schedules, Regulation of Monopoly, Dynamic Vies of Monopoly

Module IV: Oligopoly

Oligopoly – Choosing a strategy; Quantity leadership – Problems of the follower and the leader; Price leadership; Comparing quantity leadership and price leadership; Simultaneous Quantity Setting; Example of Cournot Equilibrium; Simultaneous Price Setting; Collusion

Module V: Game Theory

The Payoff Matrix of a Game; Nash Equilibrium; Mixed Strategies ;The Prisoner's Dilemma; Repeated Games; Enforcing a cartel; Sequential Games; A Game of entry deterrence.

Readings:

1. C. Snyder and W. Nicholson (2012): Microeconomic Theory: Basic Principles and Extensions, 11th Edition, Cengage Learning, Delhi, India.
2. R. S. Pindyck, D. N. Rubinfeld and P. L. Meheta (2009): Microeconomics, 7th Edition, Pearson, New Delhi.
3. H. R. Varian (2010): Intermediate Microeconomics: A Modern Approach, 8th Edition, W.W. Norton and Company/Affiliated East-West Press (India). The workbook by Varian and Bergstrom may be used for problems.

Core Economics Course 9: MACROECONOMICS II

Course Description

This course is a sequel to Macroeconomics I. In this course, the students are introduced to the long run dynamic issues like growth and technical progress. It also provides the micro-foundations to the various aggregative concepts used in the previous course.

Module I: Financial Markets and Reforms

Features of Financial Markets, Functions of Financial Markets, Banks and Financial Markets, Adverse Selection and Moral Hazard, Risk and Supply of Credit, The Determination of Banks Asset Portfolio, Financial Repression and Major Financial Sector Reforms in India, Lessons from the Global Financial Crisis and the Policy Response in India

Module II: Open Economy Macroeconomics

Balance of payments- Concept, Equilibrium and Disequilibrium, Measures to Correct Disequilibrium, Determination of Foreign Exchange Rate- the PPP Theory and its Implications, Fixed vs. Flexible Exchange Rates, The Short-run open economy Model, the basic Mundell-Fleming Model. International Financial Markets

Module III: Modelling Economic Growth

The Basic Harrod- Domar Model, Joan Robinson and the Golden Rule of Capital Accumulation, The Basic Solow Model, Theory of Endogenous Growth – the Rudimentary A-K Model

Module IV: Macroeconomic Policy

The Goals of Macroeconomic Policy and of Policy Makers, The Budget and Automatic Fiscal Stabilisers, The Doctrine of Balanced Budget and Keynesian Objections; Concepts of Budget, Revenue and Fiscal Deficits, Fiscal Policy: Objectives and Limits to Discretionary Policy, The Crowding –Out Hypothesis and the Crowding – in Controversy Meaning, Scope and Objectives of Monetary Policy, Instruments of Monetary Policy, the Transmission Mechanism of Monetary Policy, Rules vs. Discretion in Monetary Policy, Implications of Targeting the Interest Rate, Limits to Monetary Policy

Module V: Schools of Macroeconomic Thought and the Fundamentals of Macroeconomic Theory and Policy

Classics, Keynes, Monetarists, New Classicals and New Keynesians: (i) Keynes vs. the Classics – Aggregate Demand and Aggregate Supply, Underemployment Equilibrium and Wage Price Flexibility, (ii) Monetarists and Friedman’s Reformulation of Quantity Theory, Fiscal and Monetary Policy: Monetarists vs. Keynesians, (iii) The New Classical View of Macroeconomics and the Keynesian Counter critique, (iv) The New Keynesian Economics with reference to the Basic Features of Real Business Cycle Models, the Sticky Price Model.

Readings:

1. N. Gregory Mankiw (2010): *Macroeconomics*, 7th edition, Cengage Learning India Private Limited, New Delhi
2. Richard T. Froyen (2005): *Macroeconomics*, 2nd Edition, Pearson Education Asia, New Delhi.
3. Errol D’Souza (2009): *Macroeconomics*, Pearson Education Asia, New Delhi.

Core Economics Course 10: Public Economics

Course Description

Public economics is the study of government policy from the points of view of economic efficiency and equity. The paper deals with the nature of government intervention and its implications for allocation, distribution and stabilization. Inherently, this study involves a formal analysis of government taxation and expenditures. The subject encompasses a host of topics including public goods, market failures and externalities.

Module I: Introduction to public finance

Public Finance: meaning and scope, distinction between public and private finance; public good versus private good; Principle of maximum social advantage; Market failure and role of government;

Module II: Public Expenditure

Meaning, classification, principles, cannons and effects, causes of growth of public expenditure, Wagner's law of increasing state activities, Peacock-Wiseman hypotheses

Module III: Public Revenue

Sources of Public Revenue; Taxation - meaning, cannons and classification of taxes, impact and incidence of taxes, division of tax burden, the benefit and ability to pay approaches, taxable capacity, effects of taxation, characteristics of a good tax system, major trends in tax revenue of central and state governments in India

Module III: Public Budget

Public Budget: kinds of budget, economic and functional classification of the budget; Balanced and unbalanced budget; Balanced budget multiplier; Budget as an instrument of economic policy.

Module V: Public Debt

Sources, effects, debt burden – Classical, Ricardian and other views, shifting - intergenerational equity, methods of debt redemption, debt management, tax versus debt;

Readings:

1. J. Hindriks and G. Myles (2006): *Intermediate Public Economics*, MIT Press.
2. R. A. Musgrave and P. B. Musgrave (1989): *Public Finance in Theory and Practices*. McGraw Hill
3. B. P. Herber (1975): *Modern Public Finance*.
4. B. Mishra (1978): *Public Finance*, Macmillan India limited.

Core Economics Course 11: INDIAN ECONOMY I

Course Description

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in India, the reading list will have to be updated annually.

Module I: Basic Characteristics of Indian Economy as a Developing Economy

Indian Economy in the Pre-British Period; The Structure and Organisation of Villages and Towns; Industries and Handicrafts in Pre-British India; Colonialism; Economic Consequences of British Rule; Decline of Handicrafts and Progressive Ruralisation; The Land System and Commercialisation of Agriculture; Industrial Transition; Colonial Exploitation and Impacts – Underdevelopment; Colonisation and Modernisation; State Policies and Economic Underdevelopment; The Current State of Indian Economy

Module II: Population and Human Development

Population Growth and Economic Development – size, growth and future of population; Causes of rapid population growth; Population and economic development; Population policy; Demographic issues – Sex and Age Composition of population; Demographic Dividend; Urbanisation and Migration; Human Resource Development – Indicators and importance of Human Resource Development; Education policy; Health and nutrition.

Module III: National Income in India – The Growth Story and Regional Disparities

Trends in national and per capita income; Changes in sectoral composition of national income; Regional disparities in Growth and Income; Savings and Investment and Economic Growth – The Linkage

Module IV: Economic Planning in India

Rationale, Features, Objectives, Strategies, Achievements and Assessment of Planning in India; Eleventh Five Year Plan – Objectives, Targets and Achievements; Twelfth Five Year Plan – Vision and Strategy; From Planning to NITI – Transforming India's Development Agenda.

Module V: Current Challenges

Poverty – Estimation and Trends, Poverty Alleviation Programs – MGNREGA, NRLM, SJSRY; Inequality – Measures and trends in India; Unemployment – Nature, Estimates, Trends, Causes and Employment Policy

Readings:

1. Indian Economy, VK Puri and SK Misra, Himalaya Publishing House, 31st Revised Edition
2. Indian Economy Datt and Sundharam, Gaurav Datt and Ashwani Mahajan, S Chand Publications, 7th Revised Edition
3. Indian Economy Since Independence, ed by Uma Kapila, Academic Foundation, Revised Nineteenth Edition 2008-09
4. The New Oxford Economics Companion to India, ed by K Basu and A Maertens, Oxford University Press, 2012
5. Economic Survey of India 2015-16, Ministry of Finance, GoI
6. NITI Ayog document- (Feb 8, 2015)

Core Economics Course 12: DEVELOPMENT ECONOMICS I

Course Description

This is the first part of a two-part course on economic development. The course begins with a discussion of alternative conceptions of development and their justification. It then proceeds to aggregate models of growth and cross-national comparisons of the growth experience that can help evaluate these models. The axiomatic basis for inequality measurement is used to develop measures of inequality and connections between growth and inequality are explored. The course ends by linking political institutions to growth and inequality by discussing the role of the state in economic development and the informational and incentive problems that affect state governance.

Module 1: Study of economic development:

Development Economics as a subject; economic growth and economic development; characteristics of underdeveloped countries – vicious cycle of poverty and cumulative causation; obstacles to economic development; measures of economic development – national and per capita income, basic needs approach, capabilities approach, three core values of development, PQLI, HDI, HPI, MDPI, GDI; capital formation and economic development

Module 2: Theories of Economic Growth and Development

Classical theory, Marxian theory; Schumpeterian theory; Rostow's stages of economic growth; Solow model and convergence with population growth and technical progress

Module 3: Poverty, Inequality and Development:

Concepts of poverty and inequality; Measuring poverty; Measuring Inequality – Lorenz curve and Kuznets' inverted U hypothesis; Growth, poverty and inequality; Economic characteristics of poverty groups (rural poverty, women and poverty, indigenous population and poverty); Policy options – some basic considerations

Module 4: Institutions and economic development:

Role of institutions in economic development; Characteristics of good institutions and quality of institutions; The pre-requisites of a sound institutional structure; Different measures of institutions – aggregate governance index, property rights and risk of expropriation; The role of democracy in economic development; Role of state; Role of markets and market failure; Institutional and cultural requirements for operation of effective private markets; Market facilitating conditions; Limitations of markets in LDCs; Corruption and economic development – tackling the problem of corruption

Module 5: Agriculture, Industry and Economic Development:

Role of agriculture; Transforming traditional agriculture; Barriers to agricultural development; Role of industrialization; Interdependence between agriculture and industries – A model of complementarities between agriculture and industry; terms of trade between agriculture and industry; functioning of markets in agrarian societies; interlinked agrarian markets

Readings:

1. Debraj Ray (2009): *Development Economics*, Oxford University Press.
2. Partha Dasgupta (2007): *Economics, A Very Short Introduction*, Oxford University Press.
3. Abhijit Banerjee, Roland Benabou and Dilip Mookerjee (2006): *Understanding Poverty*, Oxford University Press.
4. Amartya Sen (2000): *Development as Freedom*, OUP.
5. Daron Acemoglu and James Robinson (2006): *Economic Origins of Dictatorship and Democracy*, Cambridge University Press.
6. Robert Putnam (1994): *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press.
7. Todaro, Michael P and Stephen C Smith (2006): *Economic Development*, 8th Edition, Pearson
8. Thirlwall, A P (2011): *Economics of Development*, 9th Edition, Palgrave Macmillan

Core Economics Course 13: INDIAN ECONOMY II

Course Description

This course examines sector-specific policies and their impact in shaping trends in key economic indicators in India. It highlights major policy debates and evaluates the Indian empirical evidence. Given the rapid changes taking place in the country, the reading list will have to be updated annually.

Model I: Agricultural Development in India

Indian Agriculture: nature, importance, trends in agricultural production and productivity, factors determining production, land reforms, new agricultural strategies and green revolution, rural credit; Agricultural marketing and warehousing.

Module II: Industrial Development in India

Trends in industrial output and productivities; Industrial Policies of 1948, 1956, 1977 and 1991; Industrial Licensing Policies – MRTP Act, FERA and FEMA; Growth and problems of SSIs, Industrial sickness; Industrial finance; Industrial labour

Module III: Tertiary Sector and HRD

Tertiary Sector: growth and contribution of service sector to GDP of India, share of services in employment; Human development – concept, evolution, measurement; HRD: indication, importance, education in India, Indian educational policy; Health and Nutrition.

Module IV: External Sector

Foreign Trade: role, composition and direction of India's foreign trade, trends of export and import in India, export promotion versus import substitution; Balance of Payments of India; India's Trade Policies; Foreign Capital – FDI, Aid and MNCs.

Module IV: Indian Economy and Environment

Environmental Policies in India: The Environment (Protection) Act 1986, The Environment (Protection) Rules 1986, The National Forest Policy 1988, Policy statement for Abatement of Pollution 1992, National Conservation Strategy and Policy Statement on Environment and Development 1992, The National Environment Appellate Authority Act 1997, National Environmental Policy 2006; Global deal with Climate Change: Introduction, Intergovernmental Panel for Climate Change (IPCC), Impact of Climate Change on India, Global Response on Climate Change, Possible Role of India

Readings:

1. U. Kapila (2010): *Indian economy since Independence*. Academic Foundation, New Delhi
2. S. K. Misra and V. K. Puri (Latest Year): *Indian Economy — Its Development Experience*, Himalaya Publishing House, Mumbai
3. S. Chakraborty (): *Development Planning: The Indian Experience*. Clarendon Press.
4. R. Dutt and K. P. M. Sundharam (Latest Year): *Indian Economy*, S. Chand & Company Ltd., New Delhi.
5. A. Panagariya (2008): *India: the Emerging Giant*, Oxford University Press, New York
6. S. Acharya and R. Mohan (Eds.) (2010): *India's Economy: Performance and Challenges*, Oxford University Press, New Delhi.
7. I. J. Ahluwalia and I. M. D. Little (Eds.) (1998): *India's Economic Reforms and Development: Essays for Manmohan Singh*, Oxford University Press, New Delhi.

Core Economics Course 14: DEVELOPMENT ECONOMICS II

Course Description

This is the second module of the economic development sequence. It begins with basic demographic concepts and their evolution during the process of development. The structure of markets and contracts is linked to the particular problems of enforcement experienced in poor countries. The governance of communities and organizations is studied and this is then linked to questions of sustainable growth. The course ends with reflections on the role of globalization and increased international dependence on the process of development.

Module 1: Population and Development

Demographic concepts : birth and death rates, age structure, fertility and its determinants, the Malthusian population trap and the microeconomic household theory of fertility; costs and benefits of population growth and the model of low level equilibrium trap; the seven negative consequences of population growth; the concept of optimum population; rural-urban migration – the Harris Todaro migration model and policy implications

Module 2: Dualism and economic development

Dualism – geographic, social and technological; the theory of cumulative causation; the regional inequalities in the context of economic development; the inverted U relationship; international inequality and the centre periphery thesis; dependency, exploitation and unequal exchange; the dualistic development thesis and its implications

Module 3: Environment and Development

Basic issues of environment and development – population, resources and the environment; poverty, economic growth, rural development, urban development and the environment; simple model of environment and economic activity; environmental degradation and externalities; common property resources, public goods and the free-rider problem; renewable and non-renewable resources; environmental values and their measurement; concept of sustainable development; basics of climate change

Module 4: Financing Economic Development

Saving, capital formation and economic development; rural financial intermediaries, micro credit and economic development; financial liberalisation, financial inclusion and economic development; taxation, public borrowing and economic development; inflation, saving and growth – the Keynesian approach; foreign finance, investment and aid – controversies and opportunities; private foreign investment and private portfolio investment; growing role of non-governmental organisations

Module 5: Globalisation, international trade and economic development:

Trade and economic development; export led growth; trade liberalisation and growth of exports; terms of trade and economic growth – the Prebisch Singer Hypothesis; trade strategies for development – import substitution vs export promotion; international commodity agreements; trade vs aid.

Readings

1. Debraj Ray (2009): *Development Economics*, Oxford University Press.
2. Partha Dasgupta (2007): *Economics, A Very Short Introduction*, Oxford University Press.
3. Abhijit Banerjee, Roland Benabou and Dilip Mookerjee (2006): *Understanding Poverty*, Oxford University Press.
4. Thomas Schelling (1978): *Micromotives and Macrobehavior*, W. W. Norton.
5. Albert O. Hirschman (1970): *Exit, Voice and Loyalty: Responses to Decline in Firms, Organizations and States*, Harvard University Press.
6. Elinor Ostrom (1990): *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press.
7. Dani Rodrik (2011): *The Globalization Paradox: Why Global Markets, States and Democracy Can't Coexist*, Oxford University Press.

8. Michael D. Bordo, Alan M. Taylor and Jeffrey G. Williamson (ed.) (2003): *Globalization in Historical Perspective*, University of Chicago Press.
9. Todaro, Michael P and Stephen C Smith (2006): *Economic Development*, 8th Edition, Pearson
10. Thirlwall, A P (2011): *Economics of Development*, 9th Edition, Palgrave Macmillan

DSE Group I

DSEG 1.1: Economic History of India 1857-1947

Course Description

This course analyses key aspects of Indian economic development during the second half of British colonial rule. In doing so, it investigates the place of the Indian economy in the wider colonial context, and the mechanisms that linked economic development in India to the compulsions of colonial rule. This course links directly to the course on India's economic development after independence in 1947.

Module I: Introduction: Colonial India: Background and Introduction

Overview of colonial economy

Module II: Macro Trends

National Income; population; occupational structure

Module III: Agriculture

Agrarian structure and land relations; agricultural markets and institutions – credit, commerce and technology; trends in performance and productivity; famines

Module IV: Railways and Industry

Railways; the de-industrialisation debate; evolution of entrepreneurial and industrial structure; nature of industrialisation in the interwar period; constraints to industrial breakthrough; labor relations

Module V: Economy and State in the Imperial Context

The imperial priorities and the Indian economy; drain of wealth; international trade, capital flows and the colonial economy – changes and continuities; government and fiscal policy

Readings:

1. Lakshmi Subramanian, “*History of India 1707-1857*”, Orient Blackswan, 2010, Chapter 4.
2. Sumit Guha, 1991, Mortality decline in early 20th century India’, *Indian Economic and Social History Review (IESHR)*, pp 371-74 and 385-87.
3. Tirthankar Roy, *The Economic History of India 1857-1947*, Oxford University Press, 3rd edition, 2011.
4. J. Krishnamurty, *Occupational Structure*, Dharma Kumar (editor), The Cambridge Economic History of India, Vol. II, (henceforth referred to as CEHI), 2005, Chapter 5.
5. Irfan Habib, *Indian Economy 1858-1914*, A People's History of India, Vol.28, Tulika, 2006.
6. Ira Klein, 1984, —When Rains Fail: Famine relief and mortality in British India, *IESHR* 21.
7. Jean Dreze, *Famine Prevention in India in Dreze and Sen (eds.) Political Economy of Hunger*, WIDER Studies in Development Economics, 1990, pp.13-35
8. John Hurd, *Railways*, CEHI, Chapter 8, pp.737-761.
9. Rajat Ray (ed.), *Entrepreneurship and Industry in India*, 1994.
10. AK Bagchi, —Deindustrialization in India in the nineteenth century: Some theoretical implications, *Journal of Development Studies*, 1976.
11. MD Morris, *Emergence of an Industrial Labour Force in India*, OUP 1965, Chapter 11, Summary and Conclusions.
12. K.N. Chaudhuri, *Foreign Trade and Balance of Payments*, CEHI, Chapter 10.
13. B.R. Tomlison, 1975, *India and the British Empire 1880-1935*, IESHR, Vol.XII.
14. Dharma Kumar, *The Fiscal System*, CEHI, Chapter 12.
15. Basudev Chatterjee, *Trade, Tariffs and Empire*, OUP 1992, Epilogue.

DSEG 1.2 INTRODUCTORY ECONOMETRICS

Course Description

This course provides a comprehensive introduction to basic econometric concepts and techniques. It covers statistical concepts of hypothesis testing, estimation and diagnostic testing of simple and multiple regression models. The course also covers the consequences of and tests for misspecification of regression models.

Module I: Introduction

Definition, Nature and scope of econometrics; Theoretical Probability Distributions: Normal distribution; chi-square, t- and F-distributions and their uses

Module II: Sampling

Basic concepts of sampling: Probability and non-probability sampling; Types of sampling. Theory of Estimation: Estimation of parameters; properties of estimators – small sample and asymptotic properties; point and interval estimation

Module III: Hypothesis Testing

Testing of hypotheses: defining statistical hypotheses; Simple and composite hypotheses; Null and alternative hypothesis; Type I and Type II errors, Critical region; Neyman-Pearson lemma; Power of a test.

Module IV: Linear Regression Analysis

Two variable linear regression model – Assumptions; Least square estimates, Variance and co-variance between Least square estimates; BLUE properties; Standard errors of estimates; Co-efficient of determination; Inference in a two variable linear regression model; ANOVA; Forecasting.

Module V: Violation of Classical Assumptions

Heteroscedasticity, multicollinearity and auto-correlation: Meaning, consequences, tests and remedies.

Reading List:

1. Johnston (1991), “Econometric Methods”, Mc Graw Hill Book Co
2. Koutsoyiannis, A, (1992) “Introduction to Econometrics” OUP
3. Dougherty, C. (1992) “Introduction to Econometrics” OUP.
4. Kmenta, J (1997); “Elements of Econometrics”, University of Michigan Press
5. Gujarati, D & Sangeetha (2007); “Basic Econometrics”, Mc Graw Hill Book Co.

DSEG 1.3: Odisha Economy

Course Description

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in Odisha in pre- and post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in Odisha, the reading list will have to be updated annually.

Module I: Odisha Economy before 1947

Orissa's Economy in the Nineteenth Century: Benevolence or Exploitation, Forces of Nature, Animal Power, The Company Steps in, Public Works and Public Health, Education, Disintegration of Village Economy, New Social Environment, Changing Position of Social Classes, The Moneylenders, The Borrowers, Money-flows from Village to Metropolis, Pauperization of Peasantry, The Wage Earners, Demographic Changes, Profiting from Rural Adversity; Diarchy in 1919 and Separation of Provincial Finances from Central Government in 1937; Emergence of Federal Finance (Ref.: Das 1976a and 1976b, GoO 2016).

Module II: Macro Economy of Odisha

A macro glance of Odisha economy: aggregate income, broad sectoral decomposition, performance of districts, employment, child labour and bonded labour, employment programmes, consumption expenditure, cost of living; Odisha State public finances (Chapter 14 and 15 of Ref 1; & Chapter 2 and 9 of Ref 2)

Module III: Agriculture Sector Development in Odisha

Agriculture: land ownership and land tenure, agricultural wages and rural unemployment, production and productivity of major crops, agricultural inputs, agricultural policy; Animal Husbandry; Fisheries (Chapter 1 to 3 of Ref 1; & Chapter 3 of Ref 2)

Module IV: Industry, Infrastructure and Environment

Industry: Investment, industrial policy, and the growth of large industries, mining and quarrying; Construction; tertiary sector: tourism, transport and power; Water Resources, Forest Resources (Chapter 4 to 8 of Ref 1; & Chapter 4 & 5 of Ref 2)

Module V: Social Sector in Odisha

Poverty: income poverty and inequality; health sector: outcomes, infrastructure, finance, public health, NRHM; education: Literacy, Primary education, secondary education, higher education, SSA; human development (Chapter 9 to 13 of Ref 1; & Chapter 7 & 8 of Ref 2)

Reading List:

1. Nayak, P., Panda, S. C., Pattanaik, P. K. (2016): **The Economy of Odisha: A Profile**, Oxford University Press, New Delhi
2. GoO (2012): **Odisha Economic Survey 2015-16**, Planning and Convergence Department, Directorate of Economics and Statistics, Government of Odisha, Bhubaneswar
3. GoO (2004): *Human Development Report 2004 Orissa*, Planning and Coordination Department, Government of Odisha, Bhubaneswar
4. Mahapatro, S. B. (1980): Inter-Industry Wage Differentials in Orissa: An Empirical Analysis, *Indian Journal of Industrial Relations*, 15(4): 525-536.

5. Vyasulu, V. and Arun, A. V. (1997): Industrialisation in Orissa: Trends and Structure, *Economic and Political Weekly*, 32(22): M46-M53.
6. Das, Binod S. (1976a): Orissa's Economy in the Nineteenth Century, *Social Scientist*, 4(11): 32-46.
7. Das, Binod S. (1976b): Orissa's Economy in the Nineteenth Century: Part Two, *Social Scientist*, 4(12): 38-50.
8. GoO (2016): Commemorative Volume on 80 Years Odisha Budget: Since 1936-37, CEFT-XIMB and Department of Finance, Government of Odisha
9. Mohanti, K. K. and Padhi, S. (1995): Employment Situation of Tribal Population in Orissa: 1981 Census Data, *Economic and Political Weekly*, 30(29): 1879-1882.
10. Nair, K. R. G. (1993): New Economic Policy and Development of Backward Regions: A Note on Orissa, *Economic and Political Weekly*, 28(19): 939-941.
11. Mohanty, B. (1993): Orissa Famine of 1866: Demographic and Economic Consequences, *Economic and Political Weekly*, 28(1/2): 55-66.
12. Haan, A. de and Dubey, A. (2005): Poverty, Disparities, or the Development of Underdevelopment in Orissa, *Economic and Political Weekly*, 40(22/23): 2321-2329.
13. Samal, K. C. (1998): Poverty Alleviation after Post-Liberalisation: Study of a Tribal Block in Orissa, *Economic and Political Weekly*, 33(28): 1846-1851
14. Nayak, P. and Chatterjee, B. (1986): Disguised Unemployment in Agriculture: A Case Study of Rural Orissa, *Indian Journal of Industrial Relations*, 21(3): 310-334.

DSEG 1.4: Research Methodology

Course Description

The course is to develop a research orientation among the students and to acquaint them with fundamentals of research methods. Specifically, the course aims at introducing them to the basic concepts used in research and to scientific social research methods and their approach. It includes discussions on sampling techniques, research designs and techniques of analysis.

Module I: Basics of Research

Introduction to Research: Meaning, Objectives, Motivation, Types, Approaches, Significance, Research Process, Criteria of Good Research; Qualities of a Good Researcher, Research as a Career

Module II: Research Problem

Defining the Research Problem: What is a Research Problem? Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem; Research Design: Meaning, Need, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs

Module III: Measurement and Scaling Technique

Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Techniques of Measurement Tools, Scaling and Important Scaling Technique

Module IV: Problems in Research

Research Ethics: codes and ethics, permissions to research, responsibilities, confidentiality, feedback, participatory research; Research Proposal and literature review: research proposal, review of literature, levels of analysis, using the library and internet, abstracting, word processing, plagiarism

Module V: Actions in Research

English in report writing: words, sentences, paragraph, writing style; The Report: improving quality, sections, drawing conclusions, evaluation checklists, persistence; Common Citation Styles

Basic Readings

1. Kothari, C. R. (2004): **Research Methodology: Methods and Techniques**, New Age International Private Limited Publishers, New Delhi.
2. Guthrie, G. (2010): **Basic Research Methods**, Sage Publications India Private Limited, New Delhi.
3. Monippally, M. M. (2010): **Academic Writing: A Guide for Management Students and Researchers**, Response Books (Sage), New Delhi, Pp. 196-217

Additional Readings

1. Young, P. V. (1996): **Scientific Social Survey and Research**, PHI Learning Private Limited, New Delhi
2. Dooley, D. (2008): **Social Research Methods**, Prentice-Hall of India Private Limited, New Delhi

DSE Group II

DSEG 2.1: Environmental Economics

Course Description

This course introduces the students to the basics of environmental economics to understand the fundamentals of environmental concerns and develop insights into valuation of environment.

Module I: Economy and Environment

Nature and Scope of Environmental Economics- historical development, early economic paradigms, post-war economics and environmentalism; Environment and Economy interaction; Environment as a public good- National versus global public goods, Market failure, Externalities and the environment; The nexus involving environment, development and poverty.

Module II: The Economics of Pollution and Climate change

The optimal level of pollution, Pollution as externality, alternative definitions of pollution; The market Approach to optimal pollution, Property rights and market bargain theorems, Coase theorem; Taxation, Subsidies and optimal pollution; Pollution permit trading; Climate change – concept, causes, effects and management; Climate change and Agriculture

Module III: Valuation of Environmental damage

Methods and difficulties of environmental valuation, Economic value, Total economic value, Option value, Existence value; Direct and Indirect Valuation of Environmental Goods: The hedonic price approach, Contingent valuation, Travel cost approach; Willingness to pay vs. Willingness to accept.

Module IV: Environmental Pollution and Regulation in India

Causes and effects of water pollution, air pollution, noise pollution, soil pollution, Prevention and control of environmental degradation, Mechanism for environmental regulation in India- Environmental policy and legislations

Module V: Natural Resources and Sustainable Development

Environment and sustainable development, Concept and indicators of sustainable development, Resource scarcity, Renewable and exhaustible resources, Optimal use of renewable resources – fishery and forest, Tragedy of commons, People's Participation in the management of common property resources

Reading List:

1. Bhattacharya, R. N. (2002): Environmental Economics: An Indian Perspectives, OUP, New Delhi
2. Shankar, U. (Ed.) (2001): Environmental Economics, OUP, New Delhi.
3. Dayal, V. and Chopra, K. (2009): Handbook of Environmental Economics in India, OUP, New Delhi
4. Bromley, D.W (Ed)(1995); Handbook of Environmental Economics, Blackwell, London
5. Fisher, A.C(1981); Resource and Environmental Economics, Cambridge University Press
6. Helfand, G and P. Berck (2011); The Economics of the Environment, PHI Learning Private Limited, New Delhi
7. Hemple Lamont, C (1998); Environmental Economics – the Global Challenge First East West Press
8. Hussen, A.M (1999); Principles of Environmental Economics, Routledge, London
9. Kolstad, C.D (1999); Environmental Economics Oxford University Press, New Delhi
10. Pearce, D.W and R.K Turner (1948); Economics of Natural Resources and the Environment, Harvester Wheatsheaf

11. Perman R.M. and J. McGilvary (1996); Natural Resources and Environmental Economics, Longman, London
12. Tietenberg. T (1994); Environmental Economics Policy, Harper Collings, New York
13. The Economics of Climate Change: The Stern Review by Great Britain Treasury, Cambridge University Press

DSEG 2.2: International Economics

Course Description

This course introduces the students to international trade and finance to understand the theories of international trade and develop insights into trade policy and balance of payments. The course also develops insight into international financial system and the trade policy of India.

Module I: Importance of Trade and Trade Theories

Importance of the study of International Economics; Inter-regional and international trade; Need for a separate theory of international trade; Theories of Trade- absolute advantage, comparative advantage and opportunity cost; Heckscher-Ohlin theory of trade — its main features, assumptions and limitations

Module II: Trade and Economic Growth

Concepts of terms of trade and their importance; Doctrine reciprocal demand – Offer curve techniques; Gains from trade— their measurement and distribution; International Trade and Growth: Small and Open country cases; Tariffs and quotas – their impact in partial equilibrium analysis; Free trade and policy of tariffs in relation to economic growth with special reference to India

Module III: Exchange Rate

Concept and Types of Exchange Rate (bilateral vs trade-weighted exchange rate, cross exchange rate, spot, forward, futures), Demand for and Supply of foreign exchange, Exchange Rate Determination: Purchasing-Power Parity Theory, The Monetary Model of Exchange Rates, Asset or Portfolio Model of Exchange Rates. Fixed versus Flexible exchange rate

Module IV: Balance of Trade and Payments

Concepts and components of balance of trade and balance of payments; Equilibrium and disequilibrium in balance of payments; Consequences of disequilibrium in balance of payments; Various measures to correct deficit in BoPs; Foreign trade multiplier- Concept and implications; Present balance of payment position of India – Need for and rationale of trade reforms in India including partial and full convertibility of rupee; recent export and import policies in India

Module V: International Economic Institutions

Functions of IMF, World Bank, WTO and Asian Development Bank — Their achievements and failures; Their Role from the point of view of India; Forms of economic cooperation; Reforms for the emergence of international monetary system and trading blocs at the global level

Reading List:

1. Krugman Paul R. and Obstfeld Maurice. *International Economics*, Pearson Education
2. Salvatore Dominick. *International Economics*, Wile India.
3. Sodersten Bo and Reed J. *International Economics*, McMillan Publisher
4. Carbaugh Robert. *International Economics*, South-Western College Publication.
5. Gandolfo Giancarlo. *International Trade Theory and Policy*, Springer Publication
6. Gandolfo Giancarlo. *International Finance and Open-Economy Macro Economics*, Springer Publication
7. Copeland Laurence. *Exchange Rates and International Finance*, Addison Wesley, Publication.
8. Kanan, P. B. (1994): *The International Economy*, Cambaridge University Press, London.
9. Kindleberger, C. P. (1973): *International Economics*, R.D. Irwin, Homewood.

DSEG 2.3: Economics of Agriculture

Course description

This course introduces the students to significance of agriculture in the Indian economy and helps to understand the role agriculture in economic development. It is designed to develop insights into changing agricultural practices in India and assess the significance of agriculture in the era of liberalisation.

Module I

Role of Agriculture in Economic Development, Economic growth – sectoral changes and agriculture, agriculture in rural development, farm and non-farm employment issues, inter-linkages between agriculture and industry; empirical evidence of inter-dependence between agriculture and industry

Module II

Traditional Agriculture: characteristics; Schultz's hypothesis – its criticisms; Mechanization of Indian Agriculture; Case for and against farm mechanization; Green revolution and trends of mechanization in India

Module III

Agricultural price policy for a developing economy – objectives and effectiveness of agricultural price policy, elements of agricultural price policy, features of an ideal agricultural price policy, agricultural price policy in India and public distribution system

Agricultural marketing – need and criteria for assessing efficiency, agricultural marketing system in India, development of a national agricultural marketing platform

Module IV

Risk and uncertainty in agriculture – difference between risk and uncertainty, types of uncertainty in agriculture, measures for mitigating risk and uncertainty in agriculture, new agricultural insurance scheme of India

Rural credit in India, importance and estimates, agencies for rural credit, review of progress of institutional finance in rural India since independence

Module V

Agriculture in Indian Planning, Globalization and Indian agriculture, Case for and against privatization of agriculture, WTO and India's trade in agricultural commodities

Reading List:

1. Ghatak, S and K. Ingerscent (1984), Agricultural and Economic Development, Select Books, New Delhi.
2. Rudra, A (1982), Indian Agricultural Economics: Myths and Realities, Allied Publishers, New Delhi.
3. Sony, R. N. (2006), Leading Issues in Agricultural Economics, Vishal Publishing, Jalandhar.
4. Tyagi, B. P. (1998), Agricultural Economics and Rural Development, J. P. Nath Publishing, Meerut.
5. Sadhu, A N and A Singh (2008), Fundamentals of Agricultural Economics, Himalaya Publishing House, Mumbai.
6. Lekhi, R K and Joginder Singh (2008), Agricultural Economics, Kalyani Publishers, Ludhiana.

SKILL ENHANCEMENT COURSES (SEC)

SEC II: Data Analysis and Computer Application (Option I)

Course Description:

The purpose of this course is to introduce basic computer skills to students at UG level in non technical subjects. After completion of this course, the students are expected to acquire some basic knowledge about computers and to develop some basic skills in using computers for data storage, compilation, analysis and presentation.

Module I: Introduction to computer and Basic data types

Introduction to computer- Characteristics and Basic Applications of Computer, Components of Computer System, Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output Devices, Memory, concepts of Hardware and Software, Classifications of computers; Representation of data/Information concepts of data processing, Basic data types, Storage of data/Information as files, operating system and The User Interface (windows, Linux), Windows Setting- Control Panels, Accessories (windows)

Module II: Basic Word Processing

Introduction to Word Processing, Opening Word Processing Package, Opening and closing documents, Using a Document/Help Wizard, Text Creation and Manipulation, Formatting the Text, Handling Multiple Documents, Table Manipulation, Printing, saving documents in different formats

Module III: Spreadsheets and Basic Data Analysis

Spread Sheet, Elements of Electronics Spread Sheet, Application/usage of Electronic Spread Sheet, Manipulation of cells, Formulas and functions; Spread sheets for Small accountings- maintaining invoices/budgets, basic practical data analysis works (Maintaining daily and monthly sales reports)

Module IV: Basic Computer Communication and Internet

Basic of Computer networks- LAN and WAN, Internet, Service on Internet; WWW and Web Browsers, Web Browsing software, Surfing the Internet, Chatting on Internet, Email-Basic of electronic mail, Using Emails, Document handling in Email.

Module V: Basic Presentations

Basics- Difference between presentation and document, Using Power Point, Creation of Presentation, Preparation of Slides, Selection of type of Slides, Importing text from word documents, Providing aesthetics- Slide Designs, Slide Manipulation and Slide Show, Presentation of the Slides

Reading List:

1. C.S. French "Data Processing and Information Technology", BPB Publications 1998
2. P.K Sinha, Computer Fundamentals, BPB Publications, 1992
3. Guy Hart-Davis "The ABCs of Microsoft Office 97 Professional edition", BPB Publications, 1998
4. Karl Schwartz, "Microsoft Windows 98 Training Guide", 1998

SEC II: Financial Economics (Option I)

Course Description

This course intends to explain the ideas on financial system in India. It will help the students to enhance their knowledge on concepts like financial institutions, instruments and markets, their functioning and usage in real world.

Module I: Financial system

The structure of the financial system- Functions of the financial sector-Indicators of financial development; Financial System and Economic Development; financial inclusion: concept and its evolution; policy initiatives on financial inclusion.

Module II: Interest rate policy

Theories of interest rate determination-Level of interest rates-Long period and short period rates-Administered interest rates; Deregulation of interest rates; financial sector reforms in India.

Module III: Money market

Money Market: features; objectives; features of a developed and under developed money market; importance of money market; composition of money market: organized and unorganized; money market institutions and instruments; features and problems of Indian money market.

Module IV: Capital Market

Capital market: composition; Primary and secondary market for securities. Functions of new issue and secondary market; organizations of stock exchanges in India; defects in Indian stock exchange; SEBI; its objectives and functions

Module V: Non-Banking Financial Companies

Non-Banking Financial Companies: Hire purchase Companies-Venture Capital Companies. Insurance Sector: objectives, functions, life insurance and general insurance; IRDA and its role and functions in financial markets.

Basic Reading List

1. M.Y.Khan-Indian Financial System, Tata McGraw Hill, New Delhi.
2. L.M.Bhole: Financial institutions and Market, Tata McGraw hill, New Delhi.
3. Gorden & Natrajan: Financial Market and institutions, Himalaya Publishing house.

BA Economics Regular Under CBCS of Utkal University

Core Economics I: Principles of Microeconomics I

Course Description

This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situations.

Module 1: Exploring the subject matter of Economics

The Ten Principles of Economics: How people make decisions; Working of the economy as a whole; Thinking Like an Economist: The economist as Scientist – The scientific method: Observation, Theory and more observation; Role of assumptions; Economic Models; The economist as a policy advisor; Why economists disagree; Graphs in Economics

Module 2: Supply and Demand: How Markets Work, Markets and Welfare

The market forces of demand and supply – Markets and competition; The demand curve – Market vs individual demand curve; Shifts in demand curve; The supply curve – Market vs individual supply curve; Shifts in supply curve; Equilibrium between supply and demand and changes there in; Price elasticity of demand and its determinants; Computing price elasticity of demand; Income and cross elasticity of demand; The price elasticity of supply and its determinants; Computing price elasticity of supply; Consumer Surplus and Producer Surplus; Market efficiency and market failure.

Module 3: The Households

The Budget Constraint; Preferences – representing preferences with indifference curves; Properties of indifference curves; Two extreme examples of indifference curves; Optimisation – Equilibrium; Change in equilibrium due to changes in income, changes in price; Income and substitution effect; Derivation of demand curve; Three applications – Demand for giffen goods, wages and labour supply, Interest rate and household saving.

Module 4: The Firm and Market Structures

Cost concepts; Production and costs; The various measures of cost – Fixed and variable cost, average and marginal cost; Cost curves and their shapes; Costs in the short run and in the long run; Economies and diseconomies of scale. Firms in competitive markets – What is a competitive market; Profit maximisation and the competitive firm's supply curve; The marginal cost curve and the firm's supply decision; Firm's short-run decision to shut down; Firm's long-run decision to exit or enter a market; The supply curve in a competitive market – short run and long run; Monopoly - Why monopolies arise and public policy towards monopolies

Module 5: The Input Markets

The demand for labour – The production function and the marginal product of labour; Value of the marginal product of labour and demand for labour; Shifts in labour demand curve; The supply of labour – the trade-off between work and leisure; Shifts in the labour supply curve; Equilibrium in the labour market; Other factors of production: Land and capital; Linkages among factors of production.

Readings:

1. Principles of Economics, Gregory N Mankiw, 6e Cengage Learning India Private Limited, New Delhi
2. William A McEachern and Simrit Kaur (2012): *Micro Econ: A South-Asian Perspective*, Cengage Learning India Private Limited, New Delhi.
3. Karl E. Case and Ray C. Fair (2007): *Principles of Economics*, 8th Edition, Pearson Education Inc.

Core Economics II: Principles of Microeconomics II

Course Description

The course is designed to provide a sound training in microeconomic theory to formally analyze the behaviour of individual agents. Since students are already familiar with the quantitative techniques in the previous semesters, mathematical tools are used to facilitate understanding of the basic concepts; this course looks at the behaviour of the consumer and the producer and also covers the behaviour of a competitive firm.

Module I: Consumer Theory I

The market – Constructing a model; Optimisation and equilibrium; The demand curve and the supply curve; Market Equilibrium; The budget constraint and budget set; Changes in budget line; Effect of taxes, subsidy and rationing on budget set; Consumer Preferences – Indifference curves; Case of perfect substitutes, complements, neutrals, satiation, discreet goods; The marginal rate of substitution; Utility – Cardinal utility; Constructing a utility function; Marginal utility and MRS; Optimal choice and consumer demand; Estimating Utility Functions; Implications of the MRS condition; Choosing taxes; Demand – Normal and inferior goods; Income Offer Curve and Engel Curve; Ordinary goods and Giffen goods; The Offer Curve and the demand Curve; The inverse demand function.

Module II: Consumer Theory II

Slutsky Equation – The Substitution and Income Effects; Sign of Substitution Effect; The Total Change in Demand; Rates of Change; The Law of Demand; Another Substitution Effect; Compensated Demand Curves; Consumer's Surplus – Demand for a discrete good; Constructing utility from demand; Other interpretations of consumer's surplus; Approximating continuous demand; Interpreting the change in consumer's surplus; Producer's surplus; Calculating gains and losses

Module III: Production Theory

Marginal Productivity, Isoquant Maps and the Rate of Technical Substitution, Production with One Variable Input (labour) and with Two-Variable Inputs, Returns to Scale, Four Simple Production Function (Linear, Fixed Proportions, Cobb-Duglas, CES), Technical Progress

Module IV: Cost Functions

Definition of Costs, Cost Functions and its Properties, Shift in Cost Curves, Cost in the Short-Run and Long-Run, Long-Run versus Short-Run Cost Curves, Production with Two Outputs – Economies of Scope

Module V: Profit Maximisation

The Nature and Behaviour of Firms, Profit Maximization, Marginal Revenue, Short-Run Supply by Price-Taking Firm, Profit Functions and its Properties

Readings:

4. C. Snyder and W. Nicholson (2012): Microeconomic Theory: Basic Principles and Extensions, 11th Edition, Cengage Learning, Delhi, India.
5. R. S. Pindyck, D. N. Rubinfeld and P. L. Meheta (2009): Microeconomics, 7th Edition, Pearson, New Delhi.
6. H. R. Varian (2010): Intermediate Microeconomics: A Modern Approach, 8th Edition, W.W. Norton and Company/Affiliated East-West Press (India). The workbook by Varian and Bergstrom may be used for problems

Core Economics III: Principles of Macroeconomics I

Course Description

This course aims to introduce the students to the basic concepts of Macroeconomics. Macroeconomics deals with the aggregate economy. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.

Module I: Basic Concepts

Macro vs. Micro Economics; Why Study Macroeconomics? Limitations of Macroeconomics ; Stock and Flow variables, Equilibrium and Disequilibrium, Partial and General Equilibrium Statics – Comparative Statics and Dynamics ; National Income Concepts – GDP, GNP, NDP and NNP at market price and factor cost; Personal Income and Disposable personal Income; Real and Nominal GDP

Module II: Measurement of Macroeconomic Variables

Output, Income and Expenditure Approaches ; Difficulties of Estimating National Income; National Income Identities in a simple 2- sector economy and with government and foreign trade sectors; Circular Flows of Income in 2, 3 and 4-sector; economies; National Income and Economic Welfare ; Green Accounting.

Module III: Money

Evolution and Functions of Money, Quantity Theory of Money – Cash Transactions, Cash Balances and Keynesian Approaches, Value of Money and Index Number of Prices

Module IV: Inflation, Deflation, Depression and Stagflation

Inflation – Meaning, Causes, Costs and Anti-Inflationary Measures; Classical, Keynesian, Monetarist and Modern Theories of Inflation, Deflation- Meaning, Causes, Costs and Anti-Deflationary Measures, Depression and Stagflation; Inflation vs. Deflation

Module V: Determination of National Income

The Classical Approach - Say's Law, Theory of Determination of Income and Employment with and without saving and Investment; Basics of Aggregate Demand and Aggregate Supply and Consumption- Saving – Investment Functions, The Keynesian Approach – Basics of Aggregate Demand and Aggregate Supply and Consumption, Saving, Investment Functions; The Principle of Effective Demand; Income Determination in a Simple 2-Sector Model; Changes in Aggregate Demand and Income- The Simple Investment Multiplier; Income Determination in a 3-Sector Model with the Government Sector and Fiscal Multipliers

Readings:

4. N. Gregory Mankiw (2010): *Macroeconomics*, 7th edition, Cengage Learning India Private Limited, New Delhi
5. Richard T. Froyen (2005): *Macroeconomics*, 2nd Edition, Pearson Education Asia, New Delhi.
6. Errol D'Souza (2009): *Macroeconomics*, Pearson Education Asia, New Delhi.

Core Economics IV: Principles of Macroeconomics II

Course Description

This course introduces the students to formal modelling of a macro-economy in terms of analytical tools. It discusses various alternative theories of output and employment determination in a closed economy in the short run as well as medium run, and the role of policy in this context. It also introduces the students to various theoretical issues related to an open economy.

Module I: Consumption Function

Consumption – Income Relationship, Propensities to Consume and the Fundamental Psychological Law of Consumption; Implications of Keynesian Consumption Function; Factors Influencing Consumption Function; Measures to Raise Consumption Function; Absolute, Relative, Permanent and Life – Cycle Hypotheses

Module II: Investment Function

Autonomous and Induced Investment, Residential Investment and Inventory Investment, Determinants of Business Fixed Investment, Decision to Invest and MEC, Accelerator and MEI Theories of Investment.

Module III: Demand for and Supply of Money

Demand for Money – Classical, Neoclassical and Keynesian Approaches, The Keynesian Liquidity Trap and its Implications, Supply of Money – Classical and Keynesian Approaches, The Theory of Money Supply Determination and Money Multiplier, Measures of Money Supply in India

Module IV: Aggregate Demand and Aggregate Supply

Derivation of Aggregate Demand and Aggregate Supply Curves in the IS-LM Framework; Nature and Shape of IS and LM curves; Interaction of IS and LM curves and Determination of Employment, Output, Prices and Investment; Changes in IS and LM curves and their Implications for Equilibrium

Module V: Inflation, Unemployment and Expectations, and Trade Cycles

Inflation – Unemployment Trade off and the Phillips Curve – Short run and Long run Analysis; Adaptive and Rational Expectations; The Policy Ineffectiveness Debate; Meaning and Characteristics of Trade Cycles; Hawtrey's Monetary Theory, Hayek's Over-investment Theory and Keynes' views on Trade Cycles

Readings:

4. N. Gregory Mankiw (2010): *Macroeconomics*, 7th edition, Cengage Learning India Private Limited, New Delhi
5. Richard T. Froyen (2005): *Macroeconomics*, 2nd Edition, Pearson Education Asia, New Delhi.
6. Errol D'Souza (2009): *Macroeconomics*, Pearson Education Asia, New Delhi.

DSE 1: Economic development and policy in India

Course Description: This paper introduces the students to the essentials of Indian economy with an intention of understanding the basic feature of the Indian economy and its planning process. It also aids in developing an insight into the agricultural and industrial development of India. The students will understand the problems and policies relating to the agricultural and industrial sectors of India and current challenges of Indian economy.

Module I: Introduction to Indian Economy

British Rule: exploitation and under development in India; features of Indian economy – natural resources, infrastructure, population; National income: trends, sectoral composition; Economic planning: Planning Commission and its functions, Planning exercises in India, Objectives, Strategies and achievements; A critique of planned development in India.

Module II: Agricultural Development in India

Indian Agriculture: nature, importance, trends in agricultural production and productivity, factors determining production, land reforms, new agricultural strategies and green revolution, rural credit; Agricultural marketing and warehousing.

Module III: Industrial Development in India

Trends in industrial output and productivities; Industrial Policies of 1948, 1956, 1977 and 1991; Industrial Licensing Policies – MRTP Act, FERA and FEMA; Growth and problems of SSIs, Industrial sickness; Industrial finance; Industrial labour

Module IV: Tertiary Sector and HRD

Tertiary Sector: growth and contribution of service sector to GDP of India, share of services in employment; Human development – concept, evolution, measurement; HRD: indicators, importance, Education in India, Indian educational policy; Health and Nutrition.

Module V: Current Challenges

Poverty: definition and estimate, poverty line, poverty alleviation programs; Inequality: income and regional inequality – causes and corrective measures; Unemployment: concepts, measurement, types, causes and remedies; Environmental challenges: Land, water and air

Recommended books:

1. Kapila U. *Indian economy since Independence*. Academic Foundation, New Delhi
2. Misra, S. K. and Puri V. K. *Indian Economy — Its Development Experience*. Himalaya Publishing House, Mumbai
3. Chakraborty S. *Development Planning: The Indian Experience*. Clarendon Press.
4. Dutt R. and Sundharam K. P. M. *Indian Economy*. S. Chand & Company Ltd., New Delhi.
5. Agarawala, A. N. *Indian Economy*, New Age Publications, New Delhi
6. Panagariya, Arvind (2008): **India: the Emerging Giant**, Oxford University Press, New York
7. Acharya, S. and Mohan, R. (Eds.) (2010): **India's Economy: Performance and Challenges**, Oxford University Press, New Delhi.
8. Ahluwalia, I. J. and Little, I. M. D. (Eds.) (1998): **India's Economic Reforms and Development: Essays for Manmohan Singh**, Oxford University Press, New Delhi.

DSE 2: Economic History of India 1857-1947

Course Description

This course analyses key aspects of Indian economic development during the second half of British colonial rule. In doing so, it investigates the place of the Indian economy in the wider colonial context, and the mechanisms that linked economic development in India to the compulsions of colonial rule. This course links directly to the course on India's economic development after independence in 1947.

Module I: Introduction: Colonial India: Background and Introduction

Overview of colonial economy

Module II: Macro Trends

National Income; population; occupational structure

Module III: Agriculture

Agrarian structure and land relations; agricultural markets and institutions – credit, commerce and technology; trends in performance and productivity; famines

Module IV: Railways and Industry

Railways; the de-industrialisation debate; evolution of entrepreneurial and industrial structure; nature of industrialisation in the interwar period; constraints to industrial breakthrough; labor relations

Module V: Economy and State in the Imperial Context

The imperial priorities and the Indian economy; drain of wealth; international trade, capital flows and the colonial economy – changes and continuities; government and fiscal policy

Readings:

1. Lakshmi Subramanian, *“History of India 1707-1857”*, Orient Blackswan, 2010, Chapter 4.
2. Sumit Guha, 1991, Mortality decline in early 20th century India, *Indian Economic and Social History Review (IESHR)*, pp 371-74 and 385-87.
3. Tirthankar Roy, *The Economic History of India 1857-1947*, Oxford University Press, 3rd edition, 2011.
4. J. Krishnamurty, *Occupational Structure*, Dharma Kumar (editor), The Cambridge Economic History of India, Vol. II, (henceforth referred to as CEHI), 2005, Chapter 5.
5. Irfan Habib, *Indian Economy 1858-1914*, A People's History of India, Vol.28, Tulika, 2006.
6. Ira Klein, 1984, —When Rains Fail: Famine relief and mortality in British India, *IESHR* 21.
7. Jean Dreze, *Famine Prevention in India in Dreze and Sen (eds.) Political Economy of Hunger*, WIDER Studies in Development Economics, 1990, pp.13-35
8. John Hurd, *Railways*, CEHI, Chapter 8, pp.737-761.
9. Rajat Ray (ed.), *Entrepreneurship and Industry in India*, 1994.
10. AK Bagchi, —Deindustrialization in India in the nineteenth century: Some theoretical implications, *Journal of Development Studies*, 1976.
11. MD Morris, *Emergence of an Industrial Labour Force in India*, OUP 1965, Chapter 11, Summary and Conclusions.
12. K.N. Chaudhuri, *Foreign Trade and Balance of Payments*, CEHI, Chapter 10.
13. B.R. Tomlison, 1975, *India and the British Empire 1880-1935*, IESHR, Vol.XII.
14. Dharma Kumar, *The Fiscal System*, CEHI, Chapter 12.
15. Basudev Chatterjee, *Trade, Tariffs and Empire*, OUP 1992, Epilogue.

DSE 3: Odisha Economy

Course Description

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in Odisha in pre- and post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in Odisha, the reading list will have to be updated annually.

Module I: Odisha Economy before 1947

Orissa's Economy in the Nineteenth Century: Benevolence or Exploitation, Forces of Nature, Animal Power, The Company Steps in, Public Works and Public Health, Education, Disintegration of Village Economy, New Social Environment, Changing Position of Social Classes, The Moneylenders, The Borrowers, Money-flows from Village to Metropolis, Pauperization of Peasantry, The Wage Earners, Demographic Changes, Profiting from Rural Adversity; Diarchy in 1919 and Separation of Provincial Finances from Central Government in 1937; Emergence of Federal Finance (Ref.: Das 1976a and 1976b, GoO 2016).

Module II: Macro Economy of Odisha

A macro glance of Odisha economy: aggregate income, broad sectoral decomposition, performance of districts, employment, child labour and bonded labour, employment programmes, consumption expenditure, cost of living; Odisha State public finances (Chapter 14 and 15 of Ref 1; & Chapter 2 and 9 of Ref 2)

Module III: Agriculture Sector Development in Odisha

Agriculture: land ownership and land tenure, agricultural wages and rural unemployment, production and productivity of major crops, agricultural inputs, agricultural policy; Animal Husbandry; Fisheries (Chapter 1 to 3 of Ref 1; & Chapter 3 of Ref 2)

Module IV: Industry, Infrastructure and Environment

Industry: Investment, industrial policy, and the growth of large industries, mining and quarrying; Construction; tertiary sector: tourism, transport and power; Water Resources, Forest Resources (Chapter 4 to 8 of Ref 1; & Chapter 4 & 5 of Ref 2)

Module V: Social Sector in Odisha

Poverty: income poverty and inequality; health sector: outcomes, infrastructure, finance, public health, NRHM; education: Literacy, Primary education, secondary education, higher education, SSA; human development (Chapter 9 to 13 of Ref 1; & Chapter 7 & 8 of Ref 2)

Recommended books and articles:

15. Nayak, P., Panda, S. C., Pattanaik, P. K. (2016): **The Economy of Odisha: A Profile**, Oxford University Press, New Delhi
16. GoO (2012): **Odisha Economic Survey 2015-16**, Planning and Convergence Department, Directorate of Economics and Statistics, Government of Odisha, Bhubaneswar
17. GoO (2004): *Human Development Report 2004 Orissa*, Planning and Coordination Department, Government of Odisha, Bhubaneswar
18. Mahapatro, S. B. (1980): Inter-Industry Wage Differentials in Orissa: An Empirical Analysis, *Indian Journal of Industrial Relations*, 15(4): 525-536.

19. Vyasulu, V. and Arun, A. V. (1997): Industrialisation in Orissa: Trends and Structure, *Economic and Political Weekly*, 32(22): M46-M53.
20. Das, Binod S. (1976a): Orissa's Economy in the Nineteenth Century, *Social Scientist*, 4(11): 32-46.
21. Das, Binod S. (1976b): Orissa's Economy in the Nineteenth Century: Part Two, *Social Scientist*, 4(12): 38-50.
22. GoO (2016): Commemorative Volume on 80 Years Odisha Budget: Since 1936-37, CEFT-XIMB and Department of Finance, Government of Odisha
23. Mohanti, K. K. and Padhi, S. (1995): Employment Situation of Tribal Population in Orissa: 1981 Census Data, *Economic and Political Weekly*, 30(29): 1879-1882.
24. Nair, K. R. G. (1993): New Economic Policy and Development of Backward Regions: A Note on Orissa, *Economic and Political Weekly*, 28(19): 939-941.
25. Mohanty, B. (1993): Orissa Famine of 1866: Demographic and Economic Consequences, *Economic and Political Weekly*, 28(1/2): 55-66.
26. Haan, A. de and Dubey, A. (2005): Poverty, Disparities, or the Development of Underdevelopment in Orissa, *Economic and Political Weekly*, 40(22/23): 2321-2329.
27. Samal, K. C. (1998): Poverty Alleviation after Post-Liberalisation: Study of a Tribal Block in Orissa, *Economic and Political Weekly*, 33(28): 1846-1851
28. Nayak, P. and Chatterjee, B. (1986): Disguised Unemployment in Agriculture: A Case Study of Rural Orissa, *Indian Journal of Industrial Relations*, 21(3): 310-334.

DSE 4: Money and Banking

Course description: This paper intends to explain the ideas and institutions concerning money and banking. It will help the students to understand the meaning, functions and theories of money the working of different types of banks in an economy.

Module I: Money

Money: Meaning, functions and classification; Gresham's law; Monetary standards: Metallic and paper systems of note issue; Value of money: (Uses and limitations of index number); Construction of price index number – its limitations.

Module II: Quantity theory of money

Quantity theory of money - Cash transaction approach, cash balance approach, Keynesian approach; Inflation: meaning, types, causes – demand pull and cost push, effects, measures to control inflation, Trade-off between inflation and unemployment; Stagflation and deflation: meaning; Phillip's curve.

Module III: Banking

Banking: meaning and types; Commercial banks: evolution, functions, the process of credit creation and its limitations, liabilities and assets of banks; A critical appraisal of the progress of commercial banking in India after nationalization; Recent reforms in banking sector in India

Module IV: Central Bank

Central Bank: Functions, Quantitative and qualitative methods of credit control - bank rate policy, open market operations, variable reserve ratio and selective methods; Relative efficacy of quantitative and qualitative methods of credit control.

Module V: Reserve Bank of India

Reserve Bank of India: Role and functions; Repo rate and reverse repo rate; Components of money supply in India; Objectives and limitations of monetary policy with special reference to India

Reading list:

1. Day, A.C.L. – Outline of Monetary Economics, Oxford University Press,
2. De Kock, M.H. – Central Banking, Staples Press London, 1960.
3. Halm, G. N. – Monetary Theory, Asia Publishing House, New Delhi, 1955.
4. Harris, C.L. – Money and Banking, Allyn and Bacon, London, 1961.
5. Laliwala, J.I. – The Theory of Inflation, Vani Educational Book, New Delhi, 1984.
6. Mishra, S. S. – Money Inflation and Economic Growth, Oxford and IBH Publishing Company, New Delhi, 1981.
7. Reserve Bank of India – The Reserve Bank of India, functions and working, Bombay, 1983.
8. Reserve Bank of India, Report of Trend and Progress of Banking in India (various years), Mumbai.
9. Reserve Bank of India: Report on Currency and Finance, Annual, Mumbai.
10. Sayers, R. S. – Modern Banking (7th Ed), Oxford University Press, Delhi, 1978.

Core Economics Course 1: INTRODUCTORY MICROECONOMICS

Course Description

This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situations.

Module 1: Exploring the subject matter of Economics

The Ten Principles of Economics: How people make decisions; Working of the economy as a whole; Thinking Like an Economist: The economist as Scientist – The scientific method: Observation, Theory and more observation; Role of assumptions; Economic Models; The economist as a policy advisor; Why economists disagree; Graphs in Economics

Module 2: Supply and Demand: How Markets Work, Markets and Welfare

The market forces of demand and supply – Markets and competition; The demand curve

– Market vs individual demand curve; Shifts in demand curve; The supply curve – Market vs individual supply curve; Shifts in supply curve; Equilibrium between supply and demand and changes there in; Price elasticity of demand and its determinants; Computing price elasticity of demand; Income and cross elasticity of demand; The price elasticity of supply and its determinants; Computing price elasticity of supply; Consumer Surplus and Producer Surplus; Market efficiency and market failure.

Module 3: The Households

The Budget Constraint; Preferences – representing preferences with indifference curves; Properties of indifference curves; Two extreme examples of indifference curves; Optimisation – Equilibrium; Change in equilibrium due to changes in income, changes in price; Income and substitution effect; Derivation of demand curve; Three applications – Demand for giffen goods, wages and labour supply, Interest rate and household saving.

Module 4: The Firm and Market Structures

Cost concepts; Production and costs; The various measures of cost – Fixed and variable cost, average and marginal cost; Cost curves and their shapes; Costs in the short run and in the long run; Economies and diseconomies of scale. Firms in competitive markets

– What is a competitive market; Profit maximisation and the competitive firm's supply curve; The marginal cost curve and the firm's supply decision; Firm's short-run decision to shut down; Firm's long-run decision to exit or enter a market; The supply curve in a competitive market – short run and long run; Monopoly - Why monopolies arise and public policy towards monopolies

Module 5: The Input Markets

The demand for labour – The production function and the marginal product of labour; Value of the marginal product of labour and demand for labour; Shifts in labour demand curve; The supply of labour – the trade-off between work and leisure; Shifts in the labour supply curve; Equilibrium in the labour market; Other factors of production: Land and capital; Linkages among factors of production.

Readings:

1. Principles of Economics, Gregory N Mankiw, 6e Cengage Learning India Private Limited, New Delhi
2. William A McEachern and Simrit Kaur (2012): Micro Econ: A South-Asian Perspective, Cengage Learning India Private Limited, New Delhi.
3. Karl E. Case and Ray C. Fair (2007): Principles of Economics, 8th Edition, Pearson Education Inc.

Core Economics Course 2: MATHEMATICAL METHODS FOR ECONOMICS I

Course Description

This is the first of a compulsory two-course sequence. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this syllabus. In this course, particular economic models are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.

Module I: Preliminaries

Sets and set operations; relations; functions and their properties; Number systems

Module II: Functions of one real variable

Types of functions- constant, polynomial, rational, exponential, logarithmic; Graphs and graphs of functions; Limit and continuity of functions; Limit theorems

Module III: Derivative of a function

Rate of change and derivative; Derivative and slope of a curve; Continuity and differentiability of a function; Rules of differentiation for a function of one variable; Application- Relationship between total, average and marginal functions

Module IV: Functions of two or more independent variables

Partial differentiation techniques; Geometric interpretation of partial derivatives; Partial derivatives in Economics; Elasticity of a function – demand and cost elasticity, cross and partial elasticity

Module V: Matrices and Determinants

Matrices: concept, types, matrix algebra, transpose, inverse, rank; Determinants: concept, properties, solving problems using properties of determinants, solution to a system of equations - Cramer's rule and matrix inversion method.

Readings:

1. K. Sydsaeter and P. J. Hammond (2002): Mathematics for Economic Analysis. Pearson Educational Asia
2. A. C. Chiang and K. Wainwright (2005): Fundamental Methods of Mathematical Economics, McGraw Hill International Edition.
3. T. Yamane (2012): Mathematics for Economists, Prentice-Hall of India

Core Economics Course 3: INTRODUCTORY MACROECONOMICS

Course Description

This course aims to introduce the students to the basic concepts of Macroeconomics. Macroeconomics deals with the aggregate economy. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.

Module I: Basic Concepts

Macro vs. Micro Economics; Why Study Macroeconomics? Limitations of Macroeconomics ; Stock and Flow variables, Equilibrium and Disequilibrium, Partial and General Equilibrium Statics – Comparative Statics and Dynamics ; National Income Concepts – GDP, GNP, NDP and NNP at market price and factor cost; Personal Income and Disposable personal Income; Real and Nominal GDP

Module II: Measurement of Macroeconomic Variables

Output, Income and Expenditure Approaches ; Difficulties of Estimating National Income; National Income Identities in a simple 2- sector economy and with government and foreign trade sectors; Circular Flows of Income in 2, 3 and 4-sector; economies; National Income and Economic Welfare ; Green Accounting.

Module III: Money

Evolution and Functions of Money, Quantity Theory of Money – Cash Transactions, Cash Balances and Keynesian Approaches, Value of Money and Index Number of Prices

Module IV: Inflation, Deflation, Depression and Stagflation

Inflation – Meaning, Causes, Costs and Anti -Inflationary Measures; Classical, Keynesian, Monetarist and Modern Theories of Inflation, Deflation- Meaning, Causes, Costs and Anti-Deflationary Measures, Depression and Stagflation; Inflation vs. Deflation

Module V: Determination of National Income

The Classical Approach - Say's Law, Theory of Determination of Income and Employment with and without saving and Investment; Basics of Aggregate Demand and Aggregate Supply and Consumption-Saving – Investment Functions, The Keynesian Approach – Basics of Aggregate Demand and Aggregate Supply and Consumption, Saving, Investment Functions; The Principle of Effective Demand; Income Determination in a Simple 2-Sector Model; Changes in Aggregate Demand and Income- The Simple Investment Multiplier; Income Determination in a 3-Sector Model with the Government Sector and Fiscal Multipliers

Readings:

1. N. Gregory Mankiw (2010): Macroeconomics, 7th edition, Cengage Learning India Private Limited, New Delhi
2. Richard T. Froyen (2005): Macroeconomics, 2nd Edition, Pearson Education Asia, New Delhi.
3. Errol D'Souza (2009): Macroeconomics, Pearson Education Asia, New Delhi.

Core Economics Course 4: MATHEMATICAL METHODS FOR ECONOMICS II

Course Description

This course is the second part of a compulsory two-course sequence. This part is to be taught in Semester II following the first part in Semester I. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this Syllabus. In this course, particular economic models are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.

Module I: Linear models:

Input- Output Model: Basic concepts and structure of Leontief's open and static Input-Output model; solution for equilibrium output in a three industry model; The closed model

Module II: Second and higher order derivatives:

Technique of higher order differentiation; Interpretation of second derivative; Second order derivative and curvature of a function; Concavity and convexity of functions; Points of inflection

Module III: Differentials and total derivatives:

Differentials and derivatives; Total differentials; Rules of differentials; Total derivatives; Derivatives of implicit functions

Module IV: Single and multivariable optimisation:

Optimum values and extreme values; Relative maximum and minimum; Necessary versus sufficient conditions - First and Second derivative tests; Economic applications thereof, First and second order condition for extremum of multivariable functions; Convex functions and convex sets

Module V: Optimisation with Equality Constraints:

Effects of a constraint; Finding stationary value – Lagrange-Multiplier method (Two variable single constraint case only); First and second order condition; The Bordered Hessian determinant.

Readings:

1. K. Sydsaeter and P. J. Hammond (2002): Mathematics for Economic Analysis. Pearson Educational Asia
2. A. C. Chiang and K. Wainwright (2005): Fundamental Methods of Mathematical Economics, McGraw Hill International Edition.
3. T. Yamane (2012): Mathematics for Economists, Prentice-Hall of India

Core Economics Course 5: MICROECONOMICS I

Course Description

The course is designed to provide a sound training in microeconomic theory to formally analyze the behaviour of individual agents. Since students are already familiar with the quantitative techniques in the previous semesters, mathematical tools are used to facilitate understanding of the basic concepts; this course looks at the behaviour of the consumer and the producer and also covers the behaviour of a competitive firm.

Module I: Consumer Theory I

The market – Constructing a model; Optimisation and equilibrium; The demand curve and the supply curve; Market Equilibrium; The budget constraint and budget set; Changes in budget line; Effect of taxes, subsidy and rationing on budget set; Consumer Preferences – Indifference curves; Case of perfect substitutes, complements, neutrals, satiation, discreet goods; The marginal rate of substitution; Utility – Cardinal utility; Constructing a utility function; Marginal utility and MRS; Optimal choice and consumer demand; Estimating Utility Functions; Implications of the MRS condition; Choosing taxes; Demand – Normal and inferior goods; Income Offer Curve and Engel Curve; Ordinary goods and Giffen goods; The Offer Curve and the demand Curve; The inverse demand function.

Module II: Consumer Theory II

Slutsky Equation – The Substitution and Income Effects; Sign of Substitution Effect; The Total Change in Demand; Rates of Change; The Law of Demand; Another Substitution Effect; Compensated Demand Curves; Consumer's Surplus – Demand for a discrete good; Constructing utility from demand; Other interpretations of consumer's surplus; Approximating continuous demand; Interpreting the change in consumer's surplus; Producer's surplus; Calculating gains and losses

Module III: Production Theory

Marginal Productivity, Isoquant Maps and the Rate of Technical Substitution, Production with One Variable Input (labour) and with Two-Variable Inputs, Returns to Scale, Four Simple Production Function (Linear, Fixed Proportions, Cobb-Duglas, CES), Technical Progress

Module IV: Cost Functions

Definition of Costs, Cost Functions and its Properties, Shift in Cost Curves, Cost in the Short-Run and Long-Run, Long-Run versus Short-Run Cost Curves, Production with Two Outputs – Economies of Scope

Module V: Profit Maximisation

The Nature and Behaviour of Firms, Profit Maximization, Marginal Revenue, Short-Run Supply by Price-Taking Firm, Profit Functions and its Properties

Readings:

1. C. Snyder and W. Nicholson (2012): Microeconomic Theory: Basic Principles and Extensions, 11th Edition, Cengage Learning, Delhi, India.
2. R. S. Pindyck, D. N. Rubinfeld and P. L. Meheta (2009): Microeconomics, 7th Edition, Pearson, New Delhi.
3. H. R. Varian (2010): Intermediate Microeconomics: A Modern Approach, 8th Edition, W.W. Norton and Company/Affiliated East-West Press (India). The workbook by Varian and Bergstrom may be used for problems

Core Economics Course 6: MACROECONOMICS I

Course Description

This course introduces the students to formal modelling of a macro-economy in terms of analytical tools. It discusses various alternative theories of output and employment determination in a closed economy in the short run as well as medium run, and the role of policy in this context. It also introduces the students to various theoretical issues related to an open economy.

Module I: Consumption Function

Consumption – Income Relationship, Propensities to Consume and the Fundamental Psychological Law of Consumption; Implications of Keynesian Consumption Function; Factors Influencing Consumption Function; Measures to Raise Consumption Function; Absolute, Relative, Permanent and Life – Cycle Hypotheses

Module II: Investment Function

Autonomous and Induced Investment, Residential Investment and Inventory Investment, Determinants of Business Fixed Investment, Decision to Invest and MEC, Accelerator and MEI Theories of Investment.

Module III: Demand for and Supply of Money

Demand for Money – Classical, Neoclassical and Keynesian Approaches, The Keynesian Liquidity Trap and its Implications, Supply of Money – Classical and Keynesian Approaches, The Theory of Money Supply Determination and Money Multiplier, Measures of Money Supply in India

Module IV: Aggregate Demand and Aggregate Supply

Derivation of Aggregate Demand and Aggregate Supply Curves in the IS -LM Framework; Nature and Shape of IS and LM curves; Interaction of IS and LM curves and Determination of Employment, Output, Prices and Investment; Changes in IS and LM curves and their Implications for Equilibrium

Module V: Inflation, Unemployment and Expectations, and Trade Cycles

Inflation – Unemployment Trade off and the Phillips Curve – Short run and Long run Analysis; Adaptive and Rational Expectations; The Policy Ineffectiveness Debate; Meaning and Characteristics of Trade Cycles; Hawtrey's Monetary Theory, Hayek's Over-investment Theory and Keynes' views on Trade Cycles

Readings:

1. N. Gregory Mankiw (2010): Macroeconomics, 7th edition, Cengage Learning India Private Limited, New Delhi
2. Richard T. Froyen (2005): Macroeconomics, 2nd Edition, Pearson Education Asia, New Delhi.
3. Errol D'Souza (2009): Macroeconomics, Pearson Education Asia, New Delhi.

Core Economics Course 7: STATISTICAL METHODS FOR ECONOMICS

Course Description

This is a course on statistical methods for economics. It begins with some basic concepts and terminology that are fundamental to statistical analysis and inference. It is followed by a study and measure of relationship between variables, which are the core of economic analysis. This is followed by a basic discussion on index numbers and time series. The paper finally develops the notion of probability, followed by probability distributions of discrete and continuous random variables and introduces the most frequently used theoretical distribution, the Normal distribution.

Module I: Data Collection and measures of central tendency and dispersion

Basic concepts: population and sample, parameter and statistic; Data Collection: primary and secondary data, methods of collection of primary data; Presentation of Data: frequency distribution; cumulative frequency; graphic and diagrammatic representation of data; Measures of Central Tendency: mean, median, mode, geometric mean, harmonic mean, their relative merits and demerits; Measures of Dispersion: absolute and relative - range, mean deviation, standard deviation, coefficient of variation, quartile deviation, their merits and demerits; Measures of skewness and kurtosis.

Module II: Correlation Analysis

Correlation: scatter diagram, sample correlation coefficient - Karl Pearson's correlation coefficient and its properties, probable error of correlation coefficient, Spearman's rank correlation coefficient, partial and multiple correlation.

Module III: Regression Analysis

Two variable linear regression analysis - estimation of regression lines (Least square method) and regression coefficients - their interpretation and properties, standard error of estimate

Module IV: Time Series and Index Number

Time Series: definition and components, measurement of trend- free hand method, methods of semi-average, moving average and method of least squares (equations of first and second degree only), measurement of seasonal component; Index Numbers: Concept, price relative, quantity relative and value relative; Laspeyer's and Fisher's index, family budget method, problems in construction and limitations of index numbers, test for ideal index number.

Module V: Probability theory

Probability: Basic concepts, addition and multiplication rules, conditional probability; Random variables and their probability distribution; Mathematical expectations; Theoretical Distribution: normal distribution - Properties and uses, problems using area under standard normal curve

Recommended books:

1. Jay L. Devore (2010): Probability and Statistics for Engineering and the Sciences, Cengage learning, 2010.
2. S. C. Gupta (): Fundamentals of Statistics, Himalaya Publishing House, Delhi
3. Murray R. Spiegel (): Theory & Problems of Statistics, Schaum's publishing Series.

Core Economics Course 8: MICROECONOMICS II

Course Description

This course is a sequel to Microeconomics I. The emphasis will be on giving conceptual clarity to the student coupled with the use of mathematical tools and reasoning. It covers Market, general equilibrium and welfare, imperfect markets and topics under information economics.

Module I: Firm Supply and Equilibrium

Market Environments; Pure competition ; Supply decision of a competitive firm and Exceptions; Inverse Supply Function; Profits and Producer's Surplus; Long Run Supply Curve of a Firm; Long Run Average Costs; Short Run and Long Run Industry Supply; Industry Equilibrium in Short and Long Run; Meaning of Zero Profits; Economic Rent.

Module II: General equilibrium, efficiency and welfare

The Edgeworth Box; Trade; Pareto Efficient Allocations; Existence of equilibrium and efficiency; The Welfare Theorems and their implications; The Firm; Production and the Welfare Theorems ; Production possibilities, comparative advantage and Pareto efficiency

Module III: Monopoly

Barriers to Entry, Profit Maximization and Output Choice, Monopoly and resource Allocation, Monopoly, Product Quality and Durability, Price Discrimination, Second Degree Price Discrimination through Price Schedules, Regulation of Monopoly, Dynamic Vies of Monopoly

Module IV: Oligopoly

Oligopoly – Choosing a strategy; Quantity leadership – Problems of the follower and the leader; Price leadership; Comparing quantity leadership and price leadership; Simultaneous Quantity Setting; Example of Cournot Equilibrium; Simultaneous Price Setting; Collusion

Module V: Game Theory

The Payoff Matrix of a Game; Nash Equilibrium; Mixed Strategies ;The Prisoner's Dilemma; Repeated Games; Enforcing a cartel; Sequential Games; A Game of entry deterrence.

Readings:

1. C. Snyder and W. Nicholson (2012): Microeconomic Theory: Basic Principles and Extensions, 11th Edition, Cengage Learning, Delhi, India.
2. R. S. Pindyck, D. N. Rubinfeld and P. L. Meheta (2009): Microeconomics, 7th Edition, Pearson, New Delhi.
3. H. R. Varian (2010): Intermediate Microeconomics: A Modern Approach, 8th Edition, W.W. Norton and Company/Affiliated East-West Press (India). The workbook by Varian and Bergstrom may be used for problems.

Core Economics Course 9: MACROECONOMICS II

Course Description

This course is a sequel to Macroeconomics I. In this course, the students are introduced to the long run dynamic issues like growth and technical progress. It also provides the micro-foundations to the various aggregative concepts used in the previous course.

Module I: Financial Markets and Reforms

Features of Financial Markets, Functions of Financial Markets, Banks and Financial Markets, Adverse Selection and Moral Hazard, Risk and Supply of Credit, The Determination of Banks Asset Portfolio, Financial Repression and Major Financial Sector Reforms in India, Lessons from the Global Financial Crisis and the Policy Response in India

Module II: Open Economy Macroeconomics

Balance of payments- Concept, Equilibrium and Disequilibrium, Measures to Correct Disequilibrium, Determination of Foreign Exchange Rate- the PPP Theory and its Implications, Fixed vs. Flexible Exchange Rates, The Short-run open economy Model, the basic Mundell-Fleming Model. International Financial Markets

Module III: Modelling Economic Growth

The Basic Harrod- Domar Model, Joan Robinson and the Golden Rule of Capital Accumulation, The Basic Solow Model, Theory of Endogenous Growth – the Rudimentary A-K Model

Module IV: Macroeconomic Policy

The Goals of Macroeconomic Policy and of Policy Makers, The Budget and Automatic Fiscal Stabilisers, The Doctrine of Balanced Budget and Keynesian Objections; Concepts of Budget, Revenue and Fiscal Deficits, Fiscal Policy: Objectives and Limits to Discretionary Policy, The Crowding –Out Hypothesis and the Crowding – in Controversy Meaning, Scope and Objectives of Monetary Policy, Instruments of Monetary Policy, the Transmission Mechanism of Monetary Policy, Rules vs. Discretion in Monetary Policy, Implications of Targeting the Interest Rate, Limits to Monetary Policy

Module V: Schools of Macroeconomic Thought and the Fundamentals of Macroeconomic Theory and Policy

Classics, Keynes, Monetarists, New Classicals and New Keynesians: (i) Keynes vs. the Classics – Aggregate Demand and Aggregate Supply, Underemployment Equilibrium and Wage Price Flexibility, (ii) Monetarists and Friedman's Reformulation of Quantity Theory, Fiscal and Monetary Policy: Monetarists vs. Keynesians, (iii) The New Classical View of Macroeconomics and the Keynesian Counter critique, (iv) The New Keynesian Economics with reference to the Basic Features of Real Business Cycle Models, the Sticky Price Model.

Readings:

1. N. Gregory Mankiw (2010): Macroeconomics, 7th edition, Cengage Learning India Private Limited, New Delhi
2. Richard T. Froyen (2005): Macroeconomics, 2nd Edition, Pearson Education Asia, New Delhi.
3. Errol D'Souza (2009): Macroeconomics, Pearson Education Asia, New Delhi.

Core Economics Course 10: Public Economics

Course Description

Public economics is the study of government policy from the points of view of economic efficiency and equity. The paper deals with the nature of government intervention and its implications for allocation, distribution and stabilization. Inherently, this study involves a formal analysis of government taxation and expenditures. The subject encompasses a host of topics including public goods, market failures and externalities.

Module I: Introduction to public finance

Public Finance: meaning and scope, distinction between public and private finance; public good versus private good; Principle of maximum social advantage; Market failure and role of government;

Module II: Public Expenditure

Meaning, classification, principles, cannons and effects, causes of growth of public expenditure, Wagner's law of increasing state activities, Peacock-Wiseman hypotheses

Module III: Public Revenue

Sources of Public Revenue; Taxation - meaning, cannons and classification of taxes, impact and incidence of taxes, division of tax burden, the benefit and ability to pay approaches, taxable capacity, effects of taxation, characteristics of a good tax system, major trends in tax revenue of central and state governments in India

Module III: Public Budget

Public Budget: kinds of budget, economic and functional classification of the budget; Balanced and unbalanced budget; Balanced budget multiplier; Budget as an instrument of economic policy.

Module V: Public Debt

Sources, effects, debt burden – Classical, Ricardian and other views, shifting - intergenerational equity, methods of debt redemption, debt management, tax versus debt;

Readings:

1. J. Hindriks and G. Myles (2006): Intermediate Public Economics, MIT Press.
2. R. A. Musgrave and P. B. Musgrave (1989): Public Finance in Theory and Practices. McGraw Hill
3. B. P. Herber (1975): Modern Public Finance.
4. B. Mishra (1978): Public Finance, Macmillan India limited.

Core Economics Course 11: INDIAN ECONOMY I

Course Description

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in India, the reading list will have to be updated annually.

Module I: Basic Characteristics of Indian Economy as a Developing Economy

Indian Economy in the Pre-British Period; The Structure and Organisation of Villages and Towns; Industries and Handicrafts in Pre-British India; Colonialism; Economic Consequences of British Rule; Decline of Handicrafts and Progressive Ruralisation; The Land System and Commercialisation of Agriculture; Industrial Transition; Colonial Exploitation and Impacts – Underdevelopment; Colonisation and Modernisation; State Policies and Economic Underdevelopment; The Current State of Indian Economy

Module II: Population and Human Development

Population Growth and Economic Development – size, growth and future of population; Causes of rapid population growth; Population and economic development; Population policy; Demographic issues – Sex and Age Composition of population; Demographic Dividend; Urbanisation and Migration; Human Resource Development – Indicators and importance of Human Resource Development; Education policy; Health and nutrition.

Module III: National Income in India – The Growth Story and Regional Disparities

Trends in national and per capita income; Changes in sectoral composition of national income; Regional disparities in Growth and Income; Savings and Investment and Economic Growth – The Linkage

Module IV: Economic Planning in India

Rationale, Features, Objectives, Strategies, Achievements and Assessment of Planning in India; Eleventh Five Year Plan – Objectives, Targets and Achievements; Twelfth Five Year Plan – Vision and Strategy; From Planning to NITI – Transforming India's Development Agenda.

Module V: Current Challenges

Poverty – Estimation and Trends, Poverty Alleviation Programs – MGNREGA, NRLM, SJSRY; Inequality – Measures and trends in India; Unemployment – Nature, Estimates, Trends, Causes and Employment Policy

Readings:

1. Indian Economy, VK Puri and SK Misra, Himalaya Publishing House, 31st Revised Edition
2. Indian Economy Datt and Sundharam, Gaurav Datt and Ashwani Mahajan, S Chand Publications, 7th Revised Edition
3. Indian Economy Since Independence, ed by Uma Kapila, Academic Foundation, Revised Nineteenth Edition 2008-09
4. The New Oxford Economics Companion to India, ed by K Basu and A Maertens, Oxford University Press, 2012
5. Economic Survey of India 2015-16, Ministry of Finance, GoI
6. NITI Ayog document- (Feb 8, 2015)

Core Economics Course 12: DEVELOPMENT ECONOMICS I

Course Description

This is the first part of a two-part course on economic development. The course begins with a discussion of alternative conceptions of development and their justification. It then proceeds to aggregate models of growth and cross-national comparisons of the growth experience that can help evaluate these models. The axiomatic basis for inequality measurement is used to develop measures of inequality and connections between growth and inequality are explored. The course ends by linking political institutions to growth and inequality by discussing the role of the state in economic development and the informational and incentive problems that affect state governance.

Module 1: Study of economic development:

Development Economics as a subject; economic growth and economic development; characteristics of underdeveloped countries – vicious cycle of poverty and cumulative causation; obstacles to economic development; measures of economic development – national and per capita income, basic needs approach, capabilities approach, three core values of development, PQLI, HDI, HPI, MDPI, GDI; capital formation and economic development

Module 2: Theories of Economic Growth and Development

Classical theory, Marxian theory; Schumpeterian theory; Rostow's stages of economic growth; Solow model and convergence with population growth and technical progress

Module 3: Poverty, Inequality and Development:

Concepts of poverty and inequality; Measuring poverty; Measuring Inequality – Lorenz curve and Kuznets' inverted U hypothesis; Growth, poverty and inequality; Economic characteristics of poverty groups (rural poverty, women and poverty, indigenous population and poverty); Policy options – some basic considerations

Module 4: Institutions and economic development:

Role of institutions in economic development; Characteristics of good institutions and quality of institutions; The pre-requisites of a sound institutional structure; Different measures of institutions – aggregate governance index, property rights and risk of expropriation; The role of democracy in economic development; Role of state; Role of markets and market failure; Institutional and cultural requirements for operation of effective private markets; Market facilitating conditions; Limitations of markets in LDCs; Corruption and economic development – tackling the problem of corruption

Module 5: Agriculture, Industry and Economic Development:

Role of agriculture; Transforming traditional agriculture; Barriers to agricultural development; Role of industrialization; Interdependence between agriculture and industries – A model of complementarities between agriculture and industry; terms of trade between agriculture and industry; functioning of markets in agrarian societies; interlinked agrarian markets

Readings:

1. Debraj Ray (2009): Development Economics, Oxford University Press.
2. Partha Dasgupta (2007): Economics, A Very Short Introduction, Oxford University Press.
3. Abhijit Banerjee, Roland Benabou and Dilip Mookerjee (2006): Understanding Poverty, Oxford University Press.

4. Amartya Sen (2000): Development as Freedom, OUP.
5. Daron Acemoglu and James Robinson (2006): Economic Origins of Dictatorship and Democracy, Cambridge University Press.
6. Robert Putnam (1994): Making Democracy Work: Civic Traditions in Modern Italy, Princeton University Press.
7. Todaro, Michael P and Stephen C Smith (2006): Economic Development, 8th Edition, Pearson
8. Thirlwall, A P (2011): Economics of Development, 9th Edition, Palgrave Macmillan

Core Economics Course 13: INDIAN ECONOMY II

Course Description

This course examines sector- specific policies and their impact in shaping trends in key economic indicators in India. It highlights major policy debates and evaluates the Indian empirical evidence. Given the rapid changes taking place in the country, the reading list will have to be updated annually.

Model I: Agricultural Development in India

Indian Agriculture: nature, importance, trends in agricultural production and productivity, factors determining production, land reforms, new agricultural strategies and green revolution, rural credit; Agricultural marketing and warehousing.

Module II: Industrial Development in India

Trends in industrial output and productivities; Industrial Policies of 1948, 1956, 1977 and 1991; Industrial Licensing Policies – MRTP Act, FERA and FEMA; Growth and problems of SSIs, Industrial sickness; Industrial finance; Industrial labour

Module III: Tertiary Sector and HRD

Tertiary Sector: growth and contribution of service sector to GDP of India, share of services in employment; Human development – concept, evolution, measurement; HRD: indication, importance, education in India, Indian educational policy; Health and Nutrition.

Module IV: External Sector

Foreign Trade: role, composition and direction of India's foreign trade, trends of export and import in India, export promotion versus import substitution; Balance of Payments of India; India's Trade Policies; Foreign Capital – FDI, Aid and MNCs.

Module IV: Indian Economy and Environment

Environmental Policies in India: The Environment (Protection) Act 1986, The Environment (Protection) Rules 1986, The National Forest Policy 1988, Policy statement for Abatement of Pollution 1992, National Conservation Strategy and Policy Statement on Environment and Development 1992, The National Environment Appellate Authority Act 1997, National Environmental Policy 2006; Global deal with Climate Change: Introduction, Intergovernmental Panel for Climate Change (IPCC), Impact of Climate Change on India, Global Response on Climate Change, Possible Role of India

Readings:

1. U. Kapila (2010): Indian economy since Independence. Academic Foundation, New Delhi
2. S. K. Misra and V. K. Puri (Latest Year): Indian Economy — Its Development Experience, Himalaya Publishing House, Mumbai
3. S. Chakraborty (): Development Planning: The Indian Experience. Clarendon Press.
4. R. Dutt and K. P. M, Sundharam (Latest Year): Indian Economy, S. Chand & Company Ltd., New Delhi.
5. A. Panagariya (2008): India: the Emerging Giant, Oxford University Press, New York
6. S. Acharya and R. Mohan (Eds.) (2010): India's Economy: Performance and Challenges, Oxford University Press, New Delhi.
7. I. J. Ahluwalia and I. M. D. Little (Eds.) (1998): India's Economic Reforms and Development: Essays for Manmohan Singh, Oxford University Press, New Delhi.

Core Economics Course 14: DEVELOPMENT ECONOMICS II

Course Description

This is the second module of the economic development sequence. It begins with basic demographic concepts and their evolution during the process of development. The structure of markets and contracts is linked to the particular problems of enforcement experienced in poor countries. The governance of communities and organizations is studied and this is then linked to questions of sustainable growth. The course ends with reflections on the role of globalization and increased international dependence on the process of development.

Module 1: Population and Development

Demographic concepts : birth and death rates, age structure, fertility and its determinants, the Malthusian population trap and the microeconomic household theory of fertility; costs and benefits of population growth and the model of low level equilibrium trap; the seven negative consequences of population growth; the concept of optimum population; rural-urban migration – the Harris Todaro migration model and policy implications

Module 2: Dualism and economic development

Dualism – geographic, social and technological; the theory of cumulative causation; the regional inequalities in the context of economic development; the inverted U relationship; international inequality and the centre periphery thesis; dependency, exploitation and unequal exchange; the dualistic development thesis and its implications

Module 3: Environment and Development

Basic issues of environment and development – population, resources and the environment; poverty, economic growth, rural development, urban development and the environment; simple model of environment and economic activity; environmental degradation and externalities; common property resources, public goods and the free-rider problem; renewable and non-renewable resources; environmental values and their measurement; concept of sustainable development; basics of climate change

Module 4: Financing Economic Development

Saving, capital formation and economic development; rural financial intermediaries, micro credit and economic development; financial liberalisation, financial inclusion and economic development; taxation, public borrowing and economic development; inflation, saving and growth

– the Keynesian approach; foreign finance, investment and aid – controversies and opportunities; private foreign investment and private portfolio investment; growing role of non-governmental organisations

Module 5: Globalisation, international trade and economic development:

Trade and economic development; export led growth; trade liberalisation and growth of exports; terms of trade and economic growth – the Prebisch Singer Hypothesis; trade strategies for development – import substitution vs export promotion; international commodity agreements; trade vs aid.

Readings

1. Debraj Ray (2009): Development Economics, Oxford University Press.
2. Partha Dasgupta (2007): Economics, A Very Short Introduction, Oxford University Press.
3. Abhijit Banerjee, Roland Benabou and Dilip Mookerjee (2006): Understanding Poverty, Oxford University Press.
4. Thomas Schelling (1978): Micromotives and Macrobehavior, W. W. Norton.
5. Albert O. Hirschman (1970): Exit, Voice and Loyalty: Responses to Decline in Firms, Organizations and States, Harvard University Press.
6. Elinor Ostrom (1990): Governing the Commons: The Evolution of Institutions for Collective Action, Cambridge University Press.
7. Dani Rodrik (2011): The Globalization Paradox: Why Global Markets, States and Democracy Can't Coexist, Oxford University Press.
8. Michael D. Bordo, Alan M. Taylor and Jeffrey G. Williamson (ed.) (2003): Globalization in

- Historical Perspective, University of Chicago Press.
9. Todaro, Michael P and Stephen C Smith (2006): Economic Development, 8th Edition, Pearson
10. Thirlwall, A P (2011): Economics of Development, 9th Edition, Palgrave Macmillan

DSE Group I

DSEG 1.1: Economic History of India 1857-1947

Course Description

This course analyses key aspects of Indian economic development during the second half of British colonial rule. In doing so, it investigates the place of the Indian economy in the wider colonial context, and the mechanisms that linked economic development in India to the compulsions of colonial rule. This course links directly to the course on India's economic development after independence in 1947.

Module I: Introduction: Colonial India: Background and Introduction Overview of colonial economy

Module II: Macro Trends

National Income; population; occupational structure

Module III: Agriculture

Agrarian structure and land relations; agricultural markets and institutions – credit, commerce and technology; trends in performance and productivity; famines

Module IV: Railways and Industry

Railways; the de-industrialisation debate; evolution of entrepreneurial and industrial structure; nature of industrialisation in the interwar period; constraints to industrial breakthrough; labor relations

Module V: Economy and State in the Imperial Context

The imperial priorities and the Indian economy; drain of wealth; international trade, capital flows and the colonial economy – changes and continuities; government and fiscal policy

Readings:

1. Lakshmi Subramanian, "History of India 1707-1857", Orient Blackswan, 2010, Chapter 4.
2. Sumit Guha, 1991, Mortality decline in early 20th century India', Indian Economic and Social History Review (IESHR), pp 371-74 and 385-87.
3. Tirthankar Roy, The Economic History of India 1857-1947, Oxford University Press, 3rd edition, 2011.
4. J. Krishnamurty, Occupational Structure, Dharma Kumar (editor), The Cambridge Economic History of India, Vol. II, (henceforth referred to as CEHI), 2005, Chapter 5.
5. Irfan Habib, Indian Economy 1858-1914, A People's History of India, Vol.28, Tulika, 2006.
6. Ira Klein, 1984, —When Rains Fail: Famine relief and mortality in British India, IESHR 21.
7. Jean Dreze, Famine Prevention in India in Dreze and Sen (eds.) Political Economy of Hunger, WIDER Studies in Development Economics, 1990, pp.13-35
8. John Hurd, Railways, CEHI, Chapter 8, pp.737-761.
9. Rajat Ray (ed.), Entrepreneurship and Industry in India, 1994.
10. AK Bagchi, —Deindustrialization in India in the nineteenth century: Some theoretical implications, Journal of Development Studies, 1976.
11. MD Morris, Emergence of an Industrial Labour Force in India, OUP 1965, Chapter 11, Summary and Conclusions.
12. K.N. Chaudhuri, Foreign Trade and Balance of Payments, CEHI, Chapter 10.
13. B.R. Tomlison, 1975, India and the British Empire 1880-1935, IESHR, Vol.XII.
14. Dharma Kumar, The Fiscal System, CEHI, Chapter 12.
15. Basudev Chatterjee, Trade, Tariffs and Empire, OUP 1992, Epilogue.

DSEG 1.2 INTRODUCTORY ECONOMETRICS

Course Description

This course provides a comprehensive introduction to basic econometric concepts and techniques. It covers statistical concepts of hypothesis testing, estimation and diagnostic testing of simple and multiple regression models. The course also covers the consequences of and tests for misspecification of regression models.

Module I: Introduction

Definition, Nature and scope of econometrics; Theoretical Probability Distributions: Normal distribution; chi-square, t- and F-distributions and their uses

Module II: Sampling

Basic concepts of sampling: Probability and non-probability sampling; Types of sampling. Theory of Estimation: Estimation of parameters; properties of estimators – small sample and asymptotic properties; point and interval estimation

Module III: Hypothesis Testing

Testing of hypotheses: defining statistical hypotheses; Simple and composite hypotheses; Null and alternative hypothesis; Type I and Type II errors, Critical region; Neyman-Pearson lemma; Power of a test.

Module IV: Linear Regression Analysis

Two variable linear regression model – Assumptions; Least square estimates, Variance and co-variance between Least square estimates; BLUE properties; Standard errors of estimates; Co-efficient of determination; Inference in a two variable linear regression model; ANOVA; Forecasting.

Module V: Violation of Classical Assumptions

Heteroscedasticity, multicollinearity and auto-correlation: Meaning, consequences, tests and remedies.

Reading List:

1. Johnston (1991), “Econometric Methods”, Mc Graw Hill Book Co
2. Koutsoyiannis, A, (1992) “Introduction to Econometrics” OUP
3. Dougherty, C. (1992) “Introduction to Econometrics” OUP.
4. Kmenta, J (1997); “Elements of Econometrics”, University of Michigan Press
5. Gujarati, D & Sangeetha (2007); “Basic Econometrics”, Mc Graw Hill Book Co.

DSEG 1.3: Odisha Economy

Course Description

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in Odisha in pre- and post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in Odisha, the reading list will have to be updated annually.

Module I: Odisha Economy before 1947

Orissa's Economy in the Nineteenth Century: Benevolence or Exploitation, Forces of Nature, Animal Power, The Company Steps in, Public Works and Public Health, Education, Disintegration of Village Economy, New Social Environment, Changing Position of Social Classes, The Moneylenders, The Borrowers, Money-flows from Village to Metropolis, Pauperization of Peasantry, The Wage Earners, Demographic Changes, Profiting from Rural Adversity; Diarchy in 1919 and Separation of Provincial Finances from Central Government in 1937; Emergence of Federal Finance (Ref.: Das 1976a and 1976b, GoO 2016).

Module II: Macro Economy of Odisha

A macro glance of Odisha economy: aggregate income, broad sectoral decomposition, performance of districts, employment, child labour and bonded labour, employment programmes, consumption expenditure, cost of living; Odisha State public finances (Chapter 14 and 15 of Ref 1; & Chapter 2 and 9 of Ref 2)

Module III: Agriculture Sector Development in Odisha

Agriculture: land ownership and land tenure, agricultural wages and rural unemployment, production and productivity of major crops, agricultural inputs, agricultural policy; Animal Husbandry; Fisheries (Chapter 1 to 3 of Ref 1; & Chapter 3 of Ref 2)

Module IV: Industry, Infrastructure and Environment

Industry: Investment, industrial policy, and the growth of large industries, mining and quarrying; Construction; tertiary sector: tourism, transport and power; Water Resources, Forest Resources (Chapter 4 to 8 of Ref 1; & Chapter 4 & 5 of Ref 2)

Module V: Social Sector in Odisha

Poverty: income poverty and inequality; health sector: outcomes, infrastructure, finance, public health, NRHM; education: Literacy, Primary education, secondary education, higher education, SSA; human development (Chapter 9 to 13 of Ref 1; & Chapter 7 & 8 of Ref 2)

Reading List:

1. Nayak, P., Panda, S. C., Pattanaik, P. K. (2016): The Economy of Odisha: A Profile, Oxford University Press, New Delhi
2. GoO (2012): Odisha Economic Survey 2015-16, Planning and Convergence Department, Directorate of Economics and Statistics, Government of Odisha, Bhubaneswar
3. GoO (2004): Human Development Report 2004 Orissa, Planning and Coordination Department, Government of Odisha, Bhubaneswar
- 4.
5. Mahapatro, S. B. (1980): Inter-Industry Wage Differentials in Orissa: An Empirical Analysis, Indian Journal of Industrial Relations, 15(4): 525-536.
6. Vyasulu, V. and Arun, A. V. (1997): Industrialisation in Orissa: Trends and Structure, Economic and Political Weekly, 32(22): M46-M53.
- 7.
8. Das, Binod S. (1976a): Orissa's Economy in the Nineteenth Century,

9. Social Scientist, 4(11): 32-46.
- 10.
11. Das, Binod S. (1976b): Orissa's Economy in the Nineteenth Century: Part Two, Social Scientist, 4(12): 38-50.
- 12.
13. GoO (2016): Commemorative Volume on 80 Years Odisha Budget: Since 1936-37, CEFT-XIMB and Department of Finance, Government of Odisha
14. Mohanti, K. K. and Padhi, S. (1995): Employment Situation of Tribal Population in Orissa: 1981 Census Data, Economic and Political Weekly, 30(29): 1879-1882.
- 15.
16. Nair, K. R. G. (1993): New Economic Policy and Development of Backward Regions: A Note on Orissa, Economic and Political Weekly, 28(19): 939-941.
17. Mohanty, B. (1993): Orissa Famine of 1866: Demographic and Economic Consequences, Economic and Political Weekly, 28(1/2): 55-66.
18. Haan, A. de and Dubey, A. (2005): Poverty, Disparities, or the Development of Underdevelopment in Orissa, Economic and Political Weekly, 40(22/23): 2321-2329.
19. Samal, K. C. (1998): Poverty Alleviation after Post-Liberalisation: Study of a Tribal Block in Orissa, Economic and Political Weekly, 33(28): 1846-1851
20. Nayak, P. and Chatterjee, B. (1986): Disguised Unemployment in Agriculture: A Case Study of Rural Orissa, Indian Journal of Industrial Relations, 21(3): 310-334.

DSEG 1.4: Research Methodology

Course Description

The course is to develop a research orientation among the students and to acquaint them with fundamentals of research methods. Specifically, the course aims at introducing them to the basic concepts used in research and to scientific social research methods and their approach. It includes discussions on sampling techniques, research designs and techniques of analysis.

Module I: Basics of Research

Introduction to Research: Meaning, Objectives, Motivation, Types, Approaches, Significance, Research Process, Criteria of Good Research; Qualities of a Good Researcher, Research as a Career

Module II: Research Problem

Defining the Research Problem: What is a Research Problem? Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem; Research Design: Meaning, Need, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs

Module III: Measurement and Scaling Technique

Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Techniques of Measurement Tools, Scaling and Important Scaling Technique

Module IV: Problems in Research

Research Ethics: codes and ethics, permissions to research, responsibilities, confidentiality, feedback, participatory research; Research Proposal and literature review: research proposal, review of literature, levels of analysis, using the library and internet, abstracting, word processing, plagiarism

Module V: Actions in Research

English in report writing: words, sentences, paragraph, writing style; The Report: improving quality, sections, drawing conclusions, evaluation checklists, persistence; Common Citation Styles

Basic Readings

1. Kothari, C. R. (2004): Research Methodology: Methods and Techniques, New Age International Private Limited Publishers, New Delhi.
2. Guthrie, G. (2010): Basic Research Methods, Sage Publications India Private Limited, New Delhi.
3. Monippally, M. M. (2010): Academic Writing: A Guide for Management Students and Researchers, Response Books (Sage), New Delhi, Pp. 196-217

Additional Readings

1. Young, P. V. (1996): Scientific Social Survey and Research, PHI Learning Private Limited, New Delhi
2. Dooley, D. (2008): Social Research Methods, Prentice-Hall of India Private Limited, New Delhi

DSE Group II

DSEG 2.1: Environmental Economics

Course Description

This course introduces the students to the basics of environmental economics to understand the fundamentals of environmental concerns and develop insights into valuation of environment.

Module I: Economy and Environment

Nature and Scope of Environmental Economics- historical development, early economic paradigms, post-war economics and environmentalism; Environment and Economy interaction; Environment as a public good- National versus global public goods, Market failure, Externalities and the environment; The nexus involving environment, development and poverty.

Module II: The Economics of Pollution and Climate change

The optimal level of pollution, Pollution as externality, alternative definitions of pollution; The market Approach to optimal pollution, Property rights and market bargain theorems, Coase theorem; Taxation, Subsidies and optimal pollution; Pollution permit trading; Climate change – concept, causes, effects and management; Climate change and Agriculture

Module III: Valuation of Environmental damage

Methods and difficulties of environmental valuation, Economic value, Total economic value, Option value, Existence value; Direct and Indirect Valuation of Environmental Goods: The hedonic price approach, Contingent valuation, Travel cost approach; Willingness to pay vs. Willingness to accept.

Module IV: Environmental Pollution and Regulation in India

Causes and effects of water pollution, air pollution, noise pollution, soil pollution, Prevention and control of environmental degradation, Mechanism for environmental regulation in India-Environmental policy and legislations

Module V: Natural Resources and Sustainable Development

Environment and sustainable development, Concept and indicators of sustainable development, Resource scarcity, Renewable and exhaustible resources, Optimal use of renewable resources – fishery and forest, Tragedy of commons, People's Participation in the management of common property resources

Reading List:

1. Bhattacharya, R. N. (2002): Environmental Economics: An Indian Perspectives, OUP, New Delhi
2. Shankar, U. (Ed.) (2001): Environmental Economics, OUP, New Delhi.
3. Dayal, V. and Chopra, K. (2009): Handbook of Environmental Economics in India, OUP, New Delhi
4. Bromley, D.W (Ed)(1995); Handbook of Environmental Economics, Blackwell, London
5. Fisher, A.C(1981); Resource and Environmental Economics, Cambridge University Press
6. Helfand, G and P. Berck (2011); The Economics of the Environment, PHI Learning Private Limited, New Delhi
7. Hemple Lamont, C (1998); Environmental Economics – the Global Challenge First East West Press
8. Hussen, A.M (1999); Principles of Environmental Economics, Routledge, London
9. Kolstad, C.D (1999); Environmental Economics Oxford University Press, New Delhi
10. Pearce, D.W and R.K Turner (1948); Economics of Natural Resources and the Environment, Harvester Wheatsheaf

11. Perman R.M. and J. McGilvary (1996); Natural Resources and Environmental Economics, Longman, London
12. Tietenberg. T (1994); Environmental Economics Policy, Harper Collings, New York
13. The Economics of Climate Change: The Stern Review by Great Britain Treasury, Cambridge University Press

DSEG 2.2: International Economics

Course Description

This course introduces the students to international trade and finance to understand the theories of international trade and develop insights into trade policy and balance of payments. The course also develops insight into international financial system and the trade policy of India.

Module I: Importance of Trade and Trade Theories

Importance of the study of International Economics; Inter-regional and international trade; Need for a separate theory of international trade; Theories of Trade- absolute advantage, comparative advantage and opportunity cost; Heckscher-Ohlin theory of trade — its main features, assumptions and limitations

Module II: Trade and Economic Growth

Concepts of terms of trade and their importance; Doctrine reciprocal demand – Offer curve techniques; Gains from trade— their measurement and distribution; International Trade and Growth: Small and Open country cases; Tariffs and quotas – their impact in partial equilibrium analysis; Free trade and policy of tariffs in relation to economic growth with special reference to India

Module III: Exchange Rate

Concept and Types of Exchange Rate (bilateral vs trade-weighted exchange rate, cross exchange rate, spot, forward, futures), Demand for and Supply of foreign exchange, Exchange Rate Determination: Purchasing-Power Parity Theory, The Monetary Model of Exchange Rates, Asset or Portfolio Model of Exchange Rates. Fixed versus Flexible exchange rate

Module IV: Balance of Trade and Payments

Concepts and components of balance of trade and balance of payments; Equilibrium and disequilibrium in balance of payments; Consequences of disequilibrium in balance of payments; Various measures to correct deficit in BoPs; Foreign trade multiplier- Concept and implications; Present balance of payment position of India – Need for and rationale of trade reforms in India including partial and full convertibility of rupee; recent export and import policies in India

Module V: International Economic Institutions

Functions of IMF, World Bank, WTO and Asian Development Bank — Their achievements and failures; Their Role from the point of view of India; Forms of economic cooperation; Reforms for the emergence of international monetary system and trading blocs at the global level

Reading List:

1. Krugman Paul R. and Obstfeld Maurice. International Economics, Pearson Education
2. Salvatore Dominick. International Economics, Wile India.
3. Sodersten Bo and Reed J. International Economics, McMillan Publisher
4. Carbaugh Robert. International Economics, South-Western College Publication.
5. Gandolfo Giancarlo. International Trade Theory and Policy, Springer Publication
6. Gandolfo Giancarlo. International Finance and Open-Economy Macro Economics, Springer Publication
7. Copeland Laurence. Exchange Rates and International Finance, Addison Wesley, Publication.
8. Kanan, P. B. (1994): The International Economy, Cambaridge University Press, London.
9. Kindleberger, C. P. (1973): International Economics, R.D. Irwin, Homewood.

DSEG 2.3: Economics of Agriculture

Course description

This course introduces the students to significance of agriculture in the Indian economy and helps to understand the role agriculture in economic development. It is designed to develop insights into changing agricultural practices in India and assess the significance of agriculture in the era of liberalisation.

Module I

Role of Agriculture in Economic Development, Economic growth – sectoral changes and agriculture, agriculture in rural development, farm and non-farm employment issues, inter-linkages between agriculture and industry; empirical evidence of inter-dependence between agriculture and industry

Module II

Traditional Agriculture: characteristics; Schultz's hypothesis – its criticisms; Mechanization of Indian Agriculture; Case for and against farm mechanization; Green revolution and trends of mechanization in India

Module III

Agricultural price policy for a developing economy – objectives and effectiveness of agricultural price policy, elements of agricultural price policy, features of an ideal agricultural price policy, agricultural price policy in India and public distribution system

Agricultural marketing – need and criteria for assessing efficiency, agricultural marketing system in India, development of a national agricultural marketing platform

Module IV

Risk and uncertainty in agriculture – difference between risk and uncertainty, types of uncertainty in agriculture, measures for mitigating risk and uncertainty in agriculture, new agricultural insurance scheme of India

Rural credit in India, importance and estimates, agencies for rural credit, review of progress of institutional finance in rural India since independence

Module V

Agriculture in Indian Planning, Globalization and Indian agriculture, Case for and against privatization of agriculture, WTO and India's trade in agricultural commodities

Reading List:

1. Ghatak, S and K. Ingerscent (1984), Agricultural and Economic Development, Select Books, New Delhi.
2. Rudra, A (1982), Indian Agricultural Economics: Myths and Realities, Allied Publishers, New Delhi.
3. Sony, R. N. (2006), Leading Issues in Agricultural Economics, Vishal Publishing, Jalandhar.
4. Tyagi, B. P. (1998), Agricultural Economics and Rural Development, J. P. Nath Publishing, Meerut.
5. Sadhu, A N and A Singh (2008), Fundamentals of Agricultural Economics, Himalaya Publishing House, Mumbai.
6. Lekhi, R K and Joginder Singh (2008), Agricultural Economics, Kalyani Publishers, Ludhiana.

SKILL ENHANCEMENT COURSES (SEC)

SEC II: Data Analysis and Computer Application (Option I)

Course Description:

The purpose of this course is to introduce basic computer skills to students at UG level in non technical subjects. After completion of this course, the students are expected to acquire some basic knowledge about computers and to develop some basic skills in using computers for data storage, compilation, analysis and presentation.

Module I: Introduction to computer and Basic data types

Introduction to computer - Characteristics and Basic Applications of Computer, Components of Computer System, Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output Devices, Memory, concepts of Hardware and Software, Classifications of computers; Representation of data/Information concepts of data processing, Basic data types, Storage of data/Information as files, operating system and The User Interface (windows, Linux), Windows Setting- Control Panels, Accessories (windows)

Module II: Basic Word Processing

Introduction to Word Processing, Opening Word Processing Package, Opening and closing documents, Using a Document/Help Wizard, Text Creation and Manipulation, Formatting the Text, Handling Multiple Documents, Table Manipulation, Printing, saving documents in different formats

Module III: Spreadsheets and Basic Data Analysis

Spread Sheet, Elements of Electronics Spread Sheet, Application/usage of Electronic Spread Sheet, Manipulation of cells, Formulas and functions; Spread sheets for Small accountings- maintaining invoices/budgets, basic practical data analysis works (Maintaining daily and monthly sales reports)

Module IV: Basic Computer Communication and Internet

Basic of Computer networks- LAN and WAN, Internet, Service on Internet; WWW and Web Browsers, Web Browsing software, Surfing the Internet, Chatting on Internet, Email-Basic of electronic mail, Using Emails, Document handling in Email.

Module V: Basic Presentations

Basics- Difference between presentation and document, Using Power Point, Creation of Presentation, Preparation of Slides, Selection of type of Slides, Importing text from word documents, Providing aesthetics- Slide Designs, Slide Manipulation and Slide Show, Presentation of the Slides

Reading List:

1. C.S. French "Data Processing and Information Technology", BPB Publications 1998
2. P.K Sinha, Computer Fundamentals, BPB Publications, 1992
3. Guy Hart-Davis "The ABCs of Microsoft Office 97 Professional edition", BPB Publications, 1998
4. Karl Schwartz, "Microsoft Windows 98 Training Guide", 1998

SEC II: Financial Economics (Option I)

Course Description

This course intends to explain the ideas on financial system in India. It will help the students to enhance their knowledge on concepts like financial institutions, instruments and markets, their functioning and usage in real world.

Module I: Financial system

The structure of the financial system- Functions of the financial sector-Indicators of financial development; Financial System and Economic Development; financial inclusion: concept and its evolution; policy initiatives on financial inclusion.

Module II: Interest rate policy

Theories of interest rate determination-Level of interest rates-Long period and short period rates-Administered interest rates; Deregulation of interest rates; financial sector reforms in India.

Module III: Money market

Money Market: features; objectives; features of a developed and under developed money market; importance of money market; composition of money market: organized and unorganized; money market institutions and instruments; features and problems of Indian money market.

Module IV: Capital Market

Capital market: composition; Primary and secondary market for securities. Functions of new issue and secondary market; organizations of stock exchanges in India; defects in Indian stock exchange; SEBI; its objectives and functions

Module V: Non-Banking Financial Companies

Non-Banking Financial Companies: Hire purchase Companies-Venture Capital Companies. Insurance Sector: objectives, functions, life insurance and general insurance; IRDA and its role and functions in financial markets.

Basic Reading List

1. M.Y.Khan-Indian Financial System, Tata McGraw Hill, New Delhi.
2. L.M.Bhole: Financial institutions and Market, Tata McGraw hill, New Delhi.
3. Gorden & Natrajan: Financial Market and institutions, Himalaya Publishing house.

BA Economics Regular/Pass

Core Economics I: Principles of Microeconomics I

Course Description

This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situations.

Module 1: Exploring the subject matter of Economics

The Ten Principles of Economics: How people make decisions; Working of the economy as a whole; Thinking Like an Economist: The economist as Scientist – The scientific method: Observation, Theory and more observation; Role of assumptions; Economic Models; The economist as a policy advisor; Why economists disagree; Graphs in Economics

Module 2: Supply and Demand: How Markets Work, Markets and Welfare

The market forces of demand and supply – Markets and competition; The demand curve

– Market vs individual demand curve; Shifts in demand curve; The supply curve – Market vs individual supply curve; Shifts in supply curve; Equilibrium between supply and demand and changes there in; Price elasticity of demand and its determinants; Computing price elasticity of demand; Income and cross elasticity of demand; The price elasticity of supply and its determinants; Computing price elasticity of supply; Consumer Surplus and Producer Surplus; Market efficiency and market failure.

Module 3: The Households

The Budget Constraint; Preferences – representing preferences with indifference curves; Properties of indifference curves; Two extreme examples of indifference curves; Optimisation – Equilibrium; Change in equilibrium due to changes in income, changes in price; Income and substitution effect; Derivation of demand curve; Three applications – Demand for giffen goods, wages and labour supply, Interest rate and household saving.

Module 4: The Firm and Market Structures

Cost concepts; Production and costs; The various measures of cost – Fixed and variable cost, average and marginal cost; Cost curves and their shapes; Costs in the short run and in the long run; Economies and diseconomies of scale. Firms in competitive markets

– What is a competitive market; Profit maximisation and the competitive firm's supply curve; The marginal cost curve and the firm's supply decision; Firm's short-run decision to shut down; Firm's long-run decision to exit or enter a market; The supply curve in a competitive market – short run and long run; Monopoly - Why monopolies arise and public policy towards monopolies

Module 5: The Input Markets

The demand for labour – The production function and the marginal product of labour; Value of the marginal product of labour and demand for labour; Shifts in labour demand curve; The supply of labour – the trade-off between work and leisure; Shifts in the labour supply curve; Equilibrium in the labour market; Other factors of production: Land and capital; Linkages among factors of production.

Readings:

1. Principles of Economics, Gregory N Mankiw, 6e Cengage Learning India Private Limited, New Delhi
2. William A McEachern and Simrit Kaur (2012): Micro Econ: A South-Asian Perspective, Cengage Learning India Private Limited, New Delhi.

3. Karl E. Case and Ray C. Fair (2007): Principles of Economics, 8th Edition, Pearson Education Inc.

Core Economics II: Principles of Microeconomics II

Course Description

The course is designed to provide a sound training in microeconomic theory to formally analyze the behaviour of individual agents. Since students are already familiar with the quantitative techniques in the previous semesters, mathematical tools are used to facilitate understanding of the basic concepts; this course looks at the behaviour of the consumer and the producer and also covers the behaviour of a competitive firm.

Module I: Consumer Theory I

The market – Constructing a model; Optimisation and equilibrium; The demand curve and the supply curve; Market Equilibrium; The budget constraint and budget set; Changes in budget line; Effect of taxes, subsidy and rationing on budget set; Consumer Preferences – Indifference curves; Case of perfect substitutes, complements, neutrals, satiation, discreet goods; The marginal rate of substitution; Utility – Cardinal utility; Constructing a utility function; Marginal utility and MRS; Optimal choice and consumer demand; Estimating Utility Functions; Implications of the MRS condition; Choosing taxes; Demand – Normal and inferior goods; Income Offer Curve and Engel Curve; Ordinary goods and Giffen goods; The Offer Curve and the demand Curve; The inverse demand function.

Module II: Consumer Theory II

Slutsky Equation – The Substitution and Income Effects; Sign of Substitution Effect; The Total Change in Demand; Rates of Change; The Law of Demand; Another Substitution Effect; Compensated Demand Curves; Consumer's Surplus – Demand for a discrete good; Constructing utility from demand; Other interpretations of consumer's surplus; Approximating continuous demand; Interpreting the change in consumer's surplus; Producer's surplus; Calculating gains and losses

Module III: Production Theory

Marginal Productivity, Isoquant Maps and the Rate of Technical Substitution, Production with One Variable Input (labour) and with Two-Variable Inputs, Returns to Scale, Four Simple Production Function (Linear, Fixed Proportions, Cobb-Duglas, CES), Technical Progress

Module IV: Cost Functions

Definition of Costs, Cost Functions and its Properties, Shift in Cost Curves, Cost in the Short-Run and Long-Run, Long-Run versus Short-Run Cost Curves, Production with Two Outputs – Economies of Scope

Module V: Profit Maximisation

The Nature and Behaviour of Firms, Profit Maximization, Marginal Revenue, Short-Run Supply by Price-Taking Firm, Profit Functions and its Properties

Readings:

1. C. Snyder and W. Nicholson (2012): Microeconomic Theory: Basic Principles and Extensions, 11th Edition, Cengage Learning, Delhi, India.
2. R. S. Pindyck, D. N. Rubinfeld and P. L. Meheta (2009): Microeconomics, 7th Edition, Pearson, New Delhi.
3. H. R. Varian (2010): Intermediate Microeconomics: A Modern Approach, 8th Edition, W.W. Norton and Company/Affiliated East-West Press (India). The workbook by Varian and Bergstrom may be used for problems

Core Economics III: Principles of Macroeconomics I

Course Description

This course aims to introduce the students to the basic concepts of Macroeconomics. Macroeconomics deals with the aggregate economy. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.

Module I: Basic Concepts

Macro vs. Micro Economics; Why Study Macroeconomics? Limitations of Macroeconomics ; Stock and Flow variables, Equilibrium and Disequilibrium, Partial and General Equilibrium Statics – Comparative Statics and Dynamics ; National Income Concepts – GDP, GNP, NDP and NNP at market price and factor cost; Personal Income and Disposable personal Income; Real and Nominal GDP

Module II: Measurement of Macroeconomic Variables

Output, Income and Expenditure Approaches ; Difficulties of Estimating National Income; National Income Identities in a simple 2- sector economy and with government and foreign trade sectors; Circular Flows of Income in 2, 3 and 4-sector; economies; National Income and Economic Welfare ; Green Accounting.

Module III: Money

Evolution and Functions of Money, Quantity Theory of Money – Cash Transactions, Cash Balances and Keynesian Approaches, Value of Money and Index Number of Prices

Module IV: Inflation, Deflation, Depression and Stagflation

Inflation – Meaning, Causes, Costs and Anti -Inflationary Measures; Classical, Keynesian, Monetarist and Modern Theories of Inflation, Deflation- Meaning, Causes, Costs and Anti-Deflationary Measures, Depression and Stagflation; Inflation vs. Deflation

Module V: Determination of National Income

The Classical Approach - Say's Law, Theory of Determination of Income and Employment with and without saving and Investment; Basics of Aggregate Demand and Aggregate Supply and Consumption-Saving – Investment Functions, The Keynesian Approach – Basics of Aggregate Demand and Aggregate Supply and Consumption, Saving, Investment Functions; The Principle of Effective Demand; Income Determination in a Simple 2-Sector Model; Changes in Aggregate Demand and Income- The Simple Investment Multiplier; Income Determination in a 3-Sector Model with the Government Sector and Fiscal Multipliers

Readings:

1. N. Gregory Mankiw (2010): Macroeconomics, 7th edition, Cengage Learning India Private Limited, New Delhi.
2. Richard T. Froyen (2005): Macroeconomics, 2nd Edition, Pearson Education Asia, New Delhi.
3. Errol D'Souza (2009): Macroeconomics, Pearson Education Asia, New Delhi.

Core Economics IV: Principles of Macroeconomics II

Course Description

This course introduces the students to formal modelling of a macro- economy in terms of analytical tools. It discusses various alternative theories of output and employment determination in a closed economy in the short run as well as medium run, and the role of policy in this context. It also introduces the students to various theoretical issues related to an open economy.

Module I: Consumption Function

Consumption – Income Relationship, Propensities to Consume and the Fundamental Psychological Law of Consumption; Implications of Keynesian Consumption Function; Factors Influencing Consumption Function; Measures to Raise Consumption Function; Absolute, Relative, Permanent and Life – Cycle Hypotheses

Module II: Investment Function

Autonomous and Induced Investment, Residential Investment and Inventory Investment, Determinants of Business Fixed Investment, Decision to Invest and MEC, Accelerator and MEI Theories of Investment.

Module III: Demand for and Supply of Money

Demand for Money – Classical, Neoclassical and Keynesian Approaches, The Keynesian Liquidity Trap and its Implications, Supply of Money – Classical and Keynesian Approaches, The Theory of Money Supply Determination and Money Multiplier, Measures of Money Supply in India

Module IV: Aggregate Demand and Aggregate Supply

Derivation of Aggregate Demand and Aggregate Supply Curves in the IS -LM Framework; Nature and Shape of IS and LM curves; Interaction of IS and LM curves and Determination of Employment, Output, Prices and Investment; Changes in IS and LM curves and their Implications for Equilibrium

Module V: Inflation, Unemployment and Expectations, and Trade Cycles

Inflation – Unemployment Trade off and the Phillips Curve – Short run and Long run Analysis; Adaptive and Rational Expectations; The Policy Ineffectiveness Debate; Meaning and Characteristics of Trade Cycles; Hawtrey's Monetary Theory, Hayek's Over-investment Theory and Keynes' views on Trade Cycles

Readings:

1. N. Gregory Mankiw (2010): Macroeconomics, 7th edition, Cengage Learning India Private Limited, New Delhi.
2. Richard T. Froyen (2005): Macroeconomics, 2nd Edition, Pearson Education Asia, New Delhi.
3. Errol D'Souza (2009): Macroeconomics, Pearson Education Asia, New Delhi.

DSE 1: Economic development and policy in India

Course Description: This paper introduces the students to the essentials of Indian economy with an intention of understanding the basic feature of the Indian economy and its planning process. It also aids in developing an insight into the agricultural and industrial development of India. The students will understand the problems and policies relating to the agricultural and industrial sectors of India and current challenges of Indian economy.

Module I: Introduction to Indian Economy

British Rule: exploitation and under development in India; features of Indian economy – natural resources, infrastructure, population; National income: trends, sectoral composition; Economic planning: Planning Commission and its functions, Planning exercises in India, Objectives, Strategies and achievements; A critique of planned development in India.

Module II: Agricultural Development in India

Indian Agriculture: nature, importance, trends in agricultural production and productivity, factors determining production, land reforms, new agricultural strategies and green revolution, rural credit; Agricultural marketing and warehousing.

Module III: Industrial Development in India

Trends in industrial output and productivities; Industrial Policies of 1948, 1956, 1977 and 1991; Industrial Licensing Policies – MRTP Act, FERA and FEMA; Growth and problems of SSIs, Industrial sickness; Industrial finance; Industrial labour

Module IV: Tertiary Sector and HRD

Tertiary Sector: growth and contribution of service sector to GDP of India, share of services in employment; Human development – concept, evolution, measurement; HRD: indicators, importance, Education in India, Indian educational policy; Health and Nutrition.

Module V: Current Challenges

Poverty: definition and estimate, poverty line, poverty alleviation programs; Inequality: income and regional inequality – causes and corrective measures; Unemployment: concepts, measurement, types, causes and remedies; Environmental challenges: Land, water and air.

Recommended books:

1. Kapila U. Indian economy since Independence. Academic Foundation, New Delhi
2. Misra, S. K. and Puri V. K. Indian Economy — Its Development Experience. Himalaya Publishing House, Mumbai
3. Chakraborty S. Development Planning: The Indian Experience. Clarendon Press.
4. Dutt R. and Sundharam K. P. M. Indian Economy. S. Chand & Company Ltd., New Delhi.
5. Agarawala, A. N. Indian Economy, New Age Publications, New Delhi
6. Panagariya, Arvind (2008): India: the Emerging Giant, Oxford University Press, New York
7. Acharya, S. and Mohan, R. (Eds.) (2010): India's Economy: Performance and Challenges, Oxford University Press, New Delhi.
8. Ahluwalia, I. J. and Little, I. M. D. (Eds.) (1998): India's Economic Reforms and Development: Essays for Manmohan Singh, Oxford University Press, New Delhi.

DSE 2: Economic History of India 1857-1947

Course Description

This course analyses key aspects of Indian economic development during the second half of British colonial rule. In doing so, it investigates the place of the Indian economy in the wider colonial context, and the mechanisms that linked economic development in India to the compulsions of colonial rule. This course links directly to the course on India's economic development after independence in 1947.

Module I: Introduction: Colonial India:

Background and Introduction Overview of colonial economy.

Module II: Macro Trends

National Income; population; occupational structure

Module III: Agriculture

Agrarian structure and land relations; agricultural markets and institutions – credit, commerce and technology; trends in performance and productivity; famines

Module IV: Railways and Industry

Railways; the de-industrialisation debate; evolution of entrepreneurial and industrial structure; nature of industrialisation in the interwar period; constraints to industrial breakthrough; labor relations

Module V: Economy and State in the Imperial Context

The imperial priorities and the Indian economy; drain of wealth; international trade, capital flows and the colonial economy – changes and continuities; government and fiscal policy

Readings:

1. Lakshmi Subramanian, "History of India 1707-1857", Orient Blackswan, 2010, Chapter 4.
2. Sumit Guha, 1991, Mortality decline in early 20th century India', Indian Economic and Social History Review (IESHR), pp 371-74 and 385-87.
3. Tirthankar Roy, The Economic History of India 1857-1947, Oxford University Press, 3rd edition, 2011.
4. J. Krishnamurty, Occupational Structure, Dharma Kumar (editor), The Cambridge Economic History of India, Vol. II, (henceforth referred to as CEHI), 2005, Chapter 5.
5. Irfan Habib, Indian Economy 1858-1914, A People's History of India, Vol.28, Tulika, 2006.
6. Ira Klein, 1984, —When Rains Fail: Famine relief and mortality in British India, IESHR 21.
7. Jean Dreze, Famine Prevention in India in Dreze and Sen (eds.) Political Economy of Hunger, WIDER Studies in Development Economics, 1990, pp.13-35
8. John Hurd, Railways, CEHI, Chapter 8, pp.737-761.
9. Rajat Ray (ed.), Entrepreneurship and Industry in India, 1994.
10. AK Bagchi, —Deindustrialization in India in the nineteenth century: Some theoretical implications, Journal of Development Studies, 1976.
11. MD Morris, Emergence of an Industrial Labour Force in India, OUP 1965, Chapter 11, Summary and Conclusions.
12. K.N. Chaudhuri, Foreign Trade and Balance of Payments, CEHI, Chapter 10.

13. B.R. Tomlison, 1975, India and the British Empire 1880-1935, IESHR, Vol.XII.
14. Dharma Kumar, The Fiscal System, CEHI, Chapter 12.
15. Basudev Chatterjee, Trade, Tariffs and Empire, OUP 1992, Epilogue.

DSE 3: Odisha Economy

Course Description

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in Odisha in pre- and post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in Odisha, the reading list will have to be updated annually.

Module I: Odisha Economy before 1947

Orissa's Economy in the Nineteenth Century: Benevolence or Exploitation, Forces of Nature, Animal Power, The Company Steps in, Public Works and Public Health, Education, Disintegration of Village Economy, New Social Environment, Changing Position of Social Classes, The Moneylenders, The Borrowers, Money-flows from Village to Metropolis, Pauperization of Peasantry, The Wage Earners, Demographic Changes, Profiting from Rural Adversity; Diarchy in 1919 and Separation of Provincial Finances from Central Government in 1937; Emergence of Federal Finance (Ref.: Das 1976a and 1976b, GoO 2016).

Module II: Macro Economy of Odisha

A macro glance of Odisha economy: aggregate income, broad sectoral decomposition, performance of districts, employment, child labour and bonded labour, employment programmes, consumption expenditure, cost of living; Odisha State public finances (Chapter 14 and 15 of Ref 1; & Chapter 2 and 9 of Ref 2)

Module III: Agriculture Sector Development in Odisha

Agriculture: land ownership and land tenure, agricultural wages and rural unemployment, production and productivity of major crops, agricultural inputs, agricultural policy; Animal Husbandry; Fisheries (Chapter 1 to 3 of Ref 1; & Chapter 3 of Ref 2)

Module IV: Industry, Infrastructure and Environment

Industry: Investment, industrial policy, and the growth of large industries, mining and quarrying; Construction; tertiary sector: tourism, transport and power; Water Resources, Forest Resources (Chapter 4 to 8 of Ref 1; & Chapter 4 & 5 of Ref 2)

Module V: Social Sector in Odisha

Poverty: income poverty and inequality; health sector: outcomes, infrastructure, finance, public health, NRHM; education: Literacy, Primary education, secondary education, higher education, SSA; human development (Chapter 9 to 13 of Ref 1; & Chapter 7 & 8 of Ref 2)

Recommended books and articles:

1. Nayak, P., Panda, S. C., Pattanaik, P. K. (2016): The Economy of Odisha: A Profile, Oxford University Press, New Delhi
2. GoO (2012): Odisha Economic Survey 2015-16, Planning and Convergence Department, Directorate of Economics and Statistics, Government of Odisha, Bhubaneswar
3. GoO (2004): Human Development Report 2004 Orissa, Planning and Coordination Department, Government of Odisha, Bhubaneswar
4. Mahapatro, S. B. (1980): Inter-Industry Wage Differentials in Orissa: An Empirical Analysis, Indian Journal of Industrial Relations, 15(4): 525-536.

5. Vyasulu, V. and Arun, A. V. (1997): Industrialisation in Orissa: Trends and Structure, *Economic and Political Weekly*, 32(22): M46-M53.
6. Das, Binod S. (1976a): Orissa's Economy in the Nineteenth Century, *Social Scientist*, 4(11): 32-46.
7. Das, Binod S. (1976b): Orissa's Economy in the Nineteenth Century: Part Two, *Social Scientist*, 4(12): 38-50.
8. GoO (2016): Commemorative Volume on 80 Years Odisha Budget: Since 1936-37, CEFT-XIMB and Department of Finance, Government of Odisha
9. Mohanti, K. K. and Padhi, S. (1995): Employment Situation of Tribal Population in Orissa: 1981 Census Data, *Economic and Political Weekly*, 30(29): 1879-1882.
10. Nair, K. R. G. (1993): New Economic Policy and Development of Backward Regions: A Note on Orissa, *Economic and Political Weekly*, 28(19): 939-941.
11. Mohanty, B. (1993): Orissa Famine of 1866: Demographic and Economic Consequences, *Economic and Political Weekly*, 28(1/2): 55-66.
12. Haan, A. de and Dubey, A. (2005): Poverty, Disparities, or the Development of Underdevelopment in Orissa, *Economic and Political Weekly*, 40(22/23): 2321-2329.
13. Samal, K. C. (1998): Poverty Alleviation after Post-Liberalisation: Study of a Tribal Block in Orissa, *Economic and Political Weekly*, 33(28): 1846-1851
14. Nayak, P. and Chatterjee, B. (1986): Disguised Unemployment in Agriculture: A Case Study of Rural Orissa, *Indian Journal of Industrial Relations*, 21(3): 310-334.

DSE 4: Money and Banking

Course description:

This paper intends to explain the ideas and institutions concerning money and banking. It will help the students to understand the meaning, functions and theories of money the working of different types of banks in an economy.

Module I: Money

Money: Meaning, functions and classification; Gresham's law; Monetary standards: Metallic and paper systems of note issue; Value of money: (Uses and limitations of index number); Construction of price index number – its limitations.

Module II: Quantity theory of money

Quantity theory of money - Cash transaction approach, cash balance approach, Keynesian approach; Inflation: meaning, types, causes – demand pull and cost push, effects, measures to control inflation, Trade-off between inflation and unemployment; Stagflation and deflation: meaning; Phillip's curve.

Module III: Banking

Banking: meaning and types; Commercial banks: evolution, functions, the process of credit creation and its limitations, liabilities and assets of banks; A critical appraisal of the progress of commercial banking in India after nationalization; Recent reforms in banking sector in India

Module IV: Central Bank

Central Bank: Functions, Quantitative and qualitative methods of credit control - bank rate policy, open market operations, variable reserve ratio and selective methods; Relative efficacy of quantitative and qualitative methods of credit control.

Module V: Reserve Bank of India

Reserve Bank of India: Role and functions; Repo rate and reverse repo rate; Components of money supply in India; Objectives and limitations of monetary policy with special reference to India.

Reading list:

1. Day, A.C.L. – Outline of Monetary Economics, Oxford University Press,
2. De Kock, M.H. – Central Banking, Staples Press London, 1960.
3. Halm, G. N. – Monetary Theory, Asia Publishing House, New Delhi, 1955.
4. Harris, C.L. – Money and Banking, Allyn and Bacon, London, 1961.
5. Laliwala, J.I. – The Theory of Inflation, Vani Educational Book, New Delhi, 1984.
6. Mishra, S. S. – Money Inflation and Economic Growth, Oxford and IBH Publishing Company, New Delhi, 1981.
7. Reserve Bank of India – The Reserve Bank of India, functions and working, Bombay, 1983.
8. Reserve Bank of India, Report of Trend and Progress of Banking in India (various years), Mumbai.
9. Reserve Bank of India: Report on Currency and Finance, Annual, Mumbai.
10. Sayers, R. S. – Modern Banking (7th Ed), Oxford University Press, Delhi, 1978.

CBCS BA Honours Syllabus in English 2016-17

CBCS BA Honours Syllabus in English 2016

Abstract

Credit add-up

▶ Core:	70 credits + 14 (Tutorial)
▶ Discipline Specific Elective:	15 credits + 3 (Tutorial)
▶ Generic Elective:	20 credits + 4 (Tutorial)
▶ Ability Enhancement Compulsory Course*	08 credits
▶ Skill Enhancement Course:	08 credits
▶ Dissertation (In lieu of 1 DSE paper):	06 credits

Total:	148 credits
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Marks add-up

▶ Core courses:	1400 marks
▶ Discipline Specific Elective:	300 marks
▶ Generic Elective:	400 marks
▶ Ability Enhancement Compulsory Course*	200 (100X2) marks
▶ Skill Enhancement Course:	200 (100X2) marks
▶ Project:	100 marks

Total:	2600 marks
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***Ability Enhancement Compulsory Course no longer contains an English component but is nevertheless a part of CBCS BA Honours syllabus in English and has been included here in order to show the total credit for the B.A Honours programme.**

Core courses

Credits: 70 credits (05 credits per core X 14 core = 70 credits) + 14 credits (tutorial)

Cores offered:

- ▶ Core 1: British Poetry and Drama 14th -17th Century
- ▶ Core 2: British Poetry and Drama 17th -18th Century
- ▶ Core 3: British Literature: 18th Century
- ▶ Core 4: Indian Writing in English
- ▶ Core 5: British Romantic Literature
- ▶ Core 6: British Literature: 19th Century
- ▶ Core 7: American Literature
- ▶ Core 8: British Literature: Early 20th Century
- ▶ Core 9: European Classical Literature
- ▶ Core 10: Women's Writing
- ▶ Core 11: Modern European Drama
- ▶ Core 12: Indian Classical Literature
- ▶ Core 13: Postcolonial Literature
- ▶ Core 14: Popular Literature

Discipline Specific Elective (DSE):

Credits: 05 credits per elective + 03 tutorial credits per elective= 18 credits

Discipline Specific Electives offered:

- ▶ DSE 1: Literary Theory
- ▶ DSE 2: Reading World Literature
- ▶ DSE 3: Research Methodology

Generic Elective (GE):

Credits: 05 credits per elective+ 04 credits per tutorial= 24 credits

Generic Electives offered:

- ▶ GE 1: Academic Writing & Composition
- ▶ GE 2: Modern Indian Literature
- ▶ GE 3: Language, Literature & Culture
- ▶ GE 4: Language and Linguistics

Ability Enhancement Compulsory Course (AECC):

Credits: 04 credits per elective=08 credits

Ability Enhancement Compulsory Courses offered:

- ▶ AECC 1: MIL Communication
- ▶ AECC 2: Environmental Study

Skill Enhancement Course (SEC):

Credits:04 credits per elective=08 credits

Skill Enhancement Courses offered:

- ▶ SEC 1: Soft Skills
- ▶ SEC 2: Translation and Principles of Translation

Dissertation

Credits: 06 credits

Distribution of Courses:

Sem I: 2 Core Courses (Core 1& 2), 1 AECC 1 (M.I.L Oriya/Hindi), 1 GE (Academic Writing & Composition)

Sem II: 2 Core Courses (Core 3& 4), 1 AECC 2(Env Study), 1 GE (Modern Indian Literature)

Sem III: 3 Core Courses (Core 5, 6, 7), 1 SEC 1(English Comm.), 1 GE (Language, Literature & Culture)

Sem IV: 3 Core Courses (Core 8, 9, 10), 1 SEC 2(Soft skills OR Translation & Principles of Translation), 1 GE (Language& Linguistics)

Sem V: 2 Core Courses (Core 11, 12), 2 DSE (Literary Theory & Reading World literature)

Sem VI: 2 Core Courses (Core 13, 14), 1 DSE (Research Methodology), Project Report

Scheme of Evaluation:

For Core English Honours Papers

Midterm test: 20 marks

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note /analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: =80 marks

For Generic Elective paper 1 (Title: Academic Writing and Composition)

Midterm Test [20 marks]

Using texts (500 – 600 words), students will be tested for

- Vocabulary: synonyms, antonyms, words used as different parts of speech 10 marks
- Word order; subject-predicate; subject-verb agreement 10 marks

Final Semester Examination [80 marks]

Using texts (600 -700 words), students will be tested for

- Use of vocabulary in context 05 bits X 02 marks= 10 marks
- Use of grammar in context 05 bits X 02 marks= 10 marks
- Use of cohesive and transitional devices in one paragraph 10 bits X 02 marks= 20 marks
- Writing two paragraphs (expository/ descriptive/ narrative/argumentative) using topic sentences 2qns x 10 marks= 20 marks
- Correcting in-text citation from given input 05 bits x 02 marks= 10 marks
- Preparing a correct version of Works Cited page from given input 05 bits x 02 marks=10 marks

For Generic Elective Paper 2 (Title: Modern Indian Literature)

Midterm test: 20 marks

Unit 1: 02 questions x 10 marks = 20 marks

Total: 20 marks

Final Semester Examination: 80 marks

Unit 2: 1 long answer question + 1 short note/analysis (14+06) = 20 marks

Unit 3: 1 long answer question + 1 short note/analysis (14+06) = 20 marks

Unit 4: 1 long answer question + 1 short note/analysis (14+06) = 20 marks

Unit 5: 1 long answer question + 1 short note/analysis (14+06) = 20 marks

Total: = 80 marks

For Ability Enhancement Compulsory Course Paper (English/M.I.L Communication)

Midterm test [10 marks]

Writing: 1 question 04 x 01 qn = 04 marks

Speaking: 2 questions 03 x 02 qns = 06 marks

Total 10 marks

Final Semester Examination

Unit 1 Reading: 05 questions 03 x 05 qns = 15 marks
(3 prose and two poetry questions)

Unit 2 Writing: 03 questions 05 x 03 qns = 15 marks

Unit 3 Grammar & usage: 10 qns 01 x 10 qns = 10 marks

Total 40 marks

CBCS UG SYLLABUS Sem 1

Core 1

British Poetry and Drama: 14th to 17th Centuries

The paper seeks to introduce the students to British poetry and drama from the 14th to the 17th centuries. It offers the students an exploration of certain seminal texts that set the course of British poetry and plays.

British Poetry and Drama: 14th to 17th Centuries

Unit 1

A historical overview:

The period is remarkable in many ways: 14th century poetry evokes an unmistakable sense of “modern” and the spirit of Renaissance is marked in the Elizabethan Drama. The Reformation brings about sweeping changes in religion and politics. A period of expansion of horizons: intellectual and geographical.

Unit 2

Chaucer: *The Wife of Bath's Tale* or *Sir Gawain and the Green Knight* (Part 1, lines 1-490)

Unit 3

Thomas Campion: “Follow Thy Fair Sun, Unhappy Shadow”, Sir Philip Sidney: “Leave , O Love, which reachest but to dust”, Edmund Waller: “Go, lovely Rose”, Ben Jonson: “Song to Celia”, William Shakespeare: Sonnets: “Shall I compare thee to a summer's day?”, “When to the seasons of sweet silent thought”,

“Let me not to the marriage of true minds.”

Unit 4

William Shakespeare: *Macbeth* or *Twelfth Night*.

Unit 5

Marlowe: *The Jew of Malta* or Thomas Dekker: *The Shoemaker's Holiday*.

Suggested Readings:

Weller series: *Macbeth&Twelfth Night*

Chaudhury & Goswami: *A History of English Literature: Traversing Centuries*. Orient

Blackswan

Harold Bloom: *Shakespeare: The Invention of the Human*

Sanders, Andrews: *The Short Oxford History of English Literature*. Oxford: OUP

Scheme of Evaluation:

For Core English Honours Papers

Midterm test: 20 marks

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis/ (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis/ (14+06) =20 marks

Total: = 80 marks

Core 2

British Poetry and Drama: 17th and 18th Century

The objective of this paper is to acquaint students with the Jacobean and the 18th century British poetry and drama, the first a period of the acid satire and the comedy of humours; and the second a period of supreme satiric poetry and the comedy of manners.

Unit 1 A historical overview

17th C: Period of the English Revolution (1640–60); the Jacobean period; metaphysical poetry; cavalier poetry; comedy of humours; masques and beast fables

18th C: Puritanism; Restoration; Neoclassicism; Heroic poetry; Restoration comedy; Comedy of manners

Unit 2

John Milton: *Lycidas* Or *L'Allegro* and *Il Penseroso*:

John Donne: *A Nocturnall upon S. Lucie's Day, Love's Deity*; and Andrew Marvel: *To His Coy Mistress*; *The Garden*; *A Dialogue between the Soul and the Body*

Unit 3

Ben Jonson: *Volpone* or *The Alchemist*:

Unit 4

Pope: *Ode on Solitude*, *Summer*, *Sound and Sense*, *The Dying Christian to his Soul*; and

Robert Burns: *A Red Red Rose*, *A Fond Kiss*, *A Winter Night*, *My Heart's in the Highlands*

Unit 5

Dryden : *All for Love* Or Congreve: *The Old Bachelor*

Suggested readings:

1. *A History of English Literature: Traversing the Centuries* - Chowdhury & Goswami, Orient Blackswan
2. *Lycidas* - John Milton (Eds. Paul & Thomas), Orient Blackswan
3. *The Norton Anthology of English Literature, Vol. B: The Sixteenth Century & The Early Seventeenth Century*
4. *The Norton Anthology of English Literature: The Restoration and the Eighteenth Century*

Scheme of Evaluation:

For Core English Honours Papers

Midterm test: 20 marks

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis/ (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis/ (14+06) =20 marks

Total: = 80 marks

CBCS UG SYLLABUS Sem 2

Core 3

British Literature: 18th Century

The objective of the paper is to acquaint the students with two remarkable forms of literature: Essay and novel. The period is also known for its shift of emphasis from reason to emotion.

Unit -1 A historical overview:

Restoration, Glorious Revolution, Neo-classicism, Enlightenment.

Unit-2 Joseph Addison : On Giving Advice

Reflections in Westminster Abbey

Defence and Happiness of Married Life

Richard Steele: Recollections

On Long-Winded People

Unit-3 Daniel Defoe: *Robinson Crusoe*

Unit-4 Oliver Goldsmith: A City Night-Piece

On National Prejudices

Man in Black

Samuel Johnson: Expectations of Pleasure frustrated

Domestic Greatness Unattainable

Mischiefs of Good Company

The Decay of Friendship

Unit-5

Thomas Gray:

Elegy written in a country churchyard

Suggested Readings:

1. *A History of English Literature: Traversing the Centuries* - Chowdhury & Goswami, Orient Blackswan
2. The Norton Anthology of English Literature: The Restoration and the Eighteenth Century

Scheme of Evaluation:

For Core English Honours Papers

Midterm test: 20 marks

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: = 80 marks

CBCS UG SYLLABUS Sem 2

Core 4

Indian Writing in English

Though a late developer, Indian writing in English has been the fastest growing branch of Indian literature. It has delivered a rich and vibrant body of writing spanning all genres. As a 'twice born' form of writing, it partakes of both the native and alien perspectives and has an inherent inclination to be postcolonial. This paper attempts to introduce the students to the field of Indian writing in English through some representative works.

Unit – 1

A historical overview of Indian writing in English the key points of which are East India Company's arrival in India, Macaulay's 1835 Minutes of Education, India's first war of independence and the establishment of colleges to promote Western education. The focus in the literary setting will include Dean Mohammed's travel writing, said to be the first work of Indian English writing, Toru Dutt and Henry Derozio in poetry and Bankim Chandra Chatterjee and Lal Behari Day in prose fiction.

Unit 2

Crystallization: R.K. Narayan, *The Bachelor of Arts* or Mulk Raj Anand, *Untouchable*

Unit 3

Flowering: R. Parthasarathy (ed) *Ten Twentieth Century Indian Poets*. The following poets and their poems are to be studied. Nissim Ezekiel, "Good Bye Party for Miss Puspa T.S", "Poet, Lover, Bird Watcher", Arun Kolatkar, "The Boat Ride", "Jejuri", Kamala Das, "My Grandmother's House", "A Hot Noon in Malabar", Jayanta Mahapatra, "Indian Summer", "Grass", A. K. Ramanujan, "Looking for a Cousin on a Swing", "Small Scale Reflections on a Great House"

Unit 4

Performing: Mahesh Dattani, *The Final Solution* Or Manjula Padmanabhan, *The Harvest*

Unit 5

Maturation: Amitav Ghosh, *Shadow Lines* Or Kiran Desai, *The Inheritance of Loss*

Suggested Readings:

1. Arvind Krishna Mehrotra, *An illustrated History of Indian Literature in English*. Hyderabad: Orient BlackSwan, 2003.
2. R. Parthasarathy, *Ten Twentieth-Century Indian Poets*. Delhi: Oxford University Press, 1975.
3. Vinay Dharwadkar, "The Historical Formation of Indian-English Literature" in Sheldon Pollock (ed.) *Literary Cultures in History*. New Delhi: Oxford University Press, 2003.

Scheme of Evaluation:

For Core English Honours Papers

Midterm test: 20 marks

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: =80 marks

CBCS UG SYLLABUS Sem 3

Core 5

British Romantic Literature

The paper aims at acquainting the students with the Romantic period and some of its representative writers. At the same time one of the chief objectives of the paper is to give the students with a broad idea of the social as well as historical contexts that shaped this unique upheaval.

UNIT I: A Historical Overview:

The period otherwise known as The Romantic Revival may also be called as The Age of Revolution as it owes its origin to the Epoch making French Revolution of 1789. The emphasis on individual liberty and unbridled desire free from the shackles of classicism made this period unique, intriguing and controversial.

UNIT-II

Robert Burns: "To a Muse" and "The Cotter's Saturday Night"

William Blake: "The Holy Thursday" and "London"

UNIT-III

William Wordsworth: "Tintern Abbey" and "Ode on Intimations of Immortality"

Samuel Taylor Coleridge: "Kubla Khan" and "Road to Xanadu"

UNIT-IV

John Keats "Ode on a Grecian Urn" and "Ode on Melancholy"

P.B. Shelley: "Ode to the West Wind" and "To a Skylark"

UNIT-V:

William Wordsworth: Preface to *Lyrical Ballads* (2nd Edition)

OR

P.B. Shelley: "A Defence of Poetry"

Suggested Reading:

The Routledge History of Literature in English

History of English Literature: Traversing the Centuries – Chowdhury & Goswami

Romantic Imagination by C. M. Bowra

Pelican Guide to English Literature. Vol.5. Edited by Boris Ford

Midterm test: 20 marks

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: = 80 marks

CBCS UG SYLLABUS Sem 3

Core 6

19th Century British Literature

The paper seeks to expose students to the literature produced in Britain in the 19th century. The focus is mainly on prose (fictional and non-fictional) and criticism. The 19th century embraces three distinct periods of the Regency, Victorian and late Victorian.

Unit 1

A Historical Overview

The 19th century British literature though mainly famous for the Romantic Movement, was also a witness to major socio-political developments like industrialization, technological advancements and large scale mobilization of people from the rural to the urban centers. Much of these prosaic activities/developments needed the medium of prose for its articulation. Politically known as the Victorian period 19th century also witnessed what is known as the culture and society debate.

Unit 2 : Essays

Charles Lamb:	“Old China”
William Hazlitt:	“On Going Journey”
Leigh Hunt:	“A Few Thoughts on sleep”
R L Stevenson:	“Walking Tours”

Unit 3: Novels

Mary Shelly: *Frankenstein* OR R.L .Stevenson: *Dr. Jekyll and Mr. Hyde*

Unit 4: Novel

Jane Austen: *Pride and Prejudice* OR Elizabeth Gaskell: *Mary Barton*

Unit 5 : Criticism

Mathew Arnold: *Culture and Anarchy* (Chapter 1)

OR

William Hazlitt: "Lectures Chiefly on the Dramatic Literature of the Age of Elizabeth" from *Lectures on English Poets*

Suggested Reading:

- Chapter 4, 5 from a *Short Introduction to English Literature* by Jonathan Bate
- *The English Novel* by Terry Eagleton
- *The Cultural Critics* by Leslie Johnson

Midterm:

Unit 1: _____ 02 questions x 10 marks=20 marks
Total: _____ 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: _____ =80 marks

Core 7

American Literature

This paper seeks to give the students a sense of how the great American themes of self-reliance, individualism, sin and redemption and multiculturalism were shaped through its rich and varied Literature.

Unit – I : Genesis and evolution, and the defining myths of American Literature—city on a hill, the frontier spirit, the American Dream, manifest destiny, e pluribus unum

Unit – II: Harriet Jacobs *Incidents in the Life of a Slave Girl* OR “Economy” , “Where I lived, and What I Lived for”, “Reading” and “Pond in Winter” from H D Thoreau’s *Walden*

Unit – III: *The Pioneers* – James Fennimore Cooper OR *Billy Budd*—Herman Melville

Unit – IV: (Any four poets to be studied)

- Walt Whitman: “when I heard the learn’d astronomer” and “A noiseless patient spider”
- Emily Dickinson: “Success is counted sweetest” and “Faith’ is fine invention”
- Robert Frost: “The road not taken” and “Fire and Ice”
- Wallace Stevens: “Thirteen ways of looking at a blackbird” and “Disillusionment of ten o’ clock”
- Adrienne Rich: “For the record” and “A valediction forbidding mourning”
- Susan Howe: “From the midnight” and “That this”
- Rita Dove: “Teach us to number our days” and “Exit”

Unit – V *Desire under the Elms*– Eugene O’Neill OR *The Dutchman*—Amiri Baraka

Suggested Reading

- Lewisohn, Ludwig. The Story of American Literature. The Modern Library, N. Y.
- Horton, Rod & Herbert W.. Edwards. Backgrounds of American Literary Thought . 3rd edition.
- Stewart, Randall(ed). Living Masterpieces Of American Literature . Brown University
- Norton Anthology of American Literature. 8th edition.

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note /analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: =80 marks

Core 8

British Literature: Early 20th Century

British Literature: Early 20th Century

This paper aims to familiarize the students with the new literature of Britain in the early decades of the 20th century. The course will mainly focus on the modernist canon, founded on Ezra Pound's idea of 'make it new', but will cover war poetry, social poetry of the 1930s and literary criticism.

Unit 1 (A historical overview): Highlights will include developments in society and economy, leading to a crisis in western society known as the First World War and the resultant change in the ways of knowing and perceiving. Such triggers for the modern consciousness as Marx's concept of class struggle, Freud's theory of the unconscious, Bergson's *duree*, Nietzsche's will to power and Einstein's theory of relativity are to be discussed.

Unit 2	T.S. Eliot	"The Love Song of J. Alfred Prufrock"
	W.B. Yeats	"Sailing to Byzantium"
	Ezra Pound	"In a Station of the Metro"
	T.E. Hulme	"Autumn"
	Hilda Doolittle	"The Mysteries Remain"

Unit 3 War Poetry : Wilfred Owen "Dulce Et Decorum est"

Siegfried Sassoon "Suicide in the Trenches"

Social Poetry: W.H Auden "The Unknown Citizen"

Stephen Spender "An Elementary Classroom in a Slum"

Louis MacNeice "Prayer before Birth"

Unit 4 Virginia Woolf: *Mrs. Dalloway* **OR**

James Joyce: Stories from *Dubliners* ("The Sisters", "Evelyn", "An Encounter", "Clay", "Two Gallants")

Unit 5 Literary Criticism: Henry James, "The Art of Fiction" or T.S. Eliot, "Tradition and Individual Talent"

Suggested Readings:

1. *Pelican Guide to English Literature: The Modern Age*(ed.) Boris Ford
2. Jonathan Bate, *English Literature: A Very short Introduction*, Oxford Paperback
3. Peter Faulkner, *Modernism*. London: Methuen
4. Peter Childs, *Modernism, New Accents*. Routledge

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note /analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: =80 marks

CBCS UG SYLLABUS Sem 4

Core 9

European Classical Literature

The objective of this paper is to introduce the students to European Classical literature, commonly considered to have begun in the 8th century BC in ancient Greece and continued until the decline of the Roman Empire in the 5th century AD. The paper seeks to acquaint the students with the origins of the European canon.

Unit-1 A historical overview:

Classical Antiquity: ancient Greece, the rise and decline of the Roman Empire

Geographical space: cultural history of the Greco-Roman world centered on the Mediterranean Sea

Unit-2 Epic poetry:

Homer *Odyssey* (Book I) **OR**

Virgil *Aeneid* (Book I)

Unit-3 Tragedy:

Sophocles *Oedipus the King* **OR**

Aeschylus *Prometheus Bound*

Unit-4 Comedy:

Aristophanes *Frogs* **OR** Plautus *Asinaria*

Unit-5 Criticism:

Plato	<i>Republic</i> , (Book 10) OR
Aristotle	<i>Poetics</i> , Chapter 6,7,8 OR
Horace	<i>Ars Poetica</i> or <i>Essay on Poetic Theory</i> OR
Longinus	<i>On the Sublime</i> , Chapter 7, 39

Suggested Readings:

Auerbach, Erich. *Mimesis: The Representation of Reality in Western Literature*. USA: Princeton University Press. 2013.

Beye, Charles Rowan. *Ancient Greek Literature and Society*. Ithaca, New York: Cornell University Press. 1987

*All the texts are available for access on Project Gutenberg <https://www.gutenberg.org/>

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note /analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: =80 marks

Core 10

Women's writing

The course aims to acquaint the students with the complex and multifaceted literature by women of the world, reflecting the diversity of women's experiences and their varied cultural moorings. It embraces different forms of literature: poetry, fiction, short fiction, and critical writings. In certain respects, it interlocks concerns of women's literary history, women's studies and feminist criticism.

Unit 1: In Defence of A Literature of Their Own

Mary Wollstonecraft: "Introduction" from "A Vindication of the Rights of Women"

OR

Sarala Devi: "Narira Dabi" (The Claim of the Woman) Trans. S.Mohanty, Chapters 13 & 17 from the collective novel *Basanti* (The first two in *Lost Tradition: Early Women's Writing from Orissa* and the third in *Indian Literature No.*)

Unit 2: Desiring Self: Fiction by Women from the Centre

Charlotte Bronte: *Jane Eyre* **OR** Emily Bronte: *Wuthering Heights*

Jean Rhys: *Wide Sargasso Sea* **OR** Dorris Lessing: *The Grass is Singing*

Unit 3: Desiring and Dissenting Self: Fiction by Women from the Periphery

Krupabai Satthianadhan: *Saguna* or *Kamala*

OR

Prativa Ray: *Yajnaseni*

Unit 4: Tongues of Flame: Poetry by Women from Across the World

***Any Four Poets to be read**

Kamala Das "An Introduction" & "The Sunshine Cat"

Shanta Acharya "Homecoming", "Shringara"

Eunice de Souza "Women in Dutch Painting" & "Remember Medusa?"

Tishani Doshi "Ode to the Walking Woman" & "What the Body Knows"

Maya Angelou "Phenomenal Woman" & "I Know Why the Caged Bird Sings"

Sylvia Plath "Mirror" & "Barren Woman"

Margaret Atwood "This is a Photograph of me" & "The Landlady"

Unit 5: Discoursing at Par: Literary Criticism by Women

Virginia Woolf: "Chapter 1" from *A Room of One's Own*

OR

Simone de Beauvoir: "Introduction" from *The Second Sex*

Web Resources:

- Virginia Woolf, *A Room of One's Own*
<https://victorianpersistence.files.wordpress.com/2013/03/a-room- of-ones- own-virginia-woolf-1929.pdf>
- Mary Wollstonecraft, *A Vindication of the Rights of Women*: Introduction
<http://pinkmonkey.com/dl/library1/vindicat.pdf>
- Maya Angelou's Poems
http://www.poemhunter.com/i/ebooks/pdf/maya_angelou_2012_6.pdf
- Sylvia Plath's Collected Poems
https://monoskop.org/images/2/27/Plath_Sylvia_The_Collected_Poems_1981.pdf
- Margaret Atwood's Poems
<http://www.poemhunter.com/margaret-atwood/poems/>
- Eunice de Souza, "Remember Medusa?" & "Women in Dutch Painting"
<http://www.poetrynook.com/poem/remember-medusa> ,
<http://www.gallerie.net/issue14/poetry1.html>
- Tishani Doshi's Poems
http://www.poemhunter.com/i/ebooks/pdf/tishani_doshi_2012_6.pdf
- Simone de Beauvoir *The Second Sex*
<http://burawoy.berkeley.edu/Reader.102/Beauvoir.I.pdf>

Suggested Reading:

- Toril Moi, *Sexual Textual Criticism*
- Elaine Showalter, *A Literature of Their Own*
- Sandra Gilbert and Susan Gubar, *The Mad Woman in the Attic*
- Gill Plain and Susan Sellers, *A History of Feminist Literary Criticism*. Cambridge University Press. 2007. Essays to be read: Helen Carr, "A History of Women's Writing" and Mary Eagleton, "Literary Representations of Women"
https://mthoyibi.files.wordpress.com/2011/09/05-history-of-feminist-literary-criticism_gill-plain-and-sus.pdf

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note /analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: =80 marks

Core 11

Modern European Drama

The aim of this paper is to introduce the students to the best of experimental and innovative dramatic literature of modern Europe.

Unit 1: Politics, social change and the stage; text and performance; European Drama: Realism and Beyond; Tragedy and Heroism in Modern European Drama; The Theatre of the Absurd

Unit 2: Henrik Ibsen: *Ghosts* OR August Strindberg: *Miss Julie*

Unit 3: Luigi Pirandello: *Six Characters in Search of an Author* OR Heiner Müller: *Hamletmachine*

Unit 4: Eugene Ionesco: *Chairs* OR Jean Genet: *The Maids*

Unit 5: Samuel Beckett: *Waiting for Godot* OR Bertolt Brecht: *The Good Woman of Szechuan*

Web Resources

- *Hamletmachine*: <http://theater.augent.be/file/13>
- Pirandello: <http://www.eldritchpress.org/lp/six.htm>
- Ionesco: <http://www.kkoworld.com/kitablar/ejen-ionesko-kergedan-eng.pdf>
- Genet: <http://web.mit.edu/jscheib/Public/phf/themaids.pdf>
- Ibsen: <http://www.gutenberg.org/files/8121/8121-h/8121-h.htm>
- Strindberg: <https://archive.org/details/missjulieotherpl00striiala>

Suggested Reading:

1. Constantin Stanislavski, *An Actor Prepares*, Chap. 8, 'Faith and the Sense of Truth', tr. Elizabeth Reynolds Hapgood (Harmondsworth: Penguin, 1967) sections 1,2, 7,8,9, pp. 121-5, 137-46.
2. Bertolt Brecht, 'The Street Scene', 'Theatre for Pleasure or Theatre for Instruction', and 'Dramatic Theatre vs Epic Theatre', in *Brecht on Theatre: The Development of an Aesthetic*, ed. And tr. John Willet (London: Methuen, 1992) pp.68-76, 121-8.
3. George Steiner, 'On Modern Tragedy', in *The Death of Tragedy* (London: Faber, 1995) pp. 303-24.
4. Raymond Williams, "Tragedy and Revolution" in *Modern Tragedy*, Rvsvd Ed (London: Verso, 1979) pp. 61-84.
5. Jean Genet, *Reflections on Theatre* (London: Faber & Faber) Chapter 2: "The Strange World Urb..." pp. 63-74.

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: = 80 marks

Core 12

Indian Classical Literature

This paper aims at creating awareness among the students of the rich and diverse literary culture of ancient India.

Unit 1: Vedic Literature

1. *Samjnana Sukta* Rig Veda X.19
2. *Sivasankalpa Sukta* Yajur Veda XXX.I.6
3. *Purusha Sukta* Yajur Veda XV.XXXI. 1-16

References: The New Vedic Selection Vol 1, Telang and Chaubey, Bharatiya Vidya Prakashan, New Delhi

Unit 2: Selections from Epic Lit.

Vyasa 'The Dicing' and 'The Sequel to Dicing,' 'The Book of the Assembly Hall', 'The Temptation of Karna', Book V 'The Book of Effort', in *The Mahabharata*: tr. And ed. J.A.B. van Buitenen (Chicago: Brill, 1975) pp. 106-69 **OR**
'Ayodhya Kanda' (Book II), 1st Canto—The Ramayana of Valmiki. Gita Press Edition.

Unit 3: Sanskrit Drama

Kalidasa, *Abhijnanasakuntalam*, Act IV, tr. M.R Kale, Motilal Banarasi Dass, New Delhi **OR**
Bhavabhuti's *Rama's Last Act (Uttararamacharita)* tr. Sheldon Pollock (New York: Clay Sanskrit Library, 2007)

Unit 4: Sanskrit Drama

Mrcchakatika by Sudraka, Act I, tr. M.M. Ramachandra Kale (New Delhi: Motilal Banarasidass, 1962)

Unit 5: Aesthetics and Maxims

- Bharata's *Natyasastra*, Chapter VI on Rasa theory
References-
English Translation by M.M. Ghosh, Asiatic Society, Kolkata, 1950
- *Sahitya Darpana* of Vishvanatha Kaviraja Chaps- I& II
References-
English Translation by P.V. Kane, Motilal Banarsi Dass, N Delhi
- Nitisataka of Bhartrhari 20 verses from the beginning
References- The Sataktraya edited by D.D. Kosambi, Published in Anandashrama Series, 127, Poona, 1945. Also
English Translation published from Ramakrishna Mission, Kolkata

Suggested Reading:

- Kalidasa. Critical Edition, Sahitya Akademi
- B.B Choubey, New Vedic Selection, Vol 1, Bharatiya Vidya Prakashan, New Delhi
- H.H.Wilson (Tr.)- *Rig Veda*
- Bharata, *Natyashastra*, tr. Manomohan Ghosh, vol.I, 2 nd edn (Calcutta: Granthalaya, 1967) chap. 6: 'Sentiments', pp. 100–18.
- J.A.B.Van Buitenen, 'Dharma and Moksa', in Roy W. Perrett, ed., Indian Philosophy, vol. V, Theory of Value: A Collection of Readings (New York: Garland, 2000) pp.33–40.
- Vinay Dharwadkar, 'Orientalism and the Study of Indian Literature', in Orientalism and the Postcolonial Predicament: Perspectives on South Asia, ed. Carol A.Breckenridge and Peter van der Veer (New Delhi: OUP, 1994) pp. 158–95
- Universals of Poetics by Haldhar Panda

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: = 80 marks

Core 13

Postcolonial Literature

This paper seeks to introduce the students to postcolonial literature—a body of literature that responds to the discourses of European colonialism and empire in Asia, Africa, Middle East, the Pacific and elsewhere. By focusing on representative texts situated in a variety of locations, the paper aims to provide the students with the opportunity to think through and understand the layered response – compliance, resistance, mimicry and subversion - that colonial power has provoked from the nations in their search for a literature of their own.

Unit 1: Concept

- Definition and characteristics: Resistant descriptions, appropriation of the colonizer's language, reworking colonial art forms & etc.
- Scope and Concerns: Reclaiming spaces and places, asserting cultural integrity, revising history

Prescribed Reading:

Achebe, Chinua "An image of Africa: Racism in Joseph Conrad's *Heart of Darkness*," *Research in African Literatures*, Vol. 9, No.1, Special Issue on Literary Criticism. (Spring, 1978), pp. 1-15.

Unit 2: Indian

Raja Rao: *Kanthapura* OR R K Narayan: *The English Teacher*

Unit 3: Caribbean and African

V S Naipaul: *The Mimic Men* OR Chinua Achebe: *No Longer at Ease*

Unit 4: South African

Nadine Gordimer: *July's People* OR J M Coetzee: *Life & Times of Michael K*

Unit 5: Criticism

Chinua Achebe: "English and the African Writer" and
Ngugi wa Thiong'o: "The Quest for Relevance" from *Decolonising the Mind: The Politics of Language in African Literature*

Web Resources

- Achebe, Chinua "An image of Africa: Racism in Joseph Conrad's *Heart of Darkness*," *Research in African Literatures*, Vol. 9, No.1, Special Issue on Literary Criticism. (Spring, 1978), pp. 1-15.
<http://english.gradstudies.yorku.ca/files/2013/06/achebe-chinua.pdf>
- Achebe, Chinua: "English and the African Writer"
<https://mrvenglish.wikispaces.com/file/view/English+and+the+African+Writer.pdf>
- Thiong'o, Ngugi Wa. "The Quest for Relevance" from *Decolonising the Mind: The Politics of Language in African Literature*
https://www.humanities.uci.edu/critical/pdf/Wellek_Readings_Ngugi_Quest_for_Relevance.pdf
- Ashcroft, Bill, Gareth Griffiths, Helen Tiffin. *Post-Colonial Studies: The Key Concepts*. New York: Routledge. 2007.

Suggested Reading:

- Ashcroft, Bill, Gareth Griffiths, Helen Tiffin. "Introduction", *The Empire Writes Back: Theory and Practice in Post-Colonial Literature*. London, New York: Routledge, 2nd edition, 2002.
- Bhabha, Homi K. *The Location of Culture*. Noida: Atlantic Books. 2012.
- Gandhi, Leela. *Postcolonial Theory: An Introduction*. OUP. 1998.
- Said, Edward. *Orientalism*. India: Penguin. 2001.
- Spivak, Gayatri Chakraborty. *Can the Subaltern Speak?*. UK: Macmillan. 1998
<http://planetarities.web.unc.edu/files/2015/01/spivak-subaltern-speak.pdf>

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: =80 marks

Core 14

Popular Literature

This paper seeks to introduce the students to genres such as romance, detective fiction, campus fiction, fantasy/mythology, which have a “mass” appeal, and can help us gain a better understanding of the popular roots of literature.

Unit 1: Introduction to the concept

- What is popular literature?
- Debate between popular and high cultures (‘high brow’ v/s ‘low brow’)
- What is Genre fiction?
- Debate between genre fiction and literary fiction

Essays for discussion:

- Lev Grossman: “Literary Revolution in the Supermarket Aisle: Genre Fiction is Disruptive Technology”
<http://entertainment.time.com/2012/05/23/genre-fiction-is-disruptive-technology/>
- Arthur Krystal: “Easy Writers: Guilty pleasures without guilt”
<http://www.newyorker.com/magazine/2012/05/28/easy-writers>
- Joshua Rothman: “A Better Way to Think About the Genre Debate”
<http://www.newyorker.com/books/joshua-rothman/better-way-think-genre-debate>
- Stephen Marche: “How Genre Fiction Became More Important than Literary Fiction”
<http://www.esquire.com/entertainment/books/a33599/genre-fiction-vs-literary-fiction/>

Unit 2: Detective Fiction

Sherlock Holmes: *The Hound of the Baskervilles* **OR** Agatha Christie: *Murder on the Orient Express*

Unit 3: Romance

Shobha De: *Socialite Evenings* **OR** Nicholas Sparks: *The Notebook*

Unit 4: Campus Fiction

Chetan Bhagat: *Five Point Someone* **OR** David Lodge: *Small World: An Academic Romance*

Unit 5: Rewriting Mythology

Amish Tripathi: *The Immortals of Meluha* **OR** Anuja Chandramouli: *Arjuna: Saga of a Pandava Warrior-Prince*

Suggested Reading

- Leslie Fiedler, *What was Literature? Class, Culture and Mass Society*
- Leo Lowenthal, *Literature, Popular Culture and Society*
- *Popular Fiction: Essays in Literature and History* by Peter Humm, Paul Stigant, Peter Widdowson

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: = 80 marks

Discipline Specific Course

1. Literary Theory

Objective

The development of theory in the last half-century or more is a fact of critical importance in the academic study of literature. Far from being seen as a parasite on the text, theory has been seen as a discourse that provides the conceptual framework for literature. This paper aims to give the students a firm grounding in a major methodological aspect of literary studies known as theory.

Starred texts are to be taught. Questions with alternatives are also to be set from these texts.

Unit 1: Overview

- Crisis in literary criticism and the search for a method
- Rise of theory
- What does it mean to theorise?

Unit 2: New Criticism and Formalism: with an emphasis on the main critical concepts of NC such as paradox, irony, tension, intentional and affective fallacy, heresy of paraphrase and of Formalism such as ostranenie, literariness, foregrounding, dominant and deviant

- *Cleanth Brooks, "The Language of Paradox" Or W.K. Wimsatt Jr. and Monroe Beardsley, "The Intentional Fallacy"
- *Viktor Shklovsky, "Art as Device" Or Roman Jakobson, "Linguistics and Poetics"

Unit 3: Structuralism and Poststructuralism: with an emphasis on the main critical concepts of Structuralism such as binary opposition, synchrony and diachrony, syntagm and paradigm and of Poststructuralism such as collapse of the binary, difference, mise-en-abyme, erasure

- *Gerard Genette, "Introduction" to *Narrative Discourse* (https://archive.org/stream/NarrativeDiscourseAnEssayInMethod/NarrativeDiscourse-AnEssayInMethod_djvu.txt) Or Roland Barthes, "Face of Garbo" and "French Fries" (from *Mythologies*)
- Jacques Derrida, "On the Idea of the Supplement" (from *Of Grammatology*) Or Michel Foucault, "What is an Author?" (<http://artsites.ucsc.edu/faculty/Gustafson/FILM%20162.W10/readings/foucault.author.pdf>) (Either of the two essays can be taught depending on availability)

Unit 4: Marxism and New Historicism: with an emphasis on main critical concepts of Marxism such as base, superstructure, ideology, commodification, determination and of New Historicism such as power, resistance, high-low dialectic

- *Louis Althusser, "Letters on Art" (from *Lenin and Philosophy and Other Essays*) Or Georg Lukacs, "On Reification" (from *History and Class Consciousness*)
- Raymond Williams, "In Memory of Lucien Goldmann" Or Stephen Greenblatt, "Learning to Curse" (Either of the two essays can be taught depending on availability)

Unit 5: Eco-criticism and Eco-feminism: with an emphasis on main critical concepts of Ecology as environment, balance, food chain and of Eco-feminism as body and its colonisation, patriarchy, woman as a creative principle in harmony with nature

Discipline Specific Course

2: Reading World Literature

This paper proposes to introduce the students to the study of world literature through a representative selection of texts from around the world. The idea is to read beyond the classic European canon by including defining literary texts from other major regions/countries—except the United States of America—written in languages other than English, but made available to the readers in English translation.

Unit 1: Concept

- The idea of world literature: Scope and definition
- Uses of reading world literature

Unit 2: European

Albert Camus *The Outsider*

OR

Fyodor Dostoevsky *Notes from Underground*

Unit 3: Caribbean and African

V S Naipaul *In a Free State*

OR

Chimamanda Ngozi Adichie *Purple Hibiscus*

Unit 4: Canadian Short Fiction

Margaret Atwood *Stone Mattress* & *Pretend Blood*

OR

Alice Munro *The Bear Came Over the Mountain* & *Face*

Unit 5: Latin American Poetry

Pablo Neruda “Death Alone”, “Furies and Suffering”, “There’s no Forgetting”, “Memory”

OR

Octavio Paz “from San Ildefonso Nocturne”, “Between Going and Staying the Day Wavers”, “Humayun’s Tomb”, “Motion”

Web Resources:

- The Complete Stories by Franz Kafka http://www.vanderbilt.edu/olli/class-materials/Franz_Kafka.pdf
- What is world Literature? (Introduction) David Damrosch <http://press.princeton.edu/chapters/i7545.html>
- Tagore’s comparative world literature https://www.academia.edu/4630860/Rabindranath_Tagores_Comparative_World_Literature
- Dostoevsky’s *Notes from Underground* <http://www.gutenberg.org/files/600/600-h/600-h.htm>
- Margaret Atwood’s *Stone Mattress* <http://www.newyorker.com/magazine/2011/12/19/stone-mattress>

- Margaret Atwood's Pretend Blood <http://www.independent.co.uk/arts-entertainment/books/features/first-lives-club-pretend-blood-a-short-story-by-margaret-atwood-1779529.html>
- Alice Munro's short Stories <http://www.newyorker.com/magazine/2013/10/21/the-bear-came-over-the-mountain-2>, <http://www.newyorker.com/magazine/2008/09/08/face>
- Poems of Octavio Paz http://www.poetrysoup.com/famous/poems/best/octavio_paz

Suggested Reading:

- *Weltliteratur*: John Wolfgang von Goethe in *Essays on Art and Literature* Goethe : The Collected Works Vol.3
- Rabindranath Tagore "World Literature": *Selected Writings On Literature and Language: Rabindranath Tagore* Ed. Sisir Kumar Das and Sukanta Chaudhuri Damrosch
- Goethe's "World Literature Paradigm and Contemporary Cultural Globalization" by John Pizer "Something Will Happen to You Who Read": Adrienne Rich, Eavan Boland' by Victor Luftig .JSTOR iv. *Comparative Literature* University of Oregon.
- David Damrosch, *What is World Literature?* Princeton University Press
- "WLT and the Essay" *World Literature Today* Vol. 74, No. 3, 2000. JSTOR Irish University Review, Vol.23 Spring 1, Spring-Summer.

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: 80 marks

Discipline Specific Course

3: Research Methodology

Research methodology is a discipline specific course pitched at a higher level than the generic academic preparatory courses. Research is at the core of every university course starting from the UG to the PhD level. This course is designed to develop the fundamentals of research from creating a questioning mechanism in the students' minds leading up to writing research papers and dissertations. Students learn the methodological issues imperative for conducting research and for research documentation. The course also aims to train students in the essentials of academic and research writing skills.

Unit 1 Research and the Initial Issues

- Research as systematic investigation
- Searching for and locating research questions; Finding the general background about research problem/question: review of existing literature and applicable theories
- Refining the research problem/question; formulating its rationale and objectives
- Writing a research synopsis

Unit 2 Literature review

- Selecting review areas based on the research objectives
- Primary, secondary and tertiary sources, and related theory/s (sources: library, databases, online sources, previous research, archives, media, social/psychological/political/educational contexts, and such others)
- Gathering, reading and analysing literature and related theory
- Writing the review with implications for the research question selected

Unit 3 Hypotheses and formulation of research design

- Formulating hypotheses based on research objectives
- Formulation of research design: qualitative, quantitative, combinatory; steps in research design
Theory application
- Data collection tools: surveys, questionnaires, interviews, observation checklists, review checklists, comparison tools, text analysis tools
- Data analysis and interpretation

Unit 4 Results and documentation

- Preparing tables, charts, and graphs to present data; Collating the findings
- Testing hypotheses; Generalisation of results
- Writing a dissertation; MLA/APA citation: in-text and works cited pages
- Plagiarism and related problems

Unit 5 Practical (for Internal Assessment)

Students will write i. literature review of 1000 words on a research question and ii. a book review of 500 words.

Pattern of examination

Mid-semester assessment

[20 marks]

- Literature review of 1000 words on a research question 10 marks
- A book review of 500 words 10 marks

Semester final examination

[80 marks]

Unit 1: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total:

80 marks

Texts prescribed

- i. K Samantray, *Academic and Research Writing*. Orient Blackswan (2015)
- ii. Kothari & Garg, *Research Methodology*. New Age Publishers
- iii. Deepak Chawla & Neena Sondhi. *Research methodology: Concepts & Cases*. Vikas Publishing

Generic Elective

Academic Writing and Composition

This is a generic academic preparatory course designed to develop the students' writing skills from basic to academic and research purposes. The aim of this course is to prepare students to succeed in complex academic tasks in writing along with an improvement in vocabulary and syntax.

Unit 1 Instruments of writing I

- Vocabulary development: synonyms and antonyms; words used as different parts of speech; vocabulary typical to 'science' and 'commerce'
- Collocation; effective use of vocabulary in context

Unit 2 Instruments of writing II

- Syntax: word order; subject-predicate; subject-verb agreement; simple, complex, compound, compound-complex sentences; structure and uses of active and passive sentences
- Common errors in Indian writing

Unit 3 Academic writing I

- What is academic writing?
- The formal academic writing process: the 'what' and the 'how' of writing; use of cohesive and transitional devices in short and extended pieces of writing

Unit 4 Academic writing II

- Paragraph writing: topic sentence, appropriate paragraph development ; expository, descriptive, narrative and argumentative paragraphs
- Extended pieces of writing: process development using comparison-contrast, cause and effect, argumentation, and persuasion

Unit 5 Project writing: (writing projects)

- What's a Project: reading-based, field work-based project : how to pick a topic for the project; background reading
- Structure of a Project: Title, aim of the project (a short statement), other objectives if any, significance of the Project : why is the project being undertaken, sources/books to be consulted for the study, method: Is it quantitative (field work) or qualitative (text-related), analysis/interpretation, findings, conclusion

Texts prescribed

1. K Samantray, *Academic and Research Writing: A Course for Undergraduates*, Orient BlackSwan
2. Leo Jones (1998) *Cambridge Advanced English: Student's Book* New Delhi: CUP
3. Stanley Fish (2011) *How to Write a Sentence*

Pattern of examination

Semester 1

Mid-semester assessment

[20 marks]

Using texts (500 – 600 words), students will be tested for

- Vocabulary: synonyms, antonyms, words used as different parts of speech **10 marks**
- Word order; subject-predicate; subject-verb agreement **10 marks**

Semester final examination

[80 marks]

Using texts (600 -700 words), students will be tested for

- Use of vocabulary in context **05 bits X 02 marks= 10marks**
- Use of grammar in context **05 bits X 02 marks= 10 marks**
- Use of cohesive and transitional devices in one paragraph **10 bits X 02 marks=20 marks**
- Writing two paragraphs (expository/ descriptive/ narrative/argumentative) using topic sentences **2qns x 10 marks= 20marks**
- Correcting in-text citation from given input **05bits x 02 marks= 10 marks**
- Preparing a correct version of Works Cited page from given input **05bits x 02 marks= 10marks**

Generic Elective

Modern Indian Literature

The paper aims at introducing students to the richness and diversity of modern Indian literature written in many languages and translated into English.

Unit-I Historical Overview

Background, definition of the subject and historical perspectives will be covered.

Unit-II The Modern Indian Novel

Fakir Mohan Senapati: *Six Acres and a Third* Or U. R. Ananthamurthy: *Sanskara*

Unit-III The Modern Indian Short Story

Selected stories by Fakir Mohan Senapati: "Rebati", Rabindra Nath Tagore: "Post Master" Premchand: "The Shroud", Ishmat Chughtai: "Lihaaf"

Unit-IV Modern Indian Life Writing

Excerpts from M.K. Gandhi's Story of *My Experiments with Truth* (First two chapters), Amrita Pritam's *The Revenue Stamp* (first two chapters), *Autobiography* by Rajendra Prasad (chapter six & seven)

Unit-V The Modern Indian Essay

- A. K. Ramanujan "Is there an Indian Way of Thinking? An Informal Essay" *Collected Essays*, OUP, 2013
- "Decolonising the Indian Mind" by Namwar Singh. Tr. Harish Trivedi *Indian Literature*, Vol. 35, No. 5 (151) (Sept.-Oct., 1992), pp. 145-156
- G. N. Devy's introduction to *After Amnesia*, pp. 1-5, *The G. N. Devy Reader*, Orient BlackSwan, 2009.

Suggested Readings:

1. Sisir Kumar Das, *History of Indian Literature 1910–1956, Triumph and Tragedy*, Sahitya Akademi, New Delhi, 2000
2. Amit Chaudhuri, *The Vintage Book of Modern Indian Literature*, 2004
3. M.K. Naik, *A History of Indian English Literature*, Sahitya Akademi, 2004

Midterm

Unit 1: 02 questions x 10 marks=20 marks

Total: =20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: =80 marks

Generic Elective

Language, Literature and Culture

This is a broad-based course that aims to encourage students to be knowledgeable and inquiring into the nature of language, nature of literature and the role of culture in both. The course introduces students to how language is special for humans, and how literature and culture make human beings caring. There is a strong emphasis here on encouraging students to develop intercultural understanding, open-mindedness, and the attitudes necessary for them to respect and evaluate a range of points of view.

Unit 1 Language

- Nature of language
- Functions of language : transactional, informative, interactional

(use these terms under each category above: Instrumental language, Regulatory Language, Interactional Language, Personal Language, imaginative Language, Heuristic Language, Informative Language)

Unit 2 Language and Literature 1

- Literature and its language
- Literary terms, Figures of speech used in literature: simile, metaphor, metonymy, irony, paradox, synecdoche, oxymoron

Unit 3 Language and Literature 2

- Language used in poetry, fiction and non-fiction
- Text analysis

Unit 4 Language and culture 1

- Culture, its implications and interpretations
- Transmission of culture through language: Culture and society

Unit 5 Language and Culture 2

- Intercultural and cross-cultural communications
- Analysis and applications

Suggested Reading

- Kalyani Samantray, *Pragmatics* (E-Pathsala)
- Bibhudendra Narayan Patnaik & Kalyani Samantray, *Cross-Cultural and Inter-cultural Communications* ((E-Pathsala)
- Brown, G & Yule, G. *Discourse Analysis*. CUP
- **Scaglia, B (ed.)** *Language, Understood: Examining the Linguistics of Discourse Analysis and Studies*. Webster's Digital Service.
- **Culture and language**
- <http://www2.lib.nifs-k.ac.jp/HPBU/annals/an46/46-11.pdf>
- <http://barthimeous.blogspot.in/2011/03/relationship-between-culture-and.html>
- *Companion to Literary Forms* by Padmaja Ashok, Orient BlackSwan.2015
- *Literature and Language* (ed.) Loveleen Mohan, Randep Rana, Jaibir S. Hooda. Orient BlackSwan.

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: = 80 marks

CBCS UG SYLLABUS SEM 4-GE 4

Generic Elective

Language and Linguistics

Unit 1: Language and Human Language

- Nature and features of Human language ; language and human communication; differences from other forms of communications
- Artificial intelligence and human language

Unit 2 :Linguistics and Language 1

- What is linguistics; development in the history of linguistic studies; contribution of linguistics to other areas of human inquiry
- Linguistics for jobs

Unit 3 :Linguistics and Language 2

- Phonetics and accuracy in pronunciation
- Fluency and contextual speaking

Unit 4 :Linguistics and Language 3

- Morphology and Nature of words
- Word formation processes

Unit 5: Linguistics and Language 4

- Nature of sentences and connected texts; syntax and discourse
- Language and meaning: semantics

Recommended reading

- i. *A Course in Linguistics*. Tarni Prasad. PHI
- ii. *Linguistics: A very short introduction*. P H Mathews.OUP

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Unit 5: 1 long answer question+ 1 short note/analysis (14+06) =20 marks

Total: = 80 marks

Skill Enhancement Compulsory Course

1. SEC 1 (English Communication)
2. SEC 2
 - A. Soft Skills
 - OR
 - B. Translation and Principles of Translation

SEC 1: Skill Enhancement Compulsory Course for Arts

Semester 1

Paper: 1 Marks: 100 Credits: 04

The purpose of this course is twofold: to train students in communication skills and to help develop in them a facility for communicative English.

Since language is what binds society together and serves as a crucial medium of interaction as well as interchange of ideas and thoughts, it is important that students develop a capacity for clear and effective communication, spoken and written, at a relatively young age. The need has become even more urgent in an era of globalization and the increasing social and cultural diversity that comes with it.

English, being a global language par excellence, it is important that any course in communication is tied to an English proficiency programme. The present course will seek to create academic and social English competencies in speaking, listening, arguing, enunciation, reading, writing and interpreting, grammar and usage, vocabulary, syntax, and rhetorical patterns.

Students, at the end of the course, should be able to unlock the communicator in them by using English appropriately and with confidence for further studies or in professional spheres where English is the indispensable tool of communication.

Unit-1 : **[20]**

Introduction

1. What is communication?
2. Types of communication
 - Horizontal
 - Vertical
 - Interpersonal
 - Grapevine
3. Uses of Communication

Prescribed Reading: Chapter 1 *Applying Communication Theory for Professional Life: A Practical Introduction* by Dainton and Zelle

<http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmJYXRpb25fVGhlb3J5LnBkZg%3D%3D&cidReset=true&cidReq=MBA563>

Unit-2:Languageof Communication[20]

1. Verbal: spoken and written
2. Non-verbal
 - Proxemics
 - Kinesics
 - Haptics
 - Chronemics
 - Paralinguistics
3. Barriers to communication
4. Communicative English

Unit-3 :Reading Comprehension [20]

- Locate and remember the most important points in the reading
- Interpret and evaluate events, ideas, and information
- Read “between the lines” to understand underlying meanings
- Connect information to what they already know

Unit-4: Writing [20]

- Expanding an Idea
- Note Making
- Information Transfer
- Writing a Memo
- Writing Formal Email
- Writing a Business Letter
- Letters to the Editor
- CV & Resume Writing
- Covering Letter
- Report Writing
- News Story
- Interviewing for news papers

(The above-mentioned writing activities are covered in the prescribed textbook *Vistas and Visions*)

Unit 5: Language functions in listening and conversation [20]

- Discussion on a given topic in pairs
- Speaking on a given topic individually
- Group Discussion
- Interview
- Dialogue

(Practice to be given using the set pieces from the prescribed textbook *Vistas and Visions*)

Grammar and Usage

1. Phrasal Verbs
2. Collocation
3. Using Modals
4. Use of Prepositions
5. Common Errors in English Usage

(The above-mentioned grammar items are covered in the textbook *Vistas and Visions*)

Examination pattern

Each reading and writing question will invite a 200 word response.

Midterm test

[20 marks]

Unit 1 (preferably short questions on types and uses of communication)

Total

20 marks

Final Semester Examination

Unit 2

One long question with choice

01x 10 qns= 10 marks

Two short notes with choice

02x 05 qns= 10 marks

Unit 3

Reading: 04 questions meant to test

the given reading skills prescribed under unit 3

04 x 05 qns= 20 marks

(2 prose and 2 poetry questions)

Unit 4

Writing: 02 questions

02x 10 qns = 20 marks

Unit 5

Grammar & Usage

02x10 qns = 20 marks

Total

= 80 marks

Grammar questions must be set in contexts; not as isolated sentences as used for practice in the prescribed textbook.

Book Prescribed:

Vistas and Visions: An Anthology of Prose and Poetry. (Ed.) Kalyani Samantray, Himansu S. Mohapatra, Jatindra K. Nayak, Gopa Ranjan Mishra, Arun Kumar Mohanty. OBS

Texts to be studied

Prose

- Decoding Newspapers
- Pleasures of Ignorance
- Playing the English Gentleman
- Lifestyle English
- A Cup of Tea

Poetry

- Last Sonnet
- Sonnet 46 (Shakespeare)
- Pigeons
- Miracles

All grammar and writing activities in the textbook *Vistas and Visions*

Recommended Reading:

Fluency in English – Part II, OUP, 2006

Business English, Pearson, 2008

Communicative English. E. Suresh Kumar and P. Sreehari

Break Free: Unlock the Powerful Communicator in You. Rajesh, V. Rupa, 2015

Soft Skills Shalini Verma, 2009.

Language, Literature and Creativity, Orient BlackSwan, 2013

Language through Literature. (forthcoming) ed. Gauri Mishra, Dr. Ranajan Kaul, Dr. Brati Biswas

SEC 1

Skill Enhancement Compulsory Course for Science

Semester 1

Paper: 1 Marks: 100 Credits: 04

The purpose of this course is twofold: to train students in communication skills and to help develop in them a facility for communicative English.

Since language it is which binds society together and serves as a crucial medium of interaction as well as interchange of ideas and thoughts, it is important that students develop a capacity for clear and effective communication, spoken and written, at a relatively young age. The need has become even more urgent in an era of globalization and the increasing social and cultural diversity that comes with it.

English, being a global language par excellence, it is important that any course in communication is tied to an English proficiency programme. The present course will seek to create academic and social English competencies in speaking, listening, arguing, enunciation, reading, writing and interpreting, grammar and usage, vocabulary, syntax, and rhetorical patterns.

Students, at the end of the course, should be able to unlock the communicator in them by using English appropriately and with confidence for further studies or in professional spheres where English is the indispensable tool of communication.

Unit 1

[20]

Introduction

1. What is communication?
2. Types of communication
 - Horizontal
 - Vertical
 - Interpersonal
 - Grapevine
3. Uses of Communication

Prescribed Reading: Chapter 1 *Applying Communication Theory for Professional Life: A Practical Introduction* by Dainton and Zelle

<http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmljYXRpb25fVGhlb3J5LnBkZg%3D%3D&cidReset=true&cidReq=MBA563>

Unit

2

[20]

Language of Communication

1. Verbal: spoken and written

2. Non-verbal
 - Proxemics
 - Kinesics
 - Haptics
 - Chronemics
 - Paralinguistics
3. Barriers to communication
4. Communicative English

Unit-3

[20]

Reading Comprehension

- Locate and remember the most important points in the reading
- Interpret and evaluate events, ideas, and information
- Read “between the lines” to understand underlying meanings
- Connect information to what they already know

Unit 4

[20]

Writing

- Expanding an Idea
- Note Making
- Information Transfer
- Writing a Memo
- Writing Formal Email
- Writing a Business Letter
- Letters to the Editor
- CV & Resume Writing
- Covering Letter
- Report Writing
- News Story
- Interviewing for news papers

(The above-mentioned writing activities are covered in the prescribed textbook *Vistas and Visions*)

Unit 5: Language functions in listening and conversation

[20]

1. Discussion on a given topic in pairs
2. Speaking on a given topic individually
3. Group Discussion
4. Interview
5. Dialogue

(Practice to be given using the set pieces from the prescribed textbook *Vistas and Visions*)

Grammar and Usage

1. Phrasal Verbs
2. Collocation
3. Using Modals

4. Use of Prepositions
5. Common Errors in English Usage

(The above-mentioned grammar items are covered in the textbook *Vistas and Visions*)

Examination pattern

Each reading and writing question will invite a 200 word response.

Midterm test

[20 marks]

Unit 1 (preferably short questions on types and uses of communication)

Total

20 marks

Final Semester Examination

Unit 2

One long question with choice

01x 10 qns= 10 marks

Two short notes with choice

02x 05 qns= 10 marks

Unit 3

Reading: 04 questions meant to test

the given reading skills prescribed under unit 3

04 x 05 qns= 20 marks

(2 prose and 2 poetry questions)

Unit 4

Writing: 02 questions

02x 10 qns = 20 marks

Unit 5

Grammar & Usage

02x10 qns = 20 marks

Total

= 80 marks

Grammar questions must be set in contexts; not as isolated sentences as used for practice in the prescribed textbook.

Book Prescribed:

Vistas and Visions: An Anthology of Prose and Poetry. (Ed.) Kalyani Samantray, Himansu S. Mohapatra, Jatindra K. Nayak, Gopa Ranjan Mishra, Arun Kumar Mohanty. OBS

Texts to be studied

Prose

- The Gold Frame
- Lifestyle English
- Need for Excellence
- Ecology and Community
- My Lost Dollar

Poetry

- The Darkling Thrush
- The Felling of the Banyan Tree
- Another Woman
- Meeting Poets

All grammar and writing activities in the textbook *Vistas and Visions*

Recommended Reading:

Fluency in English – Part II, OUP, 2006

Business English, Pearson, 2008

Communicative English. E. Suresh Kumar and P. Sreehari

Break Free: Unlock the Powerful Communicator in You. Rajesh, V. Rupa, 2015

Soft Skills Shalini Verma, 2009.

Language, Literature and Creativity, Orient BlackSwan, 2013

Language through Literature. (forthcoming) ed. Gauri Mishra, Dr. Ranajan Kaul, Dr. Brati Biswas

SEC 1

Skill Enhancement Compulsory Course for Commerce

Semester 1

Paper: 1 Marks: 100 Credits: 04

The purpose of this course is twofold: to train students in communication skills and to help develop in them a facility for communicative English.

Since language it is which binds society together and serves as a crucial medium of interaction as well as interchange of ideas and thoughts, it is important that students develop a capacity for clear and effective communication, spoken and written, at a relatively young age. The need has become even more urgent in an era of globalization and the increasing social and cultural diversity that comes with it.

English, being a global language par excellence, it is important that any course in communication is tied to an English proficiency programme. The present course will seek to create academic and social English competencies in speaking, listening, arguing, enunciation, reading, writing and interpreting, grammar and usage, vocabulary, syntax, and rhetorical patterns.

Students, at the end of the course, should be able to unlock the communicator in them by using English appropriately and with confidence for further studies or in professional spheres where English is the indispensable tool of communication.

Unit 1

[20]

Introduction

1. What is communication?
2. Types of communication
 - Horizontal
 - Vertical
 - Interpersonal
 - Grapevine
3. Uses of Communication

Prescribed Reading: Chapter 1 *Applying Communication Theory for Professional Life: A Practical Introduction* by Dainton and Zelle

<http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmljYXRpb25fVGhlb3J5LnBkZg%3D%3D&cidReset=true&cidReq=MBA563>

Unit 2

[20]

Language of Communication

1. Verbal: spoken and written
2. Non-verbal
 - Proxemics
 - Kinesics
 - Haptics
 - Chronemics
 - Paralinguistics
3. Barriers to communication
4. Communicative English

Unit--3

[20]

Reading Comprehension

- Locate and remember the most important points in the reading
- Interpret and evaluate events, ideas, and information
- Read “between the lines” to understand underlying meanings
- Connect information to what they already know

Unit 4

[20]

Writing

- Expanding an Idea
- Note Making
- Information Transfer
- Writing a Memo
- Writing Formal Email
- Writing a Business Letter
- Letters to the Editor
- CV & Resume Writing
- Covering Letter
- Report Writing
- News Story
- Interviewing for news papers

(The above-mentioned writing activities are covered in the prescribed textbook *Vistas and Visions*)

Unit 5: Language functions in listening and conversation

[20]

1. Discussion on a given topic in pairs
2. Speaking on a given topic individually
3. Group Discussion
4. Interview
5. Dialogue

(Practice to be given using set pieces from the prescribed textbook *Vistas and Visions*)

Grammar and Usage

1. Phrasal Verbs
2. Collocation
3. Using Modals
4. Use of Prepositions
5. Common Errors in English Usage

(The above-mentioned grammar items are covered in the textbook *Vistas and Visions*)

Examination pattern

Each reading and writing question will invite a 200 word response.

Midterm test [20 marks]

Unit 1 (preferably short questions on types and uses of communication)

Total 20 marks

Final Semester Examination

Unit 2	One long question with choice	01x 10 qns= 10 marks
	Two short notes with choice	02x 05 qns= 10 marks

Unit 3	Reading: 04 questions meant to test the given reading skills prescribed under unit 3	04 x 05 qns= 20 marks
	(2 prose and 2 poetry questions)	

Unit 4	Writing: 02 questions	02x 10 qns = 20 marks
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Unit 5	Grammar & Usage	02x10 qns = 20 marks
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Total		= 80 marks
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Grammar questions must be set in contexts; not as isolated sentences as used for practice in the prescribed textbook.

Book Prescribed:

Vistas and Visions: An Anthology of Prose and Poetry. (Ed.) Kalyani Samantray, Himansu S. Mohapatra, Jatindra K. Nayak, Gopa Ranjan Mishra, Arun Kumar Mohanty. OBS

Texts to be studied

Prose

- The Last Leaf
- Need for Excellence
- How Wealth Accumulates and Men Decay
- Values in Life
- Lifestyle English

Poetry

- Hidden Flame
- One Day I wrote Her Name
- The Darkling Thrush
- Meeting Poets

All grammar and writing activities in the textbook *Vistas and Visions*

Recommended Reading:

Fluency in English – Part II, OUP, 2006

Business English, Pearson, 2008

Communicative English. E. Suresh Kumar and P. Sreehari

Break Free: Unlock the Powerful Communicator in You. Rajesh, V. Rupa, 2015

Soft Skills Shalini Verma, 2009.

Language, Literature and Creativity, Orient BlackSwan, 2013

Language through Literature. (forthcoming) ed. Gauri Mishra, Dr. Ranajan Kaul, Dr. Brati Biswas

Skill Enhancement Course

Credits: 4 Marks: 100

1. Soft Skills

Soft skills are ‘people skills’ that include communication skills, work ethic, positive attitude, emotional intelligence and other personal attributes crucial for success in business or career. Soft skills can be learnt and practiced for personal fulfillment and progress in career. This course provides the soft skills required mainly for professional achievements, and in the process, many of the personal requirements of an individual can be compiled with.

Unit 1

Soft skills and why they are important

What are soft skills?

Soft skills in communication; soft skills and intercultural communication

Unit 2

Soft skills in preparing for a career 1

Competency in verbal and written communication skills: active listening, interactive speaking, reading different types of texts, writing for formal and business contexts

Unit 3

Soft skills in preparing for a career 2

1. Using the Microsoft Office: word, excel, powerpoint; working online and offline; telephone and face-to-face etiquette in professional communication
2. Cross-Cultural etiquette: cultural awareness, cultural sensitivity, cultural flexibility, cross-cultural communication

Unit 4

Soft skills in getting jobs

CV Writing, writing job applications; GD Skills and interview taking skills; getting another job

Unit 5

Soft skills on the job

Emotional Intelligence; time and stress management; team work and net-working; presentation skills; making meeting work: preparing, executing, following up; negotiation skills and crisis management

Prescribed Reading:

- i. Kalyani Samantray, Soft Skills for your Career, OUP
- ii. Himansu S. Mohapatra, Model of the Middle (Pieces to read: “ Our Literature Their Literature”, “ Life style English”, “Writing it Right”, ” The Vinglish way to English”)

Suggested Reading:

- i. Jayashri Mohanraj, Skill Sutras
- ii. Marian K Woodab, How to Communicate under Pressure

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2: 4 short notes (4x5) =20 marks

Unit 3: 1 long answer question to be set preferably from the second component of the Unit
(1x20) =20 marks

Unit 4: 2 long answer question (sample CV/Resume/job application) (2x10)
=20 marks

Unit 5: 1 long answer question (01x10) =10 marks

2 short notes (02x05) =10 marks

Total: = 80 marks

CBCS UG SYLLABUS SEM 4-SEC 2

Skill Enhancement Course

Credits: 2 Marks: 50

2. Translation and Principles of Translation

This paper seeks to make students aware of a fundamental process of human communication which involves movement between languages. Known by the familiar term of translation, this process of transfer of meaning and values across language borders is as inevitable as it is problematic and challenging. The paper would acquaint students with the 'what', 'why' and 'how' of translation, approaches and problems of translation, and it would also sensitize them to the various ways of reading a translation.

Unit 1

What is Translation? Carrying across of meaning from source language to target language

Why Translation? Translation as a bridge, self –other interaction

Unit 2

Approaches to translation

- Domestication: Readability in the target language
- Foreignisation: Faithfulness to the source language text

Unit 3

How to Translate:

- sense translation based on difference (metaphrase), word-to-word translation based on equivalence (paraphrase), regulated transformation (imitation)
- adaptation

Unit 4

Problems of translation

- Cultural gap
- Untranslatability
- Translation as appropriation of indigenous languages by English

Unit 5

How to read a translation:

Cultural difference and how to locate it, presence of the foreign in terms of cultural contexts and language

Text to be studied: *Rebati*, in *Bride Price and Other Stories* by Fakir Mohan Senapati, Rupa Publications.

Suggested Reading:

Translation Studies by Susan Basnett

“Found in Translation” Hamid Dabashi http://opinionator.blogs.nytimes.com/2013/07/28/found-in-translation/?_r=0

“Cultural Translation” by Harish Trivedi, “Translation and Globalization” by Paul St-Pierre from *Translation: Reflection, Refraction, Transformation*. Ed. Paul St-Pierre, Prafulla C Kar

Midterm:

Unit 1: 02 questions x 10 marks=20 marks

Total: 20 marks

Final Examination: 80 marks

Unit 2:	1 long answer question (1x20)	=20 marks
Unit 3:	1 long answer question (1x20)	=20 marks
Unit 4:	1 long answer question (1x20)	=20 marks
Unit 5:	4 short notes (04x05)	=20 marks

Total: = 80 marks

Abstract

Credit add-up

❖ **Core:** **08 credits+02 credits (tutorial)**

Marks add-up

❖ **Core Courses** **200 marks**

Core courses

Credits: 05 (04+01) credits per paper

Papers offered:

- ❖ **English Literature and Language**
- ❖ **Writing and Analysis in English**

Semester 1
English Literature and Language
BA Pass
Paper 1

This is a reading-based paper aiming to initiate the students into an understanding and appreciation of literary writing available in five recognized forms.

Unit 1: Poetry

- | | | |
|------|---------------------|--|
| I. | William Shakespeare | “Sonnet 130” (“My mistress eyes are nothing like the sun”) |
| II. | Robert Frost | “The Road Not Taken” |
| III. | Kamala Das | “Punishment in Kindergarden” |
| IV. | John Milton | “On His Blindness” |
| V. | A K Ramanujan | “Self Portrait” |

Unit 2: Short Stories

- | | | |
|------|---------------|-------------------------------|
| I. | W. S. Maugham | “The Ant and the Grasshopper” |
| II. | Anton Chekhov | “The Bet” |
| III. | R. N. Tagore | “Trust Property” |

Unit 3: Novel

Gopinath Mohanty: *Our Daily Bread* (English Translation of *Danapani*) Trans. Bikram K Das

Unit 4: Drama

G. B. Shaw: *Arms and the Man*

Unit 5: Autobiography

Winston Churchill: *My Early Life* (first Five Chapters)

Prescribed Textbooks:

Melodious Songs and Memorable Tales. (Ed) by Arun K. Mohanty and A.J. Khan. Bhubaneswar: Gyanajuga, 2015.

Pattern of Examination

Midterm Test

Two questions from Unit 1, carrying 10 marks each: 10x2=20 marks

Final semester exam:

1 long question from units 2 to 5, carrying 14 marks+ 1 short note each from units 2 to 5, carrying 6 marks per short note: 56+24=80 marks

Semester 2
BA Pass
Writing and Analysis in English
Paper 2

The focus of this writing-based paper is to help students to learn general as well as literary writing skills.

Unit 1: Prose

- | | | |
|------|-------------------------|-------------------------------|
| I. | S. Radhakrishnan: | “A Call to Youth” |
| II. | Claire Needle Hollander | “No Learning Without Feeling” |
| III. | Dilip Padgaonkar | “The Idea of Europe” |
| IV. | Dinanath Pathi | “George V High School” |

Unit 2: Critical appreciation of an unseen poem

Unit 3: Expanding an idea into a paragraph

Unit 4: Writing a précis of a passage

Unit 5: Writing an essay

Prescribed Text:

The Widening Arc: A Selection of Prose and Stories. (Ed) by Asima R. Parhi, S. Deepika and Pulastya
Jani. Bhubaneswar: KItab Bhavan, 2016

Pattern of Examination

Midterm Test

Comprehension from an unseen prose passage with 10 comprehension questions, each having 2 marks: (10x2) = 20 marks

Final Semester Examination

5 task-based questions from 5 units, the first 4 carrying 15 marks each and the essay writing carrying 20 marks:
(15x4)+20= 80 marks

Alternative English for Arts

Semester 3

Paper 1

This paper is meant for students who will opt for English in lieu of the modern Indian languages. It has been designed to help them imbibe literary skills and competence through a wide variety of expository, narrative writing as well as some rudimentary dramatic forms.

Unit 1 Prose

1. Harold Nicholson: "An Educated Person"
2. C.V Raman: "Water the Elixir of Life"
3. Roger Manvill: "Television and Film"
4. Santosh Desai: "The Emoji Disruption"

Unit 2 One Act Play

William Soroyan: *My Heart's in the Highlands*

Unit 3 Novel

R.L. Stevenson: *Treasure Island*

Unit 4 Short Stories

1. Alexander Baron: *The Man who knew Too Much*
2. Dash Benhur: *The Bicycle*

Unit 5 Reading Comprehension

Prescribed Textbooks:

- **The Widening Arc: A Selection Prose and Stories.** (Ed) by Asima R. Parhi, S.Deepika and Pulastya Jani. Bhubaneswar: KItab Bhavan, 2016
- **Spotlight: An Anthology of One Act Plays.** (Ed) by M L Tickoo, Jaya Sasikumar and Paul Gunashekar, Patna: Orient Longman Ltd.

Alternative English for Arts

Semester 4

Paper 2

This is mostly a skill based paper. Students are required to know the basics of expository writing and then go on to develop skills in expository and creative writing.

Unit 1 Prose

1. Stephen Harvey "The Empty Page"
2. G. B. Shaw "Miseries of the Rich"
3. Jim Corbett "Fight between the Leopards"
4. Will F Jenkins "Uneasy Homecoming"

Unit 2 Dialogue Writing

Unit 3 Short story writing from an outline

Unit 4 Report writing

Unit 5 Grammar and Usage

Prescribed Textbook

The Widening Arc: A Selection Prose and Stories. (Ed) by Asima R. Parhi, S.Deepika and Pulastya Jani.
Bhubaneswar: KItab Bhavan, 2016

CBCS B.Com Syllabus in English 2016

Abstract

Credit add-up

❖ **Core:** **08 credits+02 credits (tutorial)**

Marks add-up

❖ **Core Courses** **200 marks**
Core courses

Credits: 05 (04+01) credits per paper

Papers offered:

- ❖ **English Literature and Language**
- ❖ **Writing and Analysis in English**

Semester 1
English Literature and Language
B.Com Pass
Paper 1

This is a reading-based paper aiming to initiate the students into an understanding and appreciation of literary writing available in five recognized forms.

Unit 1: Prose

- | | | |
|------|---------------------|-------------------------------|
| I. | S. Radhakrishnan | “A Call to Youth” |
| II. | Claire N. Hollander | “No Learning without Feeling” |
| III. | Jim Corbett | “Fight between the Leopards” |
| IV. | Santosh Desai | “The ‘emoji’ Disruption” |

Unit 2: Short Stories

- | | | |
|------|---------------|-------------------------------|
| I. | W. S. Maugham | “The Ant and the Grasshopper” |
| II. | Anton Chekhov | “The Bet” |
| III. | R. N. Tagore | “Trust Property” |

Unit 3: Novel

Gopinath Mohanty: *Our Daily Bread* (English Translation of *Danapani*) Trans. Bikram K Das

Unit 4: Drama

G. B. Shaw: *Candida*

Unit 5: Autobiography

Winston Churchill: *My Early Life* (first Five Chapters)

Prescribed Textbooks:

Melodious Songs and Memorable Tales. (Ed) by Arun K. Mohanty and A.J. Khan. Bhubaneswar: Gyanajuga, 2015.

The Widening Arc: A Selection of Prose and Stories. (Ed) by Asima R. Parhi, S. Deepika and Pulastya Jani. Bhubaneswar: Kitab Bhavan, 2016.

Pattern of Examination

Midterm Test

Two questions from Unit 1, carrying 10 marks each: 10x2=20 marks

Final semester exam:

1 long question from units 2 to 5, carrying 14 marks+ 1 short note each from units 2 to 5, carrying 6 marks per short note: 56+24=80 marks

Semester 2
B.Com Pass
Writing and Analysis in English
Paper 2

The focus of this writing-based paper is to help students to learn general as well as literary writing skills.

Unit 1: Comprehension of an unseen passage

Unit 2: Writing business letters and business e-mails

Unit 3: Expanding an idea into a paragraph

Unit 4: Writing a précis of a passage

Unit 5: Writing an essay

Pattern of Examination

Midterm Test

Comprehension from an unseen prose passage with 10 comprehension questions, each having 2 marks: (10x2) =20 marks

Final Semester Examination

5 task-based questions from 5 units, the first 4 carrying 15 marks each and the essay writing carrying 20 marks: (15x4)+20= 80 marks

Alternative English for Commerce

Semester 3

Paper 1

This paper is meant for students who will opt for English in lieu of the modern Indian languages. It has been designed to help them imbibe literary skills and competence through a wide variety of expository, narrative writing as well as some rudimentary dramatic forms.

Unit 1 Prose

5. Harold Nicholson: "An Educated Person"
6. C.V Raman: "Water the Elixir of Life"
7. Roger Manvill: "Television and Film"
8. Santosh Desai: "The Emoji Disruption"

Unit 2 One Act Play

William Soroyan: *My Heart's in the Highlands*

Unit 3 Novel

R.L. Stevenson: *Treasure Island*

Unit 4 Short Stories

1. Alexander Baron: *The Man who knew Too Much*
2. Dash Benhur: *The Bicycle*

Unit 5 Reading Comprehension

Prescribed Textbooks:

- **The Widening Arc: A Selection Prose and Stories** (Ed) by Asima R. Parhi, S.Deepika and Pulastya Jani. Bhubaneswar: KItab Bhavan, 2016
- **Spotlight: An Anthology of One Act Plays.** (Ed) by M L Tickoo, Jaya Sasikumar and Paul Gunashekar, Patna: Orient Longman Ltd.

Alternative English for Commerce

Semester 4

Paper 2

This is mostly a skill based paper. Students are required to know the basics of expository writing and then go on to develop skills in expository and creative writing.

Unit 1 Prose

5. Stephen Harvey "The Empty Page"
6. G. B. Shaw "Miseries of the Rich"
7. Jim Corbett "Fight between the Leopards"
8. Will F Jenkins "Uneasy Homecoming"

Unit 2 Dialogue Writing

Unit 3 Short story writing from an outline

Unit 4 Report writing

Unit 5 Grammar and Usage

Prescribed Textbook

The Widening Arc: A Selection Prose and Stories. (Ed) by Asima R. Parhi, S.Deepika and Pulastya Jani. Bhubaneswar: KItab Bhavan, 2016

**COURSES OF STUDIES
FOR
B.A. EDUCATION
(HONS & ELECTIVE PAPERS)**

(UNDER CBCS PATTERN)

FOR ADMISSION BATCH 2016-17

**UTKAL UNIVERSITY
BHUBANESWAR**

COURSE STRUCTURE

B.A (EDUCATION)

The duration of +3 Course is three Academic Sessions. There will be two Semesters in each Academic Session. In total there will be six semester i.e. I, II, III, IV, V and VI.

Details of Mark & Course Distribution

Education (Core, DSE & GE Papers with Practicals)

Semester-I

+3 1st Year Education (Honours)

Sl. No.	Name of the Paper	Credits	Mid Sem	End Sem	Total	Page No.
1.	C1-Basic in education	4	20	50	70	1 - 4
	<i>C1-Practical-Book Review</i>	2	-	30	30	
2.	C2-Education and Society	4	20	50	70	5 – 7
	<i>C2-Practical-Field Study</i>	2	-	30	30	
				Total Marks	200	
Semester-II						
3.	C3-Learner and Learning	4	20	50	70	8 - 11
	<i>C3-Practical-Administration of Psychological Test</i>	2	-	30	30	
4.	C4-Pedagogical Skills	4	20	50	70	12 – 14
	C4-Practical-Preparation of Lesson Plan	2	-	30	30	
				Total Marks	200	

+3 2nd Year Education (Honours)						
Semester-III						
5.	C5-Technology and Innovations in Education <i>C5-Practical-Interaction Analysis</i>	4 2	20 -	50 30	70 30	15 – 18
6.	C6-Pedagogy of School Subjects C6-Practical-School Internship	4 2	20 -	50 30	70 30	19 – 31
7.	C7-Statistics in Education <i>C7-Practical-Statistics Analysis of Achievements</i>	4 2	20 -	50 30	70 30	32 – 34
				Total Marks	300	
Semester-IV						
8.	C8-Curriculum Development & Educational Guidance <i>C8-Practical-Text Book Review</i>	4 2	20 -	50 30	70 30	35 - 38
9.	C9-Educational Assessment and Evaluation <i>C-9-Practical-Achievement Test Construction</i>	4 2	20 -	50 30	70 30	39 – 41
10.	C10-Introduction to Educational Research <i>C10-Practical-Preparation of Project Proposal</i>	4 2	20 -	50 30	70 30	42 - 44
				Total Marks	300	

+3 3rd Year Education						
Semester-V						
11.	C11-History of Indian Education <i>C11-Practical Case Study</i>	4 2	20 -	50 30	70 30	45 – 47
12.	C12-Comparative Education <i>C12-Practical Term Paper</i>	4 2	20 -	50 30	70 30	48 – 50
13	DSE-1 - Information and Communication Technology in Education <i>DSE-1 – Practical-Internet Search for Study Material</i>	4 2	20 -	50 30	70 30	51 – 54
14	DSE-2 Special Education <i>DSE-2-Practical – Case Study of a Special Child</i>	4 2	20 -	50 30	70 30	55 – 57
				Total Marks	400	
Semester-VI						
15.	C13-Educational Administration and Management <i>C13-Practical-Visit to Administrative Unit</i>	4 2	20 -	50 30	70 30	58 – 60
16.	C14-Contemporary Concerns in Education <i>C14-Practical-Education Programme Review</i>	4 2	20 -	50 30	70 30	61 – 63
17.	DSE-3 Distance Education <i>DSE-3- Practical-Preparation of SIM/ Case Study of Distance Education</i>	4 2	20 -	50 30	70 30	64 – 66

	<i>Centre</i>					
18.	DSE-4-Project	6	-	100	100	66
				Total Marks	400	
				Grand Total Marks (Hons)	1800	

All Units in a Paper are of equal value / weight / credit

N.B.-Information Communication Technology in Education Special Education Economics of Education.

(Out of the above mentioned subjects any two may be opted as DSE in Fifth Semester)

Distance Education

Environmental Education

Alternative and Innovative Education

Project

(Out of the above mentioned subjects any two may be opted as DSE in Sixth Semester)

Semester-I**+3 1st Year Education (Generic Elective)**

Sl. No.	Name of the Paper	Credits	Mid Sem	End Sem	Total	Page No.
1.	GE1- Vision of Education in India: Issues and Concerns <i>GE1-Practical-Term Paper</i>	4 2	20 -	50 30	70 30	67 - 71
				Total marks	100	
Semester-II						
2.	GE-2-Assessment and Evaluation Techniques <i>GE-2-Practical-Achievement Test Construction</i>	4 2	20 -	50 30	70 30	72 – 74
				Total marks	100	
Semester-III+3 3rd Year Education (Generic Elective)						
3.	GE-3-Contemporary Pedagogy <i>GE-3-Practical-Preparation of Lesson Plan</i>	4 2	20 -	50 30	70 30	75 – 77
				Total marks	100	
Semester-IV						
4.	GE-4-Early Childhood care and Education GE-4-Practical- Observation of ECCE Centre	4 2	20 -	50 30	70 30	
				Total marks	100	
				Grand Total Marks (GE)	400	

All Units in a Paper are of equal value / weight / credit

CORE - 1

BASICS IN EDUCATION

INTRODUCTION :

The Philosophical foundation is a unique educational charity whose aim is to bring philosophy to schools and the wider community. Through doing philosophy in the classroom the primary concern is to improve the educational practices and provide opportunities for the disadvantaged. Philosophical enquiry develops speaking and listening skills vital for literacy and emotional development, helps children who find it difficult to access other classes, and encourages critical and creative thinking essential in the 21st Century. And it will prepare students to apply knowledge, sensibility, skills and dispositions of philosophical inquiry, analysis, and interpretation to educational practices.

Course Objectives

- after completion of the paper, students shall be able to:
- explain the concept of education and its relationship with philosophy
- list areas of philosophy and narrate their educational implications.
- describe the contribution of Philosophy to the field of education.
- appreciate the contribution of various Indian Schools of Philosophy to the field of education.
- evaluate the impact of Western Philosophies on Indian Education.
- narrate the contribution of the Great Indian Thinkers.

Unit – 1 Bases of Education

- Meaning, Nature and purpose of Education
- Aims of Education: Education for individual development and education for social efficiency
- Functions of education

Unit – 2 Philosophical foundations of education

- Concept of Philosophy
- Inter dependence of philosophy and education
- Branches of philosophy and their educational implications – Metaphysics, Epistemology and Axiology.

Unit – 3 Reflections of Indian schools of Philosophy on education

- Common characteristics of Indian Philosophy
- Sankhya and Vedanta as Philosophical systems
- Educational implications of Sankhya and Vedanta.

Unit – 4 - Western Schools of Philosophy and their educational implication.

- Idealism
- Naturalism
- Pragmatism

Unit – 5 Doctrines of Great Educators of East and West and their influence on the practices of school education with special reference to Aims and ideals of Education, Curriculum, method of teaching and the role of teacher.

- Gandhi
- Sri Aurobindo
- Rousseau
- Dewey

REFERENCES

- Agarwal, J.c. (2010), Teacher and Education in a Developing society, Delhi; Vikash Publishing house.
- Arulsarmy, S (2011), Philosophical and sociological perspectives on Education, New Delhi; Neelkamal Publications Pvt. Ltd.
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- Brubacher, John. S. *Modern Philosophies of Education*. New York, USA: McGraw
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- Mohanty, Jagannatha (1991), *Foundation of Education*, Cuttack – 2, Takshashila.
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- New York, USA: Harper & Row.
- Ozman, Howard A., & Craver, Samuel M., *Philosophical Foundations of Education*.
- Premnath, *Bases of Educations*. Delhi, India: S. Chand and Co.
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- Ross, James S., *Ground Work of Educational Theory*. London, U.K: Oxford
- Rusk, Robert R., *Philosophical Bases of Education*, London, U.K: Oxford University of London Press Ltd.
- Safaya, R.N. & Shaida, B.D. (2010), *Modern Theory and Principles of Education*, New Delhi : Dhanpatrai Publishing Company Pvt. Ltd.
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- University of London Press Ltd.
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- Wingo, G. Max. *Philosophies of Education*. New Delhi: Sterling Publishers.

C1 Practical

Book Review

Each Student is required to review a Book / Journal / Educational Article and Write a report.

EDUCATION AND SOCIETY

INTRODUCTION

Education is a sub-system of the society. The aims of education are determined by the aims of the society. The relationships between the two concepts i.e., education and society are so strong that it is not possible to separate them because what happens to one affects the other. It is impossible to think purposefully about many contemporary problems and issues of education without thinking about the society. Educational institutions are micro-societies, which reflect the entire society. The education system in any given society prepares the child for future life and instils in him those skills that will enable him to live a useful life and contribute to the development of the society. Education as a social phenomenon does not take place in a vacuum or isolation; it takes place in the society. This paper will deal with the functioning of education vis-a-vis the society. Education as a sub-system of society and how other sub-systems affect education will be discussed. Various agencies which are involved towards promotion of education will be discussed at length. Special emphasis is placed on issues relating to equality of educational opportunity with specific reference to the Scheduled Castes/Tribes and women. Special attention is also given how education plays an important role towards social change, national integration and international understanding in a diverse social context.

Course Objectives

After completion of this paper, students shall be able to:

- justify education as a social process and explain its function.
- describe the aims of education from sociological perspective.
- list various agencies of education and their function.
- justify education as a sub-system of society and how other sub-systems affect education;
- appreciate the importance of education for social change.

Unit – 1 Education and society

- Society : Meaning and characteristics
- Types of society : Agricultural, Industrial, rural and urban
- Interrelationship between education and society
- Views of Indian thinkers on Education and Society : Radhakrishnan and Sri Aurobindo on Education
- Views of Western Thinkers on Education and Society: Dewey and Illich

- Unit – 2 Education and culture**
- Meaning and concept of culture
 - Characteristics and types of culture
 - Cultural lag and acculturation
 - Cultural dimensions of Education
 - Inter relationship between education, custom and value system.
- Unit – 3 Education, Social process and Institution**
- Education and socialization
 - Education and social change
 - Education and social mobility
 - Role of Education for the development of the marginalised
 - Education and Affirmative action
- Unit – 4 Education and Globalisation**
- Education, Growth and Development
 - Globalisation and liberalization
 - Educational system in Europe
 - Educational system in SAARC countries
 - Education in Global context
- Unit – 5 Education and state**
- Concept of Democracy
 - Education in totalitarian and welfare state
 - Interrelationship of state and education
 - Role of education in Nation building
 - State Control of Education and Autonomy in Education.

REFERENCES

- Abraham, M.F. (2008). *Contemporary Sociology*. New Delhi: Oxford University Press.
- Anand, C.L. et.al. (Ed.) (1983). *Teacher and Education in Emerging in Indian Society*. New Delhi: NCERT.
- Dewey, John (1973). *The School and Society*. Chicago: University of Chicago Press.
- Mathur, S.S. (1966). *A Sociological Approach to Indian Education*. Vinod PustakMandir, Agra.
- Nayak, B.K. *Text Book of Foundation of Education*. Cuttack: Kitab Mahal.

- NCERT (1983). *Teacher and Education in Emerging Indian Society*. New Delhi.
- Ottaway, A.K.C. (1966). *Education and Society*. London: Routledge and Kegan Paul.

C2 Practical

Field Study

Each student is required to visit a school observe the school functioning and prepare a report

THE LEARNER AND LEARNING PROCESS

INTRODUCTION:

Educational Psychology plays a pivotal role in understanding Children's unique character in teaching learning process. No child is alike from physical, psychological, and social point of view. So a classroom teacher must understand unique characteristics of children and the factors affecting children's learning. This course will enable the learners to understand the Children's innate potentialities and apply educational psychology in teaching learning process.

Course Objectives:

After completion of this paper, students shall be able to:

- establish relationship between education and psychology.
- understand various methods used to study individual behaviour.
- explain the application of educational psychology in teaching learning process.
- understand individual difference from intelligence, creativity, and personality point of view
- explain the concept of learning and factors affecting learning.
- reflect the contribution of various learning theories in teaching learning process.
- Explain different category of people from different Personality type and the type of adjustment.

Unit - 1 Educational Psychology

- Relationship between education and psychology
- Meaning, Nature and scope of educational psychology
- Relevance of educational psychology for teacher
- Methods of studying learner behaviour : Survey, observation case study and experimental

Unit – 2 Developmental psychology

- Concept
- Difference between growth and development
- Principles of development
- Areas of development : Physical, social, emotional and intellectual during childhood and adolescence

- Piagetian stages of cognitive development
- Unit – 3 Intelligence, creativity and individual difference**
- Meaning and nature of intelligence
 - Theories: Uni-factor, two-factor, multiple factor, Gardner’s theory of Multiple Intelligence.
 - Measurement of intelligence : individual and group tests, verbal, non-verbal and performance test.
 - Individual difference: concept, nature factors and Role of Education
 - Creativity : Meaning, Nature and Stages of creative thinking
Assessing and nurturing creativity.
- Unit – 4 Learning and motivation**
- Learning : Meaning nature and factor
 - Theories of learning with experiment and educational implications: Trial and error with focus on laws of learning classical conditioning, operant conditioning and insightful learning and constructivist approach to learning.
 - Motivation: concept, types and technique of motivation.
- Unit – 5 Personality and Mental Health**
- Personality: Meaning and nature
 - Assessment: Subjective, objective and projective techniques.
 - Mental Health: Concept, factor affecting mental health and role of teacher.
 - Mental Health of teachers
 - Adjustment mechanism

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C3 Practical

Administration of Psychological Test

Each student is to administer a psychological test (Intelligence / creativity / personality test) and interpret the scores and prepare a report.

PEDAGOGICAL SKILLS

INTRODUCTION

It is important to note that ‘education’ is not synonymous with ‘school’. It has always been the case that a range of activities that are educational in nature can, indeed should, occur outside the school, even from the earliest age given the educative role of the parents. The Delors Commission Report on education for the 21st century proposed ‘learning to live together’ as one of the four pillars of education. It advocates learning to live together by developing an understanding of other people and an appreciation of interdependence – carrying out joint projects and learning to manage conflicts in a spirit of respect for the values of pluralism, mutual understanding and peace (UNESCO, 1996). The policy context in India and around the globe is moving towards recognition of the educational value of newer form of pedagogy in the 21st Century which will enable the children to develop critical reasoning power, justify their views, independent decision making power, expression of thoughts, and empathy to others’ feelings. Recently NCERT (2005) and NCTE (2009) have changed their curriculum framework and accordingly revised their text books and teacher orientation process to empower the prospective teachers to cope up with emerging pedagogies and to promote higher order learning of the learners like, creative expression, authenticity, abstraction of ideas, and multiple thinking, etc. This paper is intended to give insight to the students on importance of pedagogy in education.

Course objectives

After completion of the course, the students shall be able to:

- explain the concept of pedagogy;
- differentiate pedagogy from other allied concepts;
- define different type of task of teaching
- establish relationship between teaching and learning;
- list out different approaches and methods of teaching;

Unit – 1 Concept of teaching – learning

- Meaning and definitions of teaching
- Characteristics and importance of teaching
- Meaning and definition of learning.
- Relationship between teaching and learning.

Unit – 2 Task of teaching

- Meaning and definition of teaching task

- Variables involved in a teaching task: Independent Dependent and intervening variable.
- Phases of teaching task : Pre-active, interactive and post – active phase.
- Level of teaching task: Memory Understanding and reflective level.
- Lesson plan design : The Herbartian steps, 5E Model ICON Design Model.

Unit – 3 Theories of teaching

- Meaning and Nature of Theory of teaching
- Types of Teaching Theories.
- Formal : Communication theory,
- Descriptive : Gagne’s hierarchical theory
- Normative: Theories of Mitra and Clarke

Unit – 4 Principles and Maxims of Teaching

- General principles teaching
- Psychological principles of teaching
- Maxims of teaching

Unit – 5 Approaches and Methods of Teaching

Inductive – Deductive, Analytic - synthetic, Problem Solving and Project method.

Shift in focus from teaching to learning – constructivist approach

Activity based and child centered approach – concept and elements.

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C-4 Practical

Preparation of Lesson Plan

Each student is to required develop five lesson plans in his/her method subject, (which he / she has to opt in 3rd Semester). The plan will be developed following Herbatian approach / 5E Model / Icon Design Model.

TECHNOLOGY AND INNOVATIONS IN EDUCATION

INTRODUCTION

Educational technology (ET) is the efficient organization of any learning system adapting or adopting methods, processes, and products to serve identified educational goals (NCERT, 2006). This involves systematic identification of the goals of education, recognition of the diversity of learners' needs, the contexts in which learning will take place, and the range of provisions needed for each of these. Our schools should move from a predetermined set of outcomes and skill sets to one that enables students to develop explanatory reasoning and other higher-order skills. Educational technology is a powerful tool towards developing such reasoning and skills. It should enable students to access sources of knowledge, interpret them and create knowledge rather than be passive users. It should enable the teachers to promote flexible models of curriculum transaction. It should encourage to use flexible curriculum content and flexible models of evaluation as well. Present paper will give an exposure to students to understand the meaning, nature and scope of educational technology. They will be sufficiently oriented about nuances of communication and their implications in educational context. They will understand the underlying principles of instructional design. Students will develop the ability to prepare lesson plans based on constructivist approach. They will be oriented about the need and importance distance education in India.

Course Objectives

On completion of this course, the students will be able to:

- understand the meaning, nature and scope of educational technology
- explain with examples various approaches to educational technology
- describe systems approach and its application in educational context
- explain the concepts, principles, modes, process and barriers of communication and their implications in educational context
- explain the instructional design and its underlying principles
- describe different models of teaching and their use in effective classroom teaching

Unit – 1 Educational Technology

Meaning, nature and scope

Approaches to Educational Technology : Hardware, software and system approach

Types of Educational Technology

Importance of Educational Technology for the teacher and the student.

Unit – 2 Communication Process

Meaning and nature

Process, components and types

Barriers of communication

Study of Classroom Communication through flander's interaction analysis.

Unit – 3 Innovations in Educational Technology

Programmed instruction : Concept Basic principles and applications

Microteaching : Concept assumptions, phases and applications.

Simulated Teaching : concept, procedure and applications

Personalized system of instruction : Concept, objectives, strategies and applications

Unit – 4 Teaching Models

Concept attainment model

Advance organizer model

Synetics model

Inductive model

Memory model

(These teaching models are to be discussed with reference to focus, syntax, social system, support system and application)

Unit – 5 Classroom instructional Aids

Projected and non projected Aids

ICT – enabled devices

Organisation of school teaching learning

Materials (TLM) Centre:	Objective
	Procedure
	Planning
	Application

Types of Materials to be procured for teaching different school subjects.

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C5 Practical

Classroom Interaction Analysis

Each student is to observe one classroom interaction preferably in a school and prepare an observation matrix and write a report.

PEDAGOGY OF SCHOOL SUBJECTS

(Each student is required to select any one of the following school subjects)

METHODS OF TEACHING ODIA

Introduction

Mother-tongue plays a significant role in the education of a child. It has a great importance in the field of education. Therefore, mother tongue must be given an important and prominent place in the school curriculum. Method of teaching Odia will enable us to preserve and enrich our language and culture forever by developing Odia language skills among learners. The learners will also be equipped with the skills to prepare Odia lesson plans by using constructivist approach.

Learning Objectives and Expected Outcomes

On completion of the course the students shall be able to:

- describe the concept of Mother Tongue;
- explain the semantic peculiarity of Odia language
- justify the importance and objectives of teaching Mother Tongue (Odia) at Secondary Stage;
- describe various pedagogical approaches of language teaching.
- prepare subject specific lesson plan for improvement of language skills.
- plan and construct test to assess language skills and content areas.

Unit –1 Conceptual

- Importance of mother tongue in the life and education of the child
- Aims and objectives of teaching mother tongue at school level.
- Place of mother tongue in the school curriculum.

Unit – 2 Methods and approaches

- Direct Method

Discussion Method

Discussion cum appreciation method

Inductive and deductive method

Unit – 3 Techniques of Teaching

Teaching of prose and poetry

Teaching of Grammar

Teaching of composition

Unit – 4 Teaching Learning Materials for teaching Odia

Teaching learning materials : Purpose, Types and Use

Language Text Book : Importance, Purpose

Language Laboratory characteristics application

Unit – 5 Development of Lesson Plan

Preparation of Lesson Plan : Herbartian approach

5E Model

Icon Design Model

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METHOD OF TEACHING ENGLISH

INTRODUCTION

Language is always regarded as the means of communication. Among all the foreign languages English is worldwide accepted as the international language. It has been the window on the world through which we peep into the world to grasp international information on trade, education, health, politics etc. In this connection we need to strengthen our efficiency in English language to present ourselves in the market of education as a skilled person. Basically, in teaching and learning, English language deals with different modes of transaction, language skills. It enables a teacher to follow variety of methods of teaching of prose & poetry, grammar; and enables to prepare the lesson plan and scheme of lessons. As a student of education, one needs to learn role and anatomy of English language, methods of teaching and developing language skills, phonetics etc which are reflected in the course contents of this paper.

Learning Objectives and Expected Outcomes

On completion of course the students shall be able to:

- State the place of English language in India
- describe English as a second language in the multi lingual syllabus India
- List out different techniques of teaching
- Discuss different type of teaching learning materials in teaching English
- Prepare lesson plan in English

Unit – 1 Teaching / Learning English as a second language

- Importance of learning English as a second language
- Aims and objectives of teaching English
- Place of English in school curriculum

Unit – 2 Methods and approaches

- Translation and Direct methods
 - Structural approach to teaching English
 - Communicative approach to learning English
- Unit – 3 Techniques of teaching**
- Teaching prose and poetry
 - Teaching grammar
 - Teaching composition
- Unit – 4 Teaching learning materials for teaching English**
- Teaching aids : purpose types and use
 - The English test book and work book
 - The language laboratory
 - Application of ICT in teaching English
- Unit – 5 Developing a lesson plan for teaching English**
- Herbartian approach
 - 5 E Model
 - ICON Design Model

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METHODS OF TEACHING MATHEMATICS

INTRODUCTION

Mathematics is closely linked not only with the daily life of the human society but also with scientific and technological world. Therefore, teaching of mathematics has formed, since the advent of education in human history, one of the three 'R's of learning. To be effective in teaching and creating a constructive learning situation, the teacher should not only have the content knowledge of mathematics, but also the pedagogical knowledge and its values in daily life of the human being. The pedagogical knowledge of mathematics will help the learner to effectively transact the mathematical concept and apply the effective strategy to assess the learner.

Course Objectives

On completion of the course the students shall be able to:

- explain the nature and scope of mathematics
- identify different types of proof in mathematics and their application to solving mathematical problems
- relate the mathematical concepts with other school subjects
- achieve the mastery over the methods, strategy and approaches for transacting the contents of mathematics
- develop mathematics achievement test and acquire of the scoring procedure
- analyze learners learning difficulties and develop remedial strategies to meet needs of slow learners and to develop enrichment materials for the advanced learners

Unit – 1 Importance and values of teaching mathematics

- Aims and objectives of teaching mathematics
- Relationship of mathematics with other school subjects.

Unit – 2 Mathematics curriculum and its organization at school stage.

- Principles of curriculum construction in Mathematics
- Principles of Arranging / organizing curriculum
- Pedagogical analysis of content in School Mathematics

Unit – 3 Methods of teaching mathematics

- Analytic and synthetic methods
- Inductive and deductive methods
- Project method

Unit – 4 Teaching learning Materials in Mathematics

- Teaching aids in mathematics : Purpose, types and use.
- Mathematics text book and workbook.
- Application of ICT in teaching mathematics.

Unit – 5 Developing lesson plan for teaching mathematics.

- Herbartian approach
- 5 E Model
- ICON Design Model.

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METHOD OF TEACHING HISTORY

INTRODUCTION

History occupies an important place in the school curriculum. Through History students will be aware about the past events and developments. History creates linkage between present and past. Through the subject our students will respect our culture, traditions and heritage. History shows path to future.

COURSE OBJECTIVES:

On completion of the course, students shall be able to:

- explain the meaning and scope of History
- relate History with other school subjects
- explain the different approaches to organization of contents in History
- achieve mastery over different methods and approaches for curriculum transaction
- List out the different types of teaching learning materials in history and explain their importance.
- Prepare Lesson plan in History

Unit – 1 History : Meaning, nature, scope, and importance

- Aims and objectives of teaching History at school level.
- Relationship of History with other school subject.

Unit – 2 The History curriculum

- Approaches to organization of contents in history curriculum: chronological, concentric, topical, regressive.
- Selection of content of History : Local, national and global perspectives.
- The History curriculum at school level in Odisha.

Unit – 3 Methods of Teaching History

- Lecture, story telling, narration-cum-discussion, dramatization, source method.
- Development of sense of time and space.

Unit – 4 Teaching learning material (TLM) in history

- Purpose, types and use
- Time line.
- ICT-enabled teaching aids in History.

Unit – 5 Preparation of Lesson Plan in History

- Herbartian Approach
- 5E Model
- ICON design model

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METHOD OF TEACHING SCIENCE

Introduction

The paper is meant for the students joining Masters Level with B.S background. The paper intends to develop an insight among the students regarding science as a distinct discipline with its characteristics and method of inquiry. The MA (Education) students pursuing science would focus both a s physical and biological science and acquaintthemselves with different methods and models of teaching. The methods, models andmaterials would be discussed with reference to the content of course prescribed forH.S.C examination in science. The students, on completion of course, are expected todevelop scientific thinking, adapt methods and materials to the needs of students andconduct assignments in line with constructivist perspective.

Learning Objectives and Expected Outcomes

On completion of the course the students shall be able to

- gain insight on the meaning nature, scope and objective of science education.
- appreciate science as a dynamic body of knowledge
- appreciate the fact that every child possesses curiosity about his natural surroundings
- identify and relate everyday experiences with learning science
- appreciate various approaches of teaching learning of science
- employ various techniques for learning science
- use different activities like demonstration ,laboratory experiences, observation, exploration for learning of science
- facilitate development of scientific attitudes in learner
- Construct appropriate assessment tools for evaluating science learning

Unit – 1 **Conceptual**

- Meaning, nature and scope of General Science
- Aims and objectives of teaching science at school level.
- Correlation of science with other school subjects.
- Importance of science in the school curriculum

Unit – 2 **Methods and approaches**

- Observation method
 - Demonstration-cum-Discussion method
 - Project method
 - Heuristic method
 - Laboratory method
- Unit – 3 Science curriculum**
- Principles of curriculum construction in science
 - Organisation of curriculum in science
 - Pedagogical analysis of contents in science
- Unit – 4 Teaching learning materials (TLM) for teaching science**
- Purpose, type and use
 - Application of ICT in teaching science
 - The science laboratory : Purpose, Importance and utility
- Unit – 5 Development of Lesson plan for teaching Science**
- Herbartian Approach
 - 5 E Model
 - ICON Design model

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METHOD OF TEACHING GEOGRAPHY

INTRODUCTION

Geography as a subject play a vital role in the school Curriculum for many people, Geography means knowing where places are and something of their characteristics is important for reading or the multiplication of tables for arithmetic, but Geography involves far more. Geography is the study of places on earth and their relationship with each other. Often the study of Geography begins with one's home community and expands as person gains greater experience. Thus Geography provides a conceptual link for children between home, school and the world beyond. Geographers study how people enteract with the environment and with each other from place to place and they classify the earth into regions. It helps us to be better citizen.

Course Objectives:

On completion of the course ,students shall be able to:

- explain the meaning and scope of Geography.
- relate Geography with other school subjects
- explain the different approaches of curriculum transaction in Geography.
- list out the different type of Teaching Learning Material (TLM) in Geography
- explain the principles of curriculum organization in Geography.
- Prepare lesson plan in teaching Geography.

Unit – 1 **Conceptual**

- Meaning, nature and scope of Geography
- Aims and objectives of teaching Geography at the school level.
- Correlation of Geography with other school subjects.
- Place of Geography in the school curriculum.

Unit – 2 **Methods and approaches**

- Direct observation and indirect observation
- Discussion method / Demonstration-cum-discussion method
- Project method
- Regional method
- Heuristic method

Unit – 3 **Geography curriculum**

- Principles of curriculum construction in Geography

- Organisation of curriculum in Geography
- Pedagogical Analysis of contents in Geography

Unit – 4 Teaching Learning Materials (TLM) for teaching

- Teaching Learning Materials : Purpose, type, & use
- Application of ICT in Teaching Geography
- Importance of Geography Room: Purpose, importance, utility
- Geography Text Book: Importance characteristics purpose and application.

Unit – 5 Development of Lesson Plan for teaching Geography

- Herbartian approach
- 5 E Model
- ICON Design Model

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C-6 Practical

School Internship

Each student will deliver 5 (five) lesson in a school in his / her method subject opted in the 3rd Semester following Herbartian approach / 5E Model / Icon Design Model.

STATISTICS IN EDUCATION

INTRODUCTION

The fundamental principles and techniques of statistics provide a firm foundation to all those who are pursuing courses in education, psychology and sociology. The role of statistics is essential for collection, analysis, grouping and interpreting the quantitative data. Research and innovations are very essential in the field of education for enrichment, progress and development of the knowledge society. A lot of surveys and research works are carried out in the field of education. Statistical methods help the researchers in carrying out these researches successfully. Therefore, the basic knowledge of statistical method is very vital for conducting any survey, research and project work. Students at undergraduate level must have to develop the basic knowledge of statistical methods used in education.

Course Objectives

After completion of this course students shall be able to:

- Describe the importance of statistics in field of education
- Convey the essential characteristics of a set of data by representing in tabular and graphical forms.
- Compute relevant measures of average and measures of variation
- Spell out the characteristics of normal probability of distribution
- Examine relationship between and among different types of variables of a research study

Unit – 1 Concept of Statistics

- Meaning, Definition and characteristics of statistics
- Kinds of statistics
- Types of Data
- Scales of Measurement
- Frequency Distribution

Unit – 2 Graphical Representation of Data

- Histogram
- Frequency Polygon
- Pie-Diagram

- Cumulative frequency graph
 - Cumulative percentage curve / Ogive
- Unit – 3 Measures of Central Tendency and Dispersion:**
- Mean
 - Median
 - Mode
 - Range
 - Average Deviation
 - Quartile Deviation
 - Standard Deviation
- Unit – 4 Measures of Correlation**
- Concept of Correlation
 - Linear and Non-linear correlation
 - Rank difference method of correlation
 - Product moment correlational method
- Unit – 5 Inferential Statistics**
- Normal Probability curve – Divergence from Normality
 - Chi-square test
 - t-test

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C-7 Practical

Statistical Analysis of Achievement Scores

Each student is required to collect the achievement scores of the students of a class at least 02(two) schools and make statistical analysis of the collected data and a report.

CURRICULUM DEVELOPMENT & EDUCATIONAL GUIDANCE

INTRODUCTION

The organization of schooling and further education has long been associated with the idea of a curriculum. But what actually is curriculum, and how might it be conceptualized? We explore theory and practice of curriculum design and its relation to informal education. Curriculum theory and practice to some must sound like a dull but required course activity. Curriculum theory at its best is a challenging and exciting intellectual puzzle. It is a vibrant field full of contradictions, challenges, uncertainties and directions. Yet it is a critical field, the outcome of which does matter. When we teach, whether from preschool to high school; from children to adult, whether educating or training, what we do must make a difference. We cannot waste our audiences time with training that doesn't help, with educating that doesn't educate, or teaching that which may be irrelevant or even wrong. If a surgeon makes a mistake, his patient dies. If teachers, educators, professors, trainers make a mistake, we do not readily see the consequences, and indeed may never see the consequences. Ask yourself: Have you hurt anyone lately by giving misinformation? Did you really make a difference in your teaching, say yesterday? How do you know? Does the curriculum that you help design and deliver really do the job it is supposed to? This course deals with the theory and practice of curriculum design. Participants will want to ask "How do I do curriculum design?" "What are the theoretic underpinnings which inform the practical problems of making curriculum?" For this course, however, the underlying theoretical foundations which inform how and what one does will bias our discussions into particular directions. Students need Guidance in different ways and in various forms to solve their problem. Educational guidance is helpful for all categories of learner. There are different services available to provide guidance to students. The present paper emphasizes the study of various concepts of guidance and counseling and its importance in teaching learning process.

Course Objectives:

On completion of this course, the students shall be able to:

- define and explain the concept of curriculum.
- list different types of curriculum with examples.
- suggest bases of curriculum such as, philosophical, psychological and sociological.
- describe different considerations for curriculum planning;
- elucidate different process of curriculum development;
- explain the role of teacher in curriculum development.
- identify major issues and trends in curriculum;

- Explain National curricular Framework (2005)
- Explain different type of Guidance & Counselling
- List out different type of counseling services and the role of teacher in organizing those services

Unit – 1 Curriculum

- Meaning and importance
- Types of Curriculum : subject centered, learner centered, experience centered curriculum, Core curriculum, Local specific curriculum.
- Components of curriculum : Objectives, Content, Learning experience & Evaluation

Unit – 2 Bases of curriculum

- Philosophical, Sociological & Psychological bases of curriculum,

Principles of curriculum construction:

- Principles of Activity centredness, Community centeredness
- Integration, Relevance, Balance, Flexibility, Variety & Plurality, Forward looking, contextuality, ICT – enabled

Unit – 3 National Curricular Framework (NCF) 2005

- Guiding Principles
- Learning & knowledge
- Curricular areas, School Stages & Assessment

Unit – 4 Guidance and counseling

- Guidance : Meaning, Nature and scope
- Types of guidance : Educational, Vocational, & Personal
- Counseling : Meaning, nature & Scope
- Different types of counseling
- Techniques of counseling

Unit – 5 Organisation of Guidance services in school

- Placement service
- Occupational information service
- Pupil inventory service
- Follow up service
- Role of teacher in organizing guidance services in school

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C-8 Practical

Text Book Review

Each student will review a school text book and write a detailed report.

CORE - 9

EDUCATIONAL ASSESSMENT & EVALUATION

INTRODUCTION

Assessment is considered to be one of the most crucial aspects of any teaching learning process, as it helps the teacher to record the growth of their students, planning for instructional strategy and most importantly helps to assess their own growth over the years. An effective method of assessment in the classroom helps to create conducive learning environment and a teacher must have to know different techniques of assessment which may improve students' learning. The key issues that involve in assessment are how to assess, when to assess, and what will be its implication on students learning. The paper outlines the above mentioned questions and different issues that involves in assessment.

Course Objectives

After completion of the course ,students shall be able to:

- describe the role of assessment in education.
- differentiate measurement, assessment and evaluation.
- establish the relationship among measurement, assessment and evaluation.
- explain different forms of assessment that aid student learning.
- use wide range of assessment tools and techniques and construct these appropriately.
- classify educational objectives in terms of specific behavioral form
- prepare a good achievement test on any school subject
- explain the characteristics of good measuring instruments.
- list out different type of assessment techniques

Unit – 1 Assessment & Evaluation in Education

- Understanding the meaning of Test, Measurement Evaluation and Assessment
- Scales of Measurement
- Types of measurement, Norm Referenced and Criterion Referenced
- Procedure of Evaluation: Placement, Formative, Diagnostic and Summative
- Concept of continuous and comprehensive evaluation (CCE).

Unit – 2 Instructional Objectives

- Taxonomy of Educational objectives with special reference to cognitive domain
- Methods of stating instructional objectives: General instructional objectives and specific learning outcomes.
- Relationship of Evaluation procedure with objectives.
- Construction of objective based and objective type test items: Essay type, Objective type: principles of construction, Advantages and limitations.

Unit – 3 Techniques of Assessment

- Observation
- Interview
- Rating scale
- Checklist
- Project
- Concept Mapping

(Above techniques are to be discussed with reference to purpose, type, procedure of administration and application)

Unit – 4 Test construction

- Teacher made test vs. standardization
- General Principles of Test construction and standardization : Planning, Preparing, Tryingout & Evaluating.

Unit – 5 Characteristics of a Good Test

Reliability	-	Concept and method
Validity	-	Concept, type and methods of validation
Objectivity	-	Concept, type and factors
Usability	-	Concept and factors

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C-9 Practical

Construction of an achievement test

Each student will construct 50 objective based objective type test items along with a blue print

INTRODUCTION TO EDUCATIONAL RESEARCH

INTRODUCTION

Research is a creative work undertaken systematically to increase the stock of knowledge, including knowledge of humanity, culture and society, and the use of this stock of knowledge to devise new applications. It is used to establish or confirm facts, reaffirm the results of previous work, solve new or existing problems, support theorems, or develop new theories. A research project may also be an expansion on past work in the field. The primary purposes of research are documentation, discovery, interpretation, or the research and development of methods and systems for the advancement of human knowledge. Approaches to research depend on epistemologies, which vary considerably both within and between humanities and sciences. In the present paper, students will be given an orientation about the nature, purpose, scope of research in education. A brief overview of different types of research in education will be given to the students. Students will be exposed to different methodology of research in education. Students can use appropriate tools and techniques for the collection of data and understand concept of sampling.

Course Objectives

On completion of this course the students shall be able to:

- Describe the nature, purpose, scope of research in education
- Identify types of research in education
- Explain the characteristic of qualitative, quantitative and mixed research
- Select and explain an appropriate method for a research study
- Select appropriate tools and techniques for the collection of data
- Describe the procedure of preparation of Research Report

Unit – 1 Introduction to Research

- Methods of Acquiring knowledge
- The Nature of science
- Meaning and characteristics of research
- Basic, Applied and action research
- The nature of educational research

Unit – 2 Types of studies in Educational Research

- Descriptive Research
- Experimental Research
- Qualitative Research

- Philosophical and Historical studies
- Unit – 3 Research Design**
- Identification of problem and formulation of Research question
 - Hypothesis : Meaning and types
 - Sampling : Concept and purpose
 - Tools of data collection : Questionnaire, Rating scale, Attitude scale and checklist
 - Techniques of data collection : Interview and observation
- Unit – 4 Data Analysis and Interpretation**
- Analysis of Quantitative Data (Descriptive statistical Measure)
 - Analysis of Quantitative Data (inferential statistics based on parametric tests)
 - Analysis of Quantitative Data (inferential statistics based on non-parametric tests)
 - Analysis of Qualitative Data
- Unit – 5 Research reports and application**
- Writing proposal / synopsis
 - Method of literature survey / Review
 - Research Reports various components or structure
 - Scheme of chapterization and Referencing

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C-10 Practical

Preparation of Project proposal

Each student will prepare a project proposal.

HISTORY OF EDUCATION IN INDIA

INTRODUCTION

In heritage of Indian education, you need to know the key words, *Heritage* and *Education*. The Indian heritage witnesses the most fabulous contributions in the field of education. It is believed that in the ancient days, education was imparted orally by the sages and the scholars and the information was passed on from one generation to the other. The Gurukuls were the traditional Hindu residential schools of learning which were typically in the teacher's house or a monastery. At the Gurukuls, the teacher imparted knowledge on various aspects of the religion, the scriptures, the philosophy, the literature, the warfare, the statecraft, the medicine astrology and the history. As the students of Education, you all need to learn the system of education starting from the ancient India till the today's globalised knowledge society through the hierarchy of time. The paper will develop a sense of appreciation and pride about the Indian Cultural and Educational heritage.

Course objectives

On completion of this course ,students shall be able to:

- narrate the concept of education in the context of Indian heritage.
- describe education in ancient India, particularly, Vedic Education,
- panishadic Education, and the Buddhist Education.
- critically examine the education system in Medieval India
- elaborate the role of teacher, school and community in preservation of
- Indian heritage and achievement of national goals.
- Evaluate the education system during British period with special emphasison the commissions and committees.
- Elaborate the status of education during post-independence period with
- special emphasis on the commissions and committees.

Unit – 1 Education in Ancient India

- Education during Vedic & Upanishadic period
- Education during Buddhist period
- Ancient seats of learning : Nalanda, Taxila, & Varanasi
- Achievements of Ancient India in different fields of knowledge and enlightenment.

Unit – 2 Education in Medieval India

- Islamic Education in India : Aims, structure, curriculum, methods and educational institutions.
- Hindu Education : Aims, structure, curriculum, methods and educational institution.
- Impact of the interaction between the two systems of education.
- Evaluation of state patronage for education during the period.

Unit – 3 Education during early British period (up to 1885)

- Educational endeavours during the early British period (up to 1835)
- Adam's Report
- Macalay's Minute and Bentinck's Resolution. 1835
- Wood's Despatch 1854
- Hunter Commission Report 1882

Unit – 4 Education during later British period (1885-1947)

- National Education Movement
- Curzon's Education Policy
- Calcutta University (Sadler) Commission report 1917
- Basic Education 1937

Unit – 5 Education in Independent India

- Report of the University Education Commission 1948
- Report of the Secondary Education Commission 1952.
- Report of the Indian Education Commission 1966
(Reports of the commissions to be studied with reference to Aims, structure & Curriculum)
- NPE 1986 and the Revised NPE 1992.
 - Essence & the Role of Education
 - National System of Education
 - Reorganisation of Education at different stages.
- Report of NKC with regard to school & higher education

REFERENCES:

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C-11 Practical

Case Study

Each student will make a case study of an educational institution and prepare report.

COMPARATIVE EDUCATION

INTRODUCTION

This paper is an introduction to a systematic study of comparative education, the analytical survey of foreign educational systems. Comparative education is relatively a young sub field in the very old discipline of pedagogy. Educational reforms are so intimately connected with politics, with problems of race, nationality, language and religious and social ideals that it becomes rather imperative to have a glimpse over the evolution of educational development of nations. This course is an attempt to combine the two purposes : an academic insight and a general introduction into comparative education as a study of contemporary solutions to various countries. It is widely recognized that this intending students of education should have some knowledge of foreign educational systems and their comparative merits. This paper also aims at the analytical study of education in all countries with a view to perfecting national systems with modification and changes, which the circumstances and local conditions would demand.

Course objectives

On completion of this course ,students shall be able to:

- Explain the scope of comparative education
- List out the factors of comparative education
- Compare the structure,curriculum and evaluation system of India with that of China, Japan,U.K and U.S.A

Unit – 1 Definition and scope of Comparative Education

- First pioneers of comparative education.
- Other subsequent comparative studies
- Approaches : statistical, psychological and historical
- National traditions and the definition of a nation.

Unit – 2 Theory and Methods of comparative Education

- Purpose of comparative education
- Area studies : Description and interpretation
- Comparative studies : Juxtaposition and comparison

Unit – 3 Factors

- The Racial factor
- The Linguistic factor
- Geographic and economic factor
- Religious factor

Unit – 4 Systems of Education

(Characteristic, structure, curriculum and evaluation system)

- U.K.
- U.S.A.

Unit – 5 Systems of Education

(Characteristic, Structure, Curriculum & Evaluation system)

- China
- Japan

REFERENCES

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Core-12 Practical

Term Paper

Each student is required to prepare a term paper on any topic of comparative education.

DISCIPLINE SPECIFIC ELECTIVE (DSE) – 1

ICT IN EDUCATION

INTRODUCTION

Information and Communication Technology (ICT) now hold great potential for increasing the access to information as well as a means of promoting learning. ICT has tremendous potentiality in transforming classrooms into more engaging, collaborative and productive learning environments in which instructions can be customized to students' specific needs, interests and learning styles. It is also redefining the way educators teach as well as the way the students learn. The present paper is based on above assumptions. The paper will orient the learners about the need and importance of ICT in education. It will describe about the importance of open source software in education particularly, in developing country like, India. Students will be given an exposure about the various approaches and stages towards the use of ICT in education. Students are expected to develop reasonably good ICT skills in terms of use of various computer software and ICT tools.

Course Objectives

On completion of this course, the students shall be able to:

- explain the concept, nature and scope of ICT in education
- differentiate Web. 1.0 and Web 2.0
- describe the importance of open source software in education
- list and explain various approaches in adoption and use of ICT in education.
- list and explain various stages of ICT usages in general and pedagogical usages in particular in education.
- describe the needed teacher competencies for ICT usage in the classroom.
- demonstrate the use of various computer software such as Word-processing , Spreadsheets, and Presentation.

Unit – 1 Information & Communication Technology : Meaning and importance

- The ICT infrastructure : computers, telecommunication network, networking.
- Introduction to internet, the World Wide Web, e-mail, and social media.
- ICT potential for improving access, quality and inclusion in education

Unit – 2 E- learning : meaning and importance

E – learning methods and media :

Virtual learning environment

Virtual universities

Massive Open Online Course(MOOCs)

Webinars

Special internet forum / discussion groups

e-tutorials

Unit – 3 ICT Resources

- Open Educational Resources (OERs) purpose and importance
- e-Libraries, e-books, e-journals, Inflibnet
- Important website for education : NCERT, UGC, NCTE, MHRD, DHE, UNESCO, UNICEF, UIS (UNESCO Institute of Statistics) etc.
- Other learning resources: Encyclopedia, dictionaries, multimedia etc.

Unit – 4 ICT in class room

- Purpose and importance of ICT in class room
- ICT enabled curriculum : enhancing ICT use in the existing curriculum
- Full integration of ICT into curriculum
- Designing / Developing ICT integrated smart classrooms: hardware and software requirements, utilization procedures
- Developing multimedia and ICT based lessons.

Unit – 5 ICT for school improvement

- ICT for competency standards and professional development of teachers
- ICT for school administration
- ICT for student support services : admission libraries, guidance, maintenance of student records etc.
- ICT enabled assessment
- ICT for open and distance learning
- ICT for life long learning

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DSE-1 Practical

Internet Search for Study Material

Each student is required to search internet, collect study materials related to any educational topic and write a report.

DISCIPLINE SPECIFIC ELECTIVE (DSE) – 2

SPECIAL EDUCATION

INTRODUCTION

Nature and nurture have a substantial role to play in growth and development of human beings. Nature and nurture apart, human organism is susceptible to damage through disease and injury. Disease, accident, genetic causes or any other reason, which inflicts the persons, causing loss or want of abilities, may not be equal in all cases. Accordingly the degree of abilities or lack of abilities varies. Deviations from average of physical and mental ability of human beings beyond limits resulting in substantial and appreciable difficulties in performing a function or in social adjustment process be perceived as disability. Some of the practitioners understand rehabilitation as a graded sequential individualized approach in which charity has given way to right so far as the empowerment of persons with disability is concerned. Education is the means to empower them. It has become a fundamental right of every child. The evolution of education of persons with disability has a history with the starting point in the 10th century in Europe and America. It has been realized that education of the persons with disability is very crucial for the development and independent living as far as possible. Education of the persons with disability has evolved as an essential responsibility of the government not only because of constitutional provisions but also with the UN mandates.

Course Objectives

On completion of this course, students shall be able to

- know about the concept, nature, objectives, types and historical perspective of special education
- explain the innovations and issues of special education
- elaborate the policies and programmes of special education
- able to identify different type of special category children
- understand various educational interventions meant for special children
- explain the role of resource teacher and special teacher

Unit – 1 Conceptual

- Exceptional children : Concept and types
- Inter relationship between impairment, disability and handicap.

- Historical development of special education in India.
- Issues and innovations in Education of Exceptional children: Mainstreaming, Labeling and De-institutionalisation.

Unit – 2 Policies and programmes in the Education of special children

- Indian Education Commission (1964-66)
- National Policy on Education (1986)
- Report of Rama Murty Committee (1991)
- Programme of Action (1992)
- UN Conventions in Human Rights (1994)

Unit – 3 Education of the gifted and creative children

- Concept
- Characteristics
- Identification
- Educational provisions
- Role of Teacher

Unit – 4 Education of the Educable Mentally Retarded

- Concept
- Characteristics
- Methods of identification
- Educational Provision
- Role of Teacher

Unit – 5 Education of Children with Learning Disability

- Concept
- Characteristics
- Methods of identification
- Role of Special / Resource Teacher

REFERENCES:

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DSE-2 Practical

Case study of Special Child

Each student is required to conduct a case study of a special child and write a report.

CORE – 13

EDUCATIONAL PLANNING, ADMINISTRATION AND MANAGEMENT

INTRODUCTION

Management is a universal phenomenon. Knowledge of management is indispensable for successful accomplishment of goals of an organization. Knowledge of management is required to ensure efficiency and better output of an organization and its functioning. As we know education plays a significant role in the socioeconomic development of the country, proper management of educational institutions requires managerial skills among all the people entrusted with the responsibilities of education. The paper deals with various concepts, principles and functions of educational management. It emphasizes on educational planning, finance and school management and focuses on trends in educational management. The paper will develop an interest towards the educational management.

Course Objectives

On completion of the course the students shall be able to:

- explain the concept, nature and scope of educational management
- describe the functions of educational management and administration
- list down various types of educational administration
- elaborate the principles of educational management
- elaborate the steps in planning
- explain different types of administration
- elaborate functions of state level educational bodies
- describe the sources of financing in education

Unit – 1 Educational Planning

- Meaning, Nature, Objective and scope
- Approaches: Social Demand, Cost benefit analysis and Manpower requirement
- Steps in Educational Planning : Diagnosis of Educational Development, Plan formulation, Plan implementation, Monitoring and Evaluation.
- School Development Plan : Concept and Process

Unit – 2 Educational Administration

- Concept, Objectives and scope of educational administration
- Types : Totalitarian and Democratic
- Basic Functions of Administration : Planning, Organizing, Directing and Controlling.

Unit – 3 Educational administration in the state

- Administration of Education in Odisha: Structure and Functions.
- Functions of state level educational bodies: SCERT, BSE & OPEPA

Unit – 4 Educational Management

- Meaning, Nature and Scope
- Types: Centralized vs Decentralised Authoritarian vs Democratic
- Functions of Educational Management

Unit – 5 Economics of Education

- Costs in Education : The current cost and capital cost of education
 - The Direct and Indirect cost of education.
 - The private cost, social cost and unit cost of education.
- Educational Expenditure as investment
- Financing of Education :
 - Agencies of financing Education
 - Financing of education by parents
 - Financing of education by Employers.

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C-13 Practical

Visit to Administrative Unit

A visit to educational administrative unit such as DHE, SCERT, RDE, CHSE, University OPEPA interaction with administrator(s) and preparation of a report.

CORE – 14

CONTEMPORARY CONCERNS IN INDIAN EDUCATION

INTRODUCTION:

To remain current, to widen understanding levels holistically, and to thoroughly prepare learner for the world in which they will ultimately live and work, they must continually examine current practices in search of better solutions and needed change. The intent of this course is to familiarize learner to historical roots of Universalisation of Elementary education and initiative so far taken by Govt. to materialize this reality. Further, paper generally discusses the effort of Govt. to extend the provision of free and compulsory education at secondary level and developing a sound approach to dealing with the rapid pace of reform and change from the teacher's perspective. Emphasis is placed on examining over various emerging issues, problems and strategies of current trends relating to Peace education, Human Rights education, value education, environmental education, Life skills education

Course Objectives

On completion of the course the students shall be able to:

- explain the concept of universalization of elementary education
- describe universalization of elementary education and secondary education implementation strategies
- describe present position of secondary education
- Explain the challenges of secondary education
- explain present scenario of higher education and agencies for improvement
- explain the concept of value education, environmental education and Life skills education

Unit – 1 Elementary Education

- Universalisation of elementary education.
- Right of Children to Free and Compulsory Education (RCFCE) Act 2009.
- Quality concerns in Elementary education.
- Sarva Siksha Abhiyan (SSA) & District Primary Education Project (DPEP)

Unit – 2 Secondary Education

- Present position of secondary education in India
- Challenges and problems of secondary education.
- Vocationalisation of secondary education

- Rashtriya Madhyamik Sikshya Abhiyan (RMSA)
- Unit – 3 Higher Education**
- Present position of Higher Education in India
 - Challenges in higher education : expansion, quality & inclusiveness.
 - RUSA
- Unit – 4 Social Commitments in Education**
- Gender issues in Indian education
 - Equalisation of educational opportunity
 - Constitutional provisions for education
 - Education for national integration and international understanding.
- Unit – 5 Emerging concerns**
- Environmental Education
 - Value education, Peace Education and Human Rights Education
 - Adolescent Education
 - Life skills ducation

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C-14 Practical

Educational Programme Review

Each student is required to collect the perception of students / teachers / community members about the relevance and implementation issues in respect of an educational initiative / programme and prepare a report.

DISPLINE SPECIFIC ELECTIVE (DSE) – 3

DISTANCE EDUCATION

INTRODUCTION:

Distance education was an educational mode supplementary, Complementary and alternative to conventional/traditional system of education depending on the situation it was practiced. Today it has evolved into an independent system of education, hanks to the growth of communication Technologies and cognitive sciences which are flexible enough to use the technologies for pedagogic purposes. It is an educational innovation to meet the ever increasing and diversified educational needs and demands of the society which are sequal to changing social, economic and other conditions on one hand and technological developments on the other. Distance education is innovative in the sense that it sets up its own norms, approaches and methodology which are different from the face-to-face system of education. It can be non-conformist and non-traditional in nature. It makes adequate provision to impart instruction to learners at a distance by incorporating a variety of means for didactic interaction between its students and the teaches and / or the institution. This paper is an attempt to provide the students of education honours some of the fundamental concepts under the purview of distance education

Course Objectives

On completion of this course, students shall be able to

- explain the importance of Distance education in the present context
- describe the historical perspective of distance education
- elaborate the curricular process of Distance education
- understand various modes of student support services
- develop clear idea about different type of Distance education institutions

Unit – 1 Concept of Distance Education

- Aims and objectives of Distance Education
- Purposes and functions served by distance education.
- Theories of Distance Education
- Distance education in India : Historical perspective

Unit – 2 Curricular process in Distance Education

- Preparing and supplying study material

- ICT support for distance learning
- Personal contact programme in distance learning
- Assignments and projects in distance learning

Unit – 3 Development of distance learning material /self – instructional material (SIM)

- Planning for self instructional material: Importance objectives and learning outcomes
- Preparation of the material
- Context, language and formal editing of self – instructional material
- Self –assessment for self – instructional material

Unit – 4 Distance learners

- Profit of distance learners
- Needs of distance learner
- Problems of distance learner
- Steps for facilitating distance learner
- Student support services

Unit – 5 Open and distance learning institutions:

- Open Universities and open schools : Meaning and Nature
- IGNOU and NIOS
- Other forms of distance education – correspondence courses, Radio TV education
- Virtual universities and Massive Open online courses.

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DSE-3 Practical

Preparation of Self instructional materials (SIM)

Each student is required to prepare a self instructional material (SIM) on any topic.

OR

Case study of Distance education study centre

Each student is required to conduct case study of distance education study centre (IGNOU, NIOS, SOU, etc.) and write a report.

Distribution of Marks

Record - 20 marks

Viva voce - 05 marks

Total = 25 marks

DSE – 4 PROJECT

Each student is required to prepare a project on educational problem / issue and submit a report. The project shall be evaluated by an external and internal examination.

GENERIC ELECTIVE (G.E.) – 1

VISION OF EDUCATION IN INDIA : ISSUES AND CONCERNS

INTRODUCTION

Education is essentially a normative endeavour, hence is intentional. It intends, rather deliberately, to socialize children into a value frame or normative structure. That is why history reveals that every education system, at different historical periods, had been guided by certain value concerns. In contemporary times, the education system in India derives its values from the Constitution of India. While socializing children education has to negotiate within the frame of Constitutional values. Indian Constitution envisioned a humane society based on freedom, equality and justice, and this led to evolving many institutions to realize the vision. In this regard, education has been considered as an agency of social transformation and classroom as the shaper of the envisioned destiny. Since teachers ought to play crucial role in realizing the vision, they are to be informed the Constitutional vision so as to develop normative perspectives regarding education and thereby emerging concerns and issues. This normative perspective a teacher holds in turn guides his/her actions and acquires a meaning to action.

Education being an operational area, every citizen perceives several issues related to it through personal experience. The student-teachers need to understand the main issues that touch their functioning as also situate themselves in context. Such an understanding on at least a few issues and concerns will equip student teachers to be ready for dealing with other issues and concerns in the field. This is very relevant as it may not be possible to bring under scrutiny all issues and concerns.

Since, concerns and issues cannot and should not be 'informed' like 'ready to cook facts', the course is designed in such a fashion that prospective teachers would be encouraged to come to terms with concerns and issues that would emerge out of their reasoned engagement with contemporary educational reality in the light of professed humanistic values,

Course Objectives

On completion of the course the students shall be able to:

- explain normative vision of Indian Society
- explain the view points of Indian thinkers on Education

- elaborate the contemporary issues like universalisation of school education, RTE act -2009 and Rashtriya Madhyamika Siksha Abhiyan
- identify importance of common school system

Unit – 1 Normative vision of Indian Education

- Normative orientation of Indian Education: A historical enquiry.
- Constitutional provisions on education that reflect national ideas : Democracy, Equity, Liberty, Secularism and social justice
- India as an evolving nation state : Vision, nature and salient feature – Democratic and secular polity, federal structure : Implications for educational system .
- Aims and purposes of education drawn from the normative vision.

Unit – 2 Vision of Indian Education : Four Indian thinkers

- An overview of salient features of the “Philosophy and Practice” of education advocated by these thinkers.
 - Rabindranath Tagore : Liberationist pedagogy
 - M.K. Gandhi : Basic Education
 - Jiddu Krishnamurti : Education for Individual and social Transformation
 - Sir Aurobindo : integral Education

Unit – 3 Concern for Equality in Education: Concerns and Issues

- Universalisation of school education
 - (i) Issues of
 - (a) Universal enrollment
 - (b) Universal Retention
 - (c) Universal success
 - (ii) Issues of quality and equity

Unit – 4 Concern for Equality in Education

- Equality of Educational opportunity
- Prevailing nature and forms of inequality including Dominant and Minor groups and the related issues.
- Inequality in schooling : Public-private schools, Rural-urban schools, single teachers schools and many other forms of inequalities in school systems and the process leading to disparity.
- Idea of common school system

Unit – 5 Education and Development – an interface

- Education for National Development : Education Commission (1964-66)
- Emerging trends in the interface between:
 - Political process and education
 - Economic Development and Education
 - Social cultural – changes in Education

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GE-1 Practical

Term paper

Each student is required to prepare a term paper on the educational ideas of any Indian Thinkers or on any contemporary issues on Education.

ASSESSMENT AND EVALUATION TECHNIQUES

INTRODUCTION

Assessment is considered to be one of the most crucial aspects of any teaching learning process, as it helps the teacher to record the growth of their students, planning for instructional strategy and most importantly helps to assess their own growth over the years. An effective method of assessment in the classroom helps to create conducive learning environment and a teacher must have to know different techniques of assessment which may improve students' learning. The key issues that involve in assessment are how to assess, when to assess, and what will be its implication on students learning. The paper outlines the above mentioned questions and different issues that involves in assessment.

Course Objectives

After completion of the course the students shall be able to:

- describe the role of assessment in education.
- differentiate measurement, assessment and evaluation.
- establish the relationship among measurement, assessment and evaluation.
- explain different forms of assessment that aid student learning.
- use wide range of assessment tools and techniques and construct these appropriately.
- classify educational objectives in terms of specific behavioral form
- prepare a good achievement test on any school subject

Unit – 1 The Measurement, Evaluation and Assessment Process

- Educational Testing and Assessment : Context, Issues and Trends.
- The Role of Measurement, Evaluation and Assessment in Teaching.
- Instructional Goals and objectives : Foundation for Assessment.
- Types of Assessment: Placement, Formative, Diagnostic and Summative.

Unit – 2 Classroom tests and Assessment

- Planning classroom tests and assessment

- Constructing objective test items: simple forms and multiple choice forms.
- Constructing Essay type questions: Form and uses; suggestions for scoring essay questions.

Unit – 3 Alternative Techniques of Assessment

- Observational Technique: Observation schedule, Anecdotal Records, Rating scales, Checklists
- Self – reporting Techniques: Interview, portfolio, questionnaire and inventories.
- Peer – appraisal: “Guess who” technique, sociometric technique.

Unit – 4 Processing and Reporting in Assessment

- Processing qualitative evaluation data: Content Analysis
- Considerations for reporting the performance
- Scheme of reporting: criterion – reformed and non reformed interpretation.
- Combining mark or grades over different subjects and reporting results of assessment to different users.

Unit – 5 Contemporary Trends in Assessment

- Marks vs Grading system
- Credit system
- Concept of Continuous and Comprehensive Evaluation (CCE)
- Computers in student evaluation

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- Linn, R.L. & Gronlund, N.E. (2000). Measurement and Assessment in Teaching London: Merrill Prentice Hall.

GE-2 Practical

Achievement Test Construction

Each student is required to construct 50 objective based objective type test items along with a blue print.

CONTEMPORARY PEDAGOGY

INTRODUCTION

It is important to note that 'education' is not synonymous with 'school'. It has always been the case that a range of activities that are educational in nature can, indeed should, occur outside the school, even from the earliest age given the educative role of the parents. The Delors Commission Report on education for the 21st century proposed 'learning to live together' as one of the four pillars of education. It advocates learning to live together by developing an understanding of other people and an appreciation of interdependence – carrying out joint projects and learning to manage conflicts in a spirit of respect for the values of pluralism, mutual understanding and peace (UNESCO, 1996). The policy context in India and around the globe is moving towards recognition of the educational value of newer form of pedagogy in the 21st Century which will enable the children to develop critical reasoning power, justify their views, independent decision making power, expression of thoughts, and empathy to others' feelings. Recently NCERT (2005) and NCTE (2009) have changed their curriculum framework and accordingly revised their text books and teacher orientation process to empower the prospective teachers to cope up with emerging pedagogies and to promote higher order learning of the learners like, creative expression, authenticity, abstraction of ideas, and multiple thinking, etc. This paper is intended to give insight to the students on importance of pedagogy in education.

Course objectives

After completion of the course, the students shall be able to:

- explain the concept of pedagogy;
- differentiate pedagogy from other allied concepts;

Unit – 1 Meaning process and Aims of Education

- Concept of Teaching and learning
- Nature and characteristics of teaching
- Meaning and characteristics of learning

Unit – 2 The task of teaching

- Meaning and definition of teaching task
- Variables involved in teaching task
- Phases of teaching : Pre-active, interactive and post – active
- Levels of teaching : Memory, understanding and reflective
- Lesson plan design : Herbartian steps, ICON Model and 5E Model

Unit – 3 Principles and maxims of teaching

- General principles of teaching
- Psychological principles of teaching
- Maxims of teaching

Unit – 4 Approaches and methods of teaching

- Inductive –Deductive
- Analytic and synthetic
- Problems solving and project method
- Shift in focus from teaching to learning – The constructivist approach.
- Activity based and child centered approach to teaching .

Unit – 5 Technology in teaching

- ICT tools and techniques facilitating teaching : www, internet applications in teaching and learning.
- Teaching Learning Material (TLM) : purpose, types and use
- Role of mass media in teaching learning.

GE-3 Practical

Preparation of Lesson Plan

Each student is required to develop 05(Five) lesson plans on any school subject (Odia, English, History, Geography, Math, General Science) based on Herbartian approach / SE Model / Icon design Model.

REFERENCES

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EARLY CHILDHOOD CARE AND EDUCATION

INTRODUCTION

This paper will help the students to develop a sensitivity towards the needs and rights of children and will provide an understanding of their development. Students will also acquire skills that will help them to interact with children. Besides orienting the students towards a vocation in childcare, this course will orient the students towards organizing services for children. These services are crèches / day care centres and pre-schools for children up to six years of age. Students will enlighten themselves regarding how the pre-school education prepares the child for schooling which lies ahead. Pre-schools in our country are called by various names: anganwadi, balwadi, nursery school, kindergarden and play center.

Course Objectives

On completion of this course, students shall be able to:

- understand the importance of early childhood stage as the formative stage of growth and development
- explain the basic principles of curriculum formulation and their respective growth
- list out the activities for the different type of developmental needs of early child
- elaborate the learning materials needed for their appropriate developmental stage.

Unit – 1 Introduction to childcare and development

- Basic concepts in child development : Scope, growth and development, stages of development, areas of development, significance of study of child development.
- Principles of growth and development.

Unit – 2 Curriculum for ECCE

- Basic principles of the curricular framework
- Areas: cognitive development, language development, social and emotional development, exploring the environment, habit formation.

Unit – 3 Activities for physical development, movement and mobility.

- Activities for cognitive development

- Activities for language development
- Activities for social and emotional development
- Activities for exploring the environment
- Creative and aesthetic activities.

Unit – 4 Learning materials for ECCE

- Principles of selection of materials
- Type of materials
- Specific materials for different activities
- Preparation of teacher made materials
- Concept of toy bank

Unit – 5 Statutory framework for ECCE

- Constitutional framework
- National ECCE Policy, 2013
- Rights of the children

REFERENCES:

- Aggarawal J.C. and Gupta S. (2013) Early Childhood care and Education New Delhi: Shipra Publications
- Kaul Veneta (2009) Early child hood Education Programme, New Delhi, NCERT
- Soni Romila, Kapoor Rajendra & Vashishitha Krushna Kanta (2008) Early childhood Education an Introduction, New Delhi, NCERT
- NCF Curriculum Framework-2005

GE-4 Practical

Observation of ECCE Centre

Each student is required to observe an ECCE centre and prepare a report.

Pass Course For Education Under C.B.C.S Pattern

Following eight (08) Core papers as listed below may be considered as subject for Education (pass)

Core-1-Basics in Education

Core-2-Education & Society

Core-3-Learner&learning

Core-4-Pedagogical skills

Core-6-Pedagogy of school subjects

Core-11-History of Indian Education

Core-13-Educational Administration & Management

Core-14-Contemporary concerns in Education

BA (Education) Regular/Pass

Discipline Specific Core(DSC)

DSC-1-Basics in Education

BASICS IN EDUCATION

INTRODUCTION :

The Philosophical foundation is a unique educational charity whose aim is to bring philosophy to schools and the wider community. Through doing philosophy in the classroom the primary concern is to improve the educational practices and provide opportunities for the disadvantaged. Philosophical enquiry develops speaking and listening skills vital for literacy and emotional development, helps children who find it difficult to access other classes, and encourages critical and creative thinking essential in the 21st Century. And it will prepare students to apply knowledge, sensibility, skills and dispositions of philosophical inquiry, analysis, and interpretation to educational practices.

Course Objectives

- after completion of the paper, students shall be able to:
- explain the concept of education and its relationship with philosophy
- list areas of philosophy and narrate their educational implications.
- describe the contribution of Philosophy to the field of education.
- appreciate the contribution of various Indian Schools of Philosophy to the field of education.
- evaluate the impact of Western Philosophies on Indian Education.
- narrate the contribution of the Great Indian Thinkers.

Unit – 1 Bases of Education

- Meaning, Nature and purpose of Education
- Aims of Education: Education for individual development and education for social efficiency
- Functions of education

Unit – 2 Philosophical foundations of education

- Concept of Philosophy
- Inter dependence of philosophy and education

- Branches of philosophy and their educational implications – Metaphysics, Epistemology and Axiology.

Unit – 3 Reflections of Indian schools of Philosophy on education

- Common characteristics of Indian Philosophy
- Sankhya and Vedanta as Philosophical systems
- Educational implications of Sankhya and Vedanta.

Unit – 4 - Western Schools of Philosophy and their educational implication.

- Idealism
- Naturalism
- Pragmatism

Unit – 5 Doctrines of Great Educators of East and West and their influence on the practices of school education with special reference to Aims and ideals of Education, Curriculum, method of teaching and the role of teacher.

- Gandhi
- Sri Aurobindo
- Rousseau
- Dewey

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C1 Practical

Book Review

Each Student is required to review a Book / Journal / Educational Article and Write a report.

DSC -2-Education & Society

EDUCATION AND SOCIETY

INTRODUCTION

Education is a sub-system of the society. The aims of education are determined by the aims of the society. The relationships between the two concepts i.e., education and society are so strong that it is not possible to separate them because what happens to one affects the other. It is impossible to think purposefully about many contemporary problems and issues of education without thinking about the society. Educational institutions are micro-societies, which reflect the entire society. The education system in any given society prepares the child for future life and instils in him those skills that will enable him to live a useful life and contribute to the development of the society. Education as a social phenomenon does not take place in a vacuum or isolation; it takes place in the society. This paper will deal with the functioning of education vis-a-vis the society. Education as a sub-system of society and how other sub-systems affect education will be discussed. Various agencies which are involved towards promotion of education will be discussed at length. Special emphasis is placed on issues relating to equality of educational opportunity with specific reference to the Scheduled Castes/Tribes and women. Special attention is also given how education plays an important role towards social change, national integration and international understanding in a diverse social context.

Course Objectives

After completion of this paper, students shall be able to:

- justify education as a social process and explain its function.
- describe the aims of education from sociological perspective.
- list various agencies of education and their function.
- justify education as a sub-system of society and how other sub-systems affect education;
- appreciate the importance of education for social change.

Unit – 1 Education and society

- Society : Meaning and characteristics

- Types of society : Agricultural, Industrial, rural and urban
- Interrelationship between education and society
- Views of Indian thinkers on Education and Society : Radhakrishnan and Sri Aurobindo on Education
- Views of Western Thinkers on Education and Society: Dewey and Illich

Unit – 2 Education and culture

- Meaning and concept of culture
- Characteristics and types of culture
- Cultural lag and acculturation
- Cultural dimensions of Education
- Inter relationship between education, custom and value system.

Unit – 3 Education, Social process and Institution

- Education and socialization
- Education and social change
- Education and social mobility
- Role of Education for the development of the marginalised
- Education and Affirmative action

Unit – 4 Education and Globalisation

- Education, Growth and Development
- Globalisation and liberalization
- Educational system in Europe
- Educational system in SAARC countries
- Education in Global context

Unit – 5 Education and state

- Concept of Democracy
- Education in totalitarian and welfare state
- Interrelationship of state and education
- Role of education in Nation building
- State Control of Education and Autonomy in Education.

REFERENCES

- Abraham, M.F. (2008). *Contemporary Sociology*. New Delhi: Oxford University Press.

- Anand, C.L. et.al. (Ed.) (1983). *Teacher and Education in Emerging in Indian Society*. New Delhi: NCERT.
- Dewey, John (1973). *The School and Society*. Chicago: University of Chicago Press.
- Mathur, S.S. (1966). *A Sociological Approach to Indian Education*. Vinod PustakMandir, Agra.
- Nayak, B.K. *Text Book of Foundation of Education*. Cuttack: Kitab Mahal.
- NCERT (1983). *Teacher and Education in Emerging Indian Society*. New Delhi.
- Ottaway, A.K.C. (1966). *Education and Society*. London: Routledge and Kegan Paul.

C2 Practical

Field Study

Each student is required to visit a school observe the school functioning and prepare a report

DSC -3-Learner&learning

THE LEARNER AND LEARNING PROCESS

INTRODUCTION:

Educational Psychology plays a pivotal role in understanding Childs' unique character in teaching learning process. No child is alike from physical, psychological, and social point of view. So a classroom teacher must understand unique characteristics of children and the factors affecting children's learning. This course will enable the learners to understand the Childs' innate potentialities and apply educational psychology in teaching learning process.

Course Objectives:

After completion of this paper, students shall be able to:

- establish relationship between education and psychology.
- understand various methods used to study individual behaviour.
- explain the application of educational psychology in teaching learning process.
- understand individual difference from intelligence, creativity, and personality point of view
- explain the concept of learning and factors affecting learning.
- reflect the contribution of various learning theories in teaching learning process.
- Explain different category of people from different Personality type and the type of adjustment.

Unit - 1 Educational Psychology

- Relationship between education and psychology
- Meaning, Nature and scope of educational psychology
- Relevance of educational psychology for teacher
- Methods of studying learner behaviour : Survey, observation case study and experimental

Unit – 2 Developmental psychology

- Concept
- Difference between growth and development
- Principles of development
- Areas of development : Physical, social, emotional and intellectual during childhood and adolescence
- Piagetian stages of cognitive development

Unit – 3 Intelligence, creativity and individual difference

- Meaning and nature of intelligence
- Theories: Uni-factor, two-factor, multiple factor, Gardner's theory of Multiple Intelligence.
- Measurement of intelligence : individual and group tests, verbal, non-verbal and performance test.
- Individual difference: concept, nature factors and Role of Education
- Creativity : Meaning, Nature and Stages of creative thinking
Assessing and nurturing creativity.

Unit – 4 Learning and motivation

- Learning : Meaning nature and factor
- Theories of learning with experiment and educational implications: Trial and error with focus on laws of learning classical conditioning, operant conditioning and insightful learning and constructivist approach to learning.
- Motivation: concept, types and technique of motivation.

Unit – 5 Personality and Mental Health

- Personality: Meaning and nature
- Assessment: Subjective, objective and projective techniques.
- Mental Health: Concept, factor affecting mental health and role of teacher.
- Mental Health of teachers
- Adjustment mechanism

REFERNECES

- Aggarwal J.C (2010) Essentials of Educational Psychology, New Delhi, Vikas Publishing House Pvt. Ltd.
- Sharma R.N. (2010) Educational Psychology, Delhi, Surjeet Publications.
- Mangal S.K. (2008) Essentials of Educational Psychology, New Delhi, Prentice Hall of India Private Limited.

- Kuppuswamy B (2013) Advanced Educational Psychology, New Delhi, Sterling Publishers Private Limited.
- Mathur S.S. (1962) Educational Psychology, Agra, Vinod Pustak Mandir.
- Kulshreshtha S.P. (2013) Educational Psychology, Meerut, R. Lall Book Depot.
- Bhatia & Bhatia (2004) A Text Book of Educational Psychology, Delhi, Doaba House Book Sellers & Publishers.
- Pandey Ram Shakal (2006), Advanced Educational Psychology, Meerut, R. Lall Book Depot.
- Bigge, M.L. *Psychological Foundations of Education*. Harper and Row, New York.
- Chauhan, S.S.(1998). *Advanced Educational Psychology*. Vikash Publishing House, New Delhi.
- Choube, S. P. & Choube. (1996). Educational Psychology and Experiments. Himalay Publishing House New Delhi.
- Mangal S.K. (1997). *Advanced Educational Psychology*. Presentice Hall of India, New Delhi.
- Woolfolk, A.E. (2011). *Educational Psychology*. Derling Kinderslay (India) Pvt. Ltd.
- Cronbach, L.J. Essential of Psychological Testing. Harper Collins Publisher, New York.
- Dash, U.N & Mohanty, M.M (1990). Schooling and Cognition. Harper Collins Publisher, New York.
- Maslow, A.H. (1970). Motivation and Personality (2nd edition). New York: Harper & Row.

C3 Practical

Administration of Psychological Test

Each student is to administer a psychological test (Intelligence / creativity / personality test) and interpret the scores and prepare a report.

DSC -4-Pedagogical skills

PEDAGOGICAL SKILLS

INTRODUCTION

It is important to note that ‘education’ is not synonymous with ‘school’. It has always been the case that a range of activities that are educational in nature can, indeed should, occur outside the school, even from the earliest age given the educative role of the parents. The Delors Commission Report on education for the 21st century proposed ‘learning to live together’ as one of the four pillars of education. It advocates learning to live together by developing an understanding of other people and an appreciation of interdependence – carrying out joint projects and learning to manage conflicts in a spirit of respect for the values of pluralism, mutual understanding and peace (UNESCO, 1996). The policy context in India and around the globe is moving towards recognition of the educational value of newer form of pedagogy in the 21st Century which will enable the children to develop critical reasoning power, justify their views, independent decision making power, expression of thoughts, and empathy to others’ feelings. Recently NCERT (2005) and NCTE (2009) have changed their curriculum framework and accordingly revised their text books and teacher orientation process to empower the prospective teachers to cope up with emerging pedagogies and to promote higher order learning of the learners like, creative expression, authenticity, abstraction of ideas, and multiple thinking, etc. This paper is intended to give insight to the students on importance of pedagogy in education.

Course objectives

After completion of the course, the students shall be able to:

- explain the concept of pedagogy;
- differentiate pedagogy from other allied concepts;
- define different type of task of teaching
- establish relationship between teaching and learning;
- list out different approaches and methods of teaching;

Unit – 1 Concept of teaching – learning

- Meaning and definitions of teaching
- Characteristics and importance of teaching
- Meaning and definition of learning.
- Relationship between teaching and learning.

Unit – 2 Task of teaching

- Meaning and definition of teaching task
- Variables involved in a teaching task: Independent Dependent and intervening variable.
- Phases of teaching task : Pre-active, interactive and post – active phase.
- Level of teaching task: Memory Understanding and reflective level.
- Lesson plan design : The Herbartian steps, 5E Model ICON Design Model.

Unit – 3 Theories of teaching

- Meaning and Nature of Theory of teaching
- Types of Teaching Theories.
- Formal : Communication theory,
- Descriptive : Gagne’s hierarchical theory
- Normative: Theories of Mitra and Clarke

Unit – 4 Principles and Maxims of Teaching

- General principles teaching
- Psychological principles of teaching
- Maxims of teaching

Unit – 5 Approaches and Methods of Teaching

Inductive – Deductive, Analytic - synthetic, Problem Solving and Project method.

Shift in focus from teaching to learning – constructivist approach

Activity based and child centered approach – concept and elements.

REFERENCES

- Aggarawal, J.C. (1995) Essential of Educational Technology, Vikas Publishing House New Delhi.
- Chauhan S.S. (1995) Innovation of Teaching Learning Process, Vikas Publishing House, New Delhi.
- Kochar, S.K. (2011) Methods and Techniques of Teaching, Sterling Publisher Pvt. Ltd., New Delhi.
- Mangal S.K. and Mangal, UMA (2010), Essentials of Educational Technology, New Delhi, Asok Ghosh PHI Learning Pvt. Ltd.
- Mangal, S.K. (1988) Fundamentals of Educational Technology, Educational Publishers Ludhiana.

- Nageswara Rao, S., Sreedhar, P & Bhaskar Rao (2007) Methods and Techniques of teaching, Sonali Publications, New Delhi
- Oliver, R.A. (1963) effective teaching, J.M. Dent & Sons, Toronto
- Pathak, R.P. & Chaudhary J (2012) Educational Technology, Pearson, New Delhi.
- Rayment, T (1946) Modern Education - - It's Aims and Methods, Longmans, Green Co. London.
- Ryburn, W.M. (1955) Principles of Teaching, Geoffrey Cembridge, OUP
- Sampath, K, Pannir Salvam. A., & Santhanam, S. (1981) introduction to Educational Technology, sterling publishers, New Delhi.
- Sharma, R.A. (1986) Technology of Teaching, International Publishing House, Meerut.

C-4 Practical

Preparation of Lesson Plan

Each student is to required develop five lesson plans in his/her method subject, (which he / she has to opt in 3rd Semester). The plan will be developed following Herbatian approach / 5E Model / Icon Design Model

..The Generic Elective and subject specific elective are same as Honours.

**B.A. (Hons.) History Syllabus
Choice Based Credit System (CBCS)
2016-17**



**P.G. DEPARTMENT OF HISTORY
UTKAL UNIVERSITY, VANI VIHAR
BHUBANESWAR-751004**

UTKAL UNIVERSITY
CBCS SYLLABUS
B.A.(HONS) HISTORY-2016-17
SEMESTER-I

Sl.	PAPERS	CREDIT	MARKS
1-	C.C.I-History of India-I	6	100
2-	C.C.II- Social Formations and Cultural Patterns of the Ancient World	6	100
3-	AECC-I- Environmental Science 2	2	50
4-	GE-I- For non-History students: Minor-1	6	100

SEMESTER-II

Sl.	PAPERS	CREDIT	MARKS
5-	C.C.III- History of India-II	6	100
6-	C.C.IV- Social Formations and Cultural Patterns of the Medieval World	6	100
7-	AECC-II- English / MIL	2	50
8-	GE-II- For non-History students: Minor-2	6	100

SEMESTER-III

Sl.	PAPERS	CREDIT	MARKS
9-	C.C.V- History of India-III(c.750-1206)	6	100
10-	C.C.VI- Rise of Modern West-I	6	100
11-	C.C.VII- History of India-IV(c.1206-1526)	6	100
12-	SEC-I- Understanding Heritage	2	50
13-	GE-III- For non-History students: Minor-1	6	100

SEMESTER-IV

Sl.	PAPERS	CREDIT	MARKS
14-	C.C.VIII-Rise of Modern West-II	6	100
15-	C.C.IX- History of India-V(c.1526-1750)	6	100
16-	C.C.X- Historical Theories and Methods	6	100
17-	SEC-II- Understanding Popular Culture	2	50
18-	GE-IV- For non-History students: Minor-2	6	100

SEMESTER-V

Sl.	PAPERS	CREDIT	MARKS
19-	C.C.XI- History of Modern Europe-I(c.1780-1939)	6	100
20-	C.C.XII-History of India-VII(1750-1857)	6	100
21-	DSE-I- History of United States of America-I(C.1776-1945)	6	100
22-	DSE-II- History and Culture of Odisha	6	100

SEMESTER-VI

S.I.	PAPERS	REDIT	MARKS
23-	C.C.XIII- History of India-VIII(C.1857-1950)	6	100
24-	C.C.XIV- History of Modern Europe-II(1780-1939)	6	100
25-	DSE-III- History of United states of America-II (C.1776-1945)	6	100
26-	DSE-IV- Project Report	6	100
	TOTAL	140	2400

Abbreviations Used

C.C: Core Compulsory:14 Papers@ 100 marks each = 1400

A.E.CC: Ability Enhancement Course Compulsory:02 Papers @ 50 marks each = 100

S.E.C: Skill Enhancement Course: 02 Papers @ 50 marks each= 100

DSE: Discipline Specific Elective: 04 Papers @ 100 marks each= 400

(includingProject)

GE: Generic Elective: 04 papers @ 100 marks each = 400
TOTAL 2400

★ N.B: The non-History students as Minor-1 and Minor-2 groups may chose from the following Generic Elective (GE) Papers. The details of the following papers are placed at the end of the syllabus: -

History and Culture of Odisha

Freedom Movement in India

Making of Contemporary India

Issues in Contemporary World

UTKAL UNIVERSITY

CBCS SYLLABUS

B.A.(Hons) HISTORY: 2016-17

Semester I

C.C.I: HISTORY OF INDIA- I

Unit-I: Reconstructing Ancient Indian History

- [1] Early Indian notions of History
- [2] Sources of Historical Writings
- [3] Historical Geography (Identification of Ancient historic sites and their importance)

Unit-II: Pre-historic hunter-gatherers

- [1] Paleolithic culture- Upper, Middle and Lower; Tool making habit
- [2] Mesolithic culture-New developments in technology and economy; rock art.

Unit-III: The advent of food production

Neolithic and Chalcolithic cultures:

- [1] Regional and chronological distribution
- [2] Settlements and Food Production

Unit-IV: The Harappan civilization

- [1] Origins; settlement patterns and town planning
- [2] Agrarian base; craft productions and trade
- [3] Social and political organization; religious beliefs and practices
- [4] Causes of Decline

Unit-V: Cultures in transition

- [1] Origin of the Aryans
- [2] Early Vedic Age- Society, Polity, Religion and Philosophy
- [3] Later Vedic Age- Social Stratification (Varna and Gender), Polity, Religion, Literature
and Philosophy

Reading List:

- R.S. Sharma, India's Ancient Past, New Delhi, OUP, 2007
R. S. Sharma, Material Culture and Social Formations in Ancient India, 1983.
R.S. Sharma, Looking for the Aryas, Delhi, Orient
Longman Publishers,1995
D. P. Agrawal, The Archaeology of India, 1985
Bridget & F. Raymond Allchin, The Rise of Civilization in India and Pakistan, 1983.
A. L. Basham, The Wonder that Was India, 1971.
D. K. Chakrabarti, The Archaeology of Ancient Indian Cities, 1997,
Paperback.
D. K. Chakrabarti, The Oxford Companion to Indian Archaeology, New Delhi, 2006.
H. C. Raychaudhuri, Political History of Ancient India, Rev. ed. With Commentary by
B. N. Mukherjee, 1996
K. A. N. Sastri, ed., History of South India, OUP, 1966.
Upinder Singh, A History of Ancient and Early Medieval India, 2008.
Romila Thapar, Early India from the Beginnings to 1300, London,
2002.
Irfan Habib, A People's History-Vol.1, PreHistory, 2001,
----Vol.-2, Indus Civilization: Including Other Copper Age Cultures
and the History of Language Change till 155 B.C., 2002
Uma Chakravarti, The Social Dimensions of Early Buddhism. 1997.

Rajan Gurukkal, Social Formations of Early South India, 2010.
 R. Champakalakshmi, Trade. Ideology and urbanization: SouthIndia 300 BC- AD 1300, 1996.
 Gregory L. Possehl, A Indus Civilization: The Contemporary Perspectives, New Delhi, Vistaar publications, 2002.

C.C.II: SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE ANCIENT WORLD

Unit-I: Evolution of humankind; Paleolithic and Mesolithiccultures.

Unit-II: Neolithic Culture: Food production;beginnings of agriculture and animal husbandry

Unit-III: Bronze Age Civilizations: with reference to *any one* of thefollowing: i) Egypt (Old

Kingdom); ii) Mesopotamia (Sumeria & Babylonia); iii) China (Shang); iv) Eastern Mediterranean (Minoan); economy, socialstratification, state structure, religion.

Unit-IV: Nomadic groups in Central and West Asia; Advent of iron and its implications

Unit-V: Ancient Greece:

Agrarian economy, urbanization, trade and politics in Ancient Greece: Athens and Sparta; Greek Culture.

Reading List:

Burns and Ralph. World Civilizations.
 Cambridge History of Africa, Vol. I.
 V. Gordon Childe, What Happened in History.
 G. Clark, World Prehistory: A New Perspective.
 B. Fagan, People of the Earth.
 Amar Farooqui, Early Social Formations.
 M. I. Finley, The Ancient Economy.
 Jacquetta Hawkes, First Civilizations.
 G. Roux, Ancient Iraq.
 Bai Shaoyi, An Outline History of China.
 H. W. F. Saggs, The Greatness that was Babylon.
 B. Trigger, Ancient Egypt: A Social History.
 UNESCO Series: History of Mankind, Vols. I - III./ or New ed.
 History of Humanity.
 R. J. Wenke, Patterns in Prehistory.
 G. E. M. Ste Croix, Class Struggles in the Ancient Greek World.
 J. D. Bernal, Science in History, Vol. I.
 V. Gordon Childe, Social Evolution.
 Glyn Daniel, First Civilizations.
 A. Hauser, A Social History of Art, Vol. I.

A.E.C.C-I: Environmental Science

(to be prepared by University)

GE-I: For non-History students, Minor-1

Semester II

C.C.III: HISTORY OF INDIA-II

Unit-I: Economy and Society (circa 300 BCE to circa CE 300):

- [1] Expansion of agrarian economy
- [2] Urban growth; craft production: trade and trade routes
- [3] Social stratification: class, Varna, jati, untouchability; gender; marriage and property relations

Unit-II: Changing political formations (circa 300 BCE to circa CE 300):

- [1] The Mauryan Empire: Chandragupta Maurya and Asoka-Conquest and Administration;
- [2] Post-Mauryan Polities with special reference to the Kushanas and the Satavahanas-Kaniska I and Gautamiputra Satakarni

Unit-III: Towards early medieval India [circa CE fourth century to CE 750]:

- [1] Gupta Age: Agrarian expansion, land grants, graded Land rights and peasantry
- [2] The problem of urban decline: patterns of trade, currency, and urban Settlements.
- [3] Varna, proliferation of *jatis*: changing norms of marriage and property.
- [4] The nature of polities: the Gupta empire and its contemporaries: post- Gupta polities

—
Pallavas, Chalukyas

Unit-IV: Religion, philosophy and society (circa 300 BCE- CE 750):

- (1) Consolidation of the brahmanical tradition: dharma, *Varnashram*, *Purusharthas*, *Samskaras*.
- (2) Theistic cults (from circa second century BC): Mahayana; the Puranic tradition.
- (3) The beginnings of Tantricism

Unit-V: Cultural developments (circa 300 BCE- CE 750):

- [1] A brief survey of Sanskrit, Pali, Prakrit and Tamil literature. Scientific and technical treatises
- [2] Art and architecture; Mauryan, post-Mauryan, Gupta, post-Gupta

Reading List:

- B. D. Chattopadhyaya, *The Making of Early Medieval India*, 1994.
- D. P. Chattopadhyaya, *History of Science and Technology in Ancient India*, 1986.
- D. D. Kosambi, *An Introduction to the Study of Indian History*, 1975.
- S. K. Maity, *Economic Life in Northern India in the Gupta Period*, 1970.
- B. P. Sahu (ed), *Land System and Rural Society in Early India*, 1997.
- K. A. N. Sastri, *A History of South India*.
- R. S. Sharma, *Indian Feudalism*, 1980.
- R. S. Sharma, *Urban Decay in India, c. 300-1000*, Delhi, Munshiram Manohar Lal, 1987
- Romila Thapar, *Asoka and the Decline of the Mauryas*, 1997.

Susan Huntington, *The Art of Ancient India: Buddhist, Hindu, and Jain*, New York, 1985.
 N. N. Bhattacharya, *Ancient Indian Rituals and Their Social Contents*, 2nd ed., 1996.
 J. C. Harle, *The Art and Architecture of the Indian Subcontinent*, 1987.
 P. L. Gupta, *Coins*, 4th ed., 1996.
 Kesavan Veluthat, *The Early Medieval in South India*, New Delhi, 2009
 H. P. Ray *Winds of Change*, 1994.
 Romila Thapar, *Early India: From the Origins to 1300*, 2002.

C.C. IV: SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE MEDIEVAL WORLD

Unit-I: Roman Republic: Polity and Empire in ancient Rome: Agrarian economy, urbanization, trade.

Unit-II: Religion and culture in ancient Rome; Crises of the Roman Empire- Rise and fall

of Julius Caesar

Unit-III: Economic developments in Europe from 7th to 14th centuries:

[1] Organization of production, towns and trade,

[2] Technological developments.

[3] Feudalism- Origin, growth and decline

Unit-IV: Religion and culture in medieval Europe: Medieval Church, Monastic Communities, and Papacy

Unit-V: Societies in Central Islamic Lands:

[1] The tribal background, *ummah*, Caliphate state; rise of Sultanates

[2] Religious developments: the origins of shariah, Sufism

[3] Urbanization and trade

Reading List:

Perry Anderson, *Passages from Antiquity to Feudalism*.

Marc Bloch, *Feudal Society*, 2 Vols.

Cambridge History of Islam, 2 Vols.

Georges Duby, *The Early Growth of the European Economy*.

Fontana, *Economic History of Europe*, Vol. I (relevant chapters).

P. K. Hitti, *History of the Arabs*.

P. Garnsey and Saller, *The Roman Empire*.

SUGGESTED READINGS

S. Ameer Ali, *The Spirit of Islam*.

J. Barrowclough, *The Medieval Papacy*.

Encyclopedia of Islam, 1st ed., 4 vols.

M. G. S. Hodgson, *The Venture of Islam*.

GE-II- (For non-History Students, Minor-2)

Semester III

C.C.V: HISTORY OF INDIA-III (c. 750 -1206)

Unit –I: Studying Early Medieval India:

[1] Historical geography

[2] Sources: texts, epigraphic and numismatic Data,

[3] Indian feudalism

[4] Rise of the Rajputs and the nature of the state

Unit-II: Political Structures:

- [1] Evolution of political structures: Rashtrakutas, Palas, Pratiharas, and Cholas
- [2] Legitimization of kingship; *Brahmanas* and temples; royal genealogies and rituals
- [3] Arab conquest of Sindh: causes and impact
- [4] Causes and consequences of early Turkish invasions: Mahmud of Ghazni; Shahab-ud-Din of Ghur

Unit-III: Agrarian Structure and Social Change:

- [1] Agricultural expansion; crops
- [2] Landlords and peasants
- [3] Proliferation of castes; status of Untouchables
- [4] Tribes as peasants and their place in the Varna Order

Unit-IV: Trade and Commerce:

- [1] Inter-regional trade
- [2] Maritime trade and forms of exchange
- [3] Process of urbanization
- [4] Merchant guilds of South India

Unit-V: Religious and Cultural Developments:

- [1] Bhakti, Tantrism, Puranic traditions; Condition of Buddhism and Jainism
- [2] Islamic intellectual traditions: Al-Biruni; Al-Hujwiri
- [3] Regional languages and literature
- [4] Art and architecture: Evolution of regional styles: Kalingan and Dravidian style of Temple Architecture.

Reading List:

- R.S. Sharma, Indian Feudalism (circa 300 - 1200). B.D. Chattopadhyaya, The Making of Early Medieval India. R.S. Sharma and K.M. Shrivastava, eds, Comprehensive History of India, Vol. IV (A & B).
- Mohammad Habib and K.A. Nizami, eds, Comprehensive History of India, Vol. V, The Delhi Sultanate. Hermann Kulke, ed., The State in India (AD 1000 - AD 1700).
- Dissanayake, W. and K. M. Gokul Singh, Indian Popular Cinema, Trentham Book, London, 2004. John Storey, Cultural Theory and Popular Culture, London, 2001. Oberoi, Patricia, Freedom and Destiny: Gender, Family and Popular Culture in India, Delhi, 2009. Christopher Princy, Camera Indica: The Social Life of Indian Photographs, Chicago, 1998.
- Pankaj Rag, Dhuno ke Yatri, Rajkamal, New Delhi, 2006 (Hindi). Ramanujan, A.K. Folktales from India A Selection of Oral Tales from Twenty-two Languages (Only Introduction). Ramaswamy, V. 'Women and the 'Domestic' in Tamil Folk Songs' in Kumkum Sangari and Uma Chakravarti, eds., From Myths to Markets: Essays on Gender, Shimla, 1999.
- Singh, Lata (ed.), Theatre in Colonial India: Playhouse of Power, New Delhi, 2009.
- N. Karashima, South Indian History and Society (Studies from Inscriptions, AD 850 - 1800).
- Derryl N. Maclean, Religion and Society in Arab Sindh. Irfan Habib, Medieval India: The Study of a Civilization. Richard Davis Lives of Indian Images.
- Romila Thapar, Somanatha: The Many Voices of a History. John S. Deyell, Living Without Silver: The Monetary History of Early Medieval North India.
- Vijaya Ramaswamy, Walking Naked: Women, Society, and Spirituality in South India.
- Burton Stein, Peasant State and Society in Medieval South India.

R. Champakalakshmi, Trade, Ideology and Urbanization: South India, 300 BC to 1300 AD.

Al. Beruni's India, NBT edition. Ali Hujwiri, Kashful Mahjoob, tr. R. Nicholson.

S C Mishra, Rise of Muslim Communities in Gujarat. J. Schwartzberg, Historical Atlas of South Asia.

C.C.VI: RISE OF THE MODERN WEST – I

Unit-I: Transition from feudalism to capitalism:

1. The problems of Transition: Economic Expansion, Industrial production, trade and commerce
2. Urban Development, Town life

Unit-II: Early colonial expansion:

1. Motives, voyages and explorations
2. The conquests of the Americas: Beginning of the era of colonization
3. Mining and plantation, The African slaves

Unit-III: Renaissance:

1. Its social roots, city-states of Italy
2. Spread of humanism in Europe
3. The Art of Renaissance- Architecture, Sculpture, Painting and Literature

Unit-IV: The Reformation

1. Origins, course and results
2. Spread of Reformation movements.
3. Emergence of European State system: Spain, France, England, Russia

Unit-V: Economic developments of the sixteenth century:

1. Shift of economic balance from the Mediterranean to the Atlantic.
2. Commercial Revolution- Causes and Nature
3. Growth of Industries and its impact

Reading List:

B. H. Slicher von Bath, The Agrarian History of Western Europe. AD.500 - 1850.

Charles A. Nauert, Humanism and the Culture of the Renaissance (1996).

D. H. Pennington, Seventeenth Century Europe.

F. Rice, The Foundations of Early Modern Europe

G. R. Elton, Reformation Europe, 1517 to 1559.

Harry Miskimin, The Economy of Later Renaissance Europe: 1460 to 1600.

J. Lynch, Spain under the Hapsburgs.

James B. Collins, The State in Early Modern France, New Approaches to European History.

L. W. Ovie, Seventeenth Century Europe.

M. P. Gilmore, The World of Humanism. 1453 to 1517.

M. S. Anderson, Europe in the Eighteenth Century.

Perry Anderson, The Lineages of the Absolutist State.

Peter Kriedte, Peasants, Landlords and Merchant Capitalists.

Peter Mathias, First Industrial Revolution.

Stuart Andrews, Eighteenth Century Europe.

The Cambridge Economic History of Europe. Vol. I - VI.

The New Cambridge Modern History of Europe, Vols. I - VII.

C.C. VII: HISTORY OF INDIA IV (c.1206 - 1526)

Unit-I: Interpreting the Sources of Delhi Sultanate:

Survey of Sources: (a) Persian *Tarikh* Tradition, (b) Vernacular Histories; (c) Epigraphy

Unit-II: Sultanate Political Structures:

1. Consolidation of the Sultanate of Delhi: Balban, the Khaljis and the Tughluqs.
2. Theories of kingship: The ruling elites, Sufis, Ulema and the imperial monuments

Unit-III: Emergence of Regional Identities

1. Bahamanis, Vijayanagar, Gujarat and Odisha.
2. Regional Art, Architecture and Literature.

Unit-IV: Society and Economy:

1. Iqta and the Revenue-free Grants.
2. Agricultural production, Technology.
3. Market Regulations, Growth of Urban Centers.
4. Trade and Commerce, Indian Ocean (Maritime) Trade.

Unit-V: Religion, Society and Culture:

1. Sufi silsilas: Chishtis and Suhrawardis; doctrines and practices, Social roles
2. Bhakti movement and monotheistic traditions: Kabir, Nanak and Sri Chaitanya.
3. Social Impact of the Bhakti tradition: Rise of Liberal Thought, Ideology of Equality and Gender Relations

Reading List:

K.A. Nizami, Religion and Politics in the Thirteenth Century.
S.A.A. Rizvi, A History of Sufism in India, Vol. I.
Satish Chandra, Medieval India, vol.I, Har Anand Publications, New Delhi.
Tapan Raychaudhuri and Irfan Habib, eds, Cambridge Economic History of India, Vol. I.
W.H. McLeod, Karine Schomer, et al, Eds, The Sants.
Burton Stein, New Cambridge History of India: Vijayanagara.
Pushpa Prasad, Sanskrit Inscriptions of the Delhi Sultanate.
Richard M. Eaton, ed., India's Islamic Traditions.
Sheldon Pollock, Languages of the Gods in the World of Men.
Vijaya Ramaswamy, Walking Naked: Women, Society, and Spirituality in South India.
K.C. Panigrahi, History of Orissa, Cuttack, Kitab Mahal, 2008

SEC.I: Understanding Heritage

This course will enable students to understand the different facets of heritage and their significance. It highlights the legal and institutional frameworks for heritage protection in India as also the challenges facing it. The implications of the rapidly changing interface between heritage and history will also be examined. The course will be strongly project-based and will require visits to sites and monuments. At least two Projects will be based on visits to Museums/Heritage Sites.

Unit-I: Defining Heritage

- [1] Meaning of 'antiquity'
- [2] Archaeological sites
- [3] Tangible heritage
- [4] Intangible heritage and art treasures

Unit-II: Evolution of Heritage -Legislation and the Institutional Framework:

[1] Conventions and Acts— national and international Heritage

[2] Heritage related government departments

[3] Museums, Regulatory Bodies

[4] Conservation Initiatives

Unit-III: Challenges facing Tangible and Intangible Heritage

[1] Development of Heritage Sites

[2] Antiquity smuggling.

[3] Conflicts (to be examined through specific case studies)

Unit-IV: Heritage and Travel:

[1] Viewing Heritage Sites

[2] The relationship between cultural heritage, landscape and travel, and recent trends

[3] Management of heritage sites

Unit-V: World Heritage Monuments:

[1] Tajmahal

[2] Red Fort

[3] Golden temple at Amritsar

[4] Sun temple at Konark

Reading List

David Lowenthal, *Possessed By The Past: The Heritage Crusade and The Spoils of History*, Cambridge, 2010

Layton, R. P. Stone and J. Thomas. *Destruction and Conservation of Cultural Property*. London: Rutledge, 2001

Lahiri, N. *Marshaling the Past - Ancient India and its Modern Histories*. Ranikhet: Permanent Black. 2012, Chapters 4 and 5.

S.S. Biswas, *Protecting the Cultural Heritage (National Legislations and International Conventions)*. New Delhi: INTACH, 1999.

Acts, Charters and Conventions are available on the UNESCO and ASI websites (www.unesco.org; www.asi.nic.in)

Agrawal, O.P., *Essentials of Conservation and Museology*, Delhi, 2006_Chainani, S. 2007. *Heritage and Environment*. Mumbai: Urban Design Research Institute, 2007

GE-III- (For non-History Students, Minor-1)

Semester IV

C.C.VIII: RISE OF THE MODERN WEST – II

Unit- I: 17th century European crisis: economic, social and political dimensions

Unit-II: The English Revolution and European politics in the 18th century:

(1) Major issues-political and intellectual Currents

(2) Parliamentary monarchy

(3) Patterns of Absolutism in Europe

Unit-III: Rise of modern science

(1) Development of Science from Renaissance to the 17th century

(2) Impact of Modern science on European society

Unit-IV: Mercantilism, European economics and Preludes to the Industrial Revolution

(1) Origin and spread of Mercantilism

(2) Impact of Mercantilism on European economy

(3) Agricultural and Scientific Background to the Industrial Revolution

Unit-V: The American Revolution, 1776

(1) Political currents

(2) Socio-Economic Issues

(3) Significance of the American Revolution

Reading List:

- T.S. Aston and C.H.E. Philpin (eds.), *The Brenner Debate*.
H. Butterfield, *The Origins of Modern Science*.
Carlo M. Cipolla, *Fontana Economic History of Europe*, Vols. II and III.
Carlo M. Cipolla, *Before the Industrial Revolution, European Society and Economy, 1000 -1700*. 3rd ed. (1993)
. D.C. Coleman (ed.), *Revisions in Mercantilism*.
Ralph Davis, *The Rise of the Atlantic Economics*.
Maurice Dobb, *Studies in the Development of Capitalism*.
J.R. Hale, *Renaissance Europe*.
R. Hall, *From Galileo to Newton*.
Christopher Hill, *A Century of Revolutions*.
Rodney Hilton, *Transition from Feudalism to Capitalism*.
Stephen J. Lee, *Aspects of European History, 1494 - 1789*.
G. Parker, *Europe in Crisis, 1598 - 1648*.
G. Parker and L.M. Smith, *General Crisis of the Seventeenth Century*.
J.H. Parry, *The Age of Reconnaissance*.
Meenaxi Phukan, *Rise of the Modern West: Social and Economic History of Early Modern Europe*.
V. Poliensiky, *War and Society in Europe. 1618 -48*.
Theodore K. Rabb, *The Struggle for Stability in Early Modern Europe*.
V. Scammell, *The First Imperial Age: European Overseas Expansion, 1400-1715*.
Jan de Vries, *Economy of Europe in an Age of Crisis 1600- 1750*.
B. V. Rao, *World History*, New Delhi: Sterling Publishers
M. S. Anderson, *Europe in the Eighteenth Century*.
Perry Anderson, *The Lineages of the Absolutist State*

Stuart Andrews, *Eighteenth Century Europe*.

B. H. Slicher von Bath, *The Agrarian History of Western Europe. AD. 500 - 1850*.
The Cambridge Economic History of Europe. Vol. I - VI.
James B. Collins, *The State in Early Modern France, New Approaches to European History*.
G. R. Elton, *Reformation Europe, 1517-1559*.
M. P. Gilmore, *The World of Humanism. 1453 -1517*.
Peter Kriedte, *Peasants, Landlords and Merchant Capitalists*.
J. Lynch, *Spain under the Hapsburgs*.
Peter Mathias, *First Industrial revolution*.
Harry Miskimin, *The Economy of Later Renaissance Europe: 1460 - 1600*.
Charles A. Nauert, *Humanism and the Culture of the Renaissance* (1996).
The New Cambridge Modern History of Europe, Vols. I - VII.
L. W. Ovie, *Seventeenth Century Europe*.
D. H. Pennington, *Seventeenth Century Europe*.
F. Rice, *The Foundations of Early Modern Europe*

C.C. IX: HISTORY OF INDIA V (c. 1526 - 1750)

Unit-I: Sources and Historiography:

- (1) Persian literary culture, translations; (2) Vernacular literary Traditions; (3) Memoirs and Travelogues

Unit-II: Establishment of Mughal rule:

- (1) India on the eve of advent of the Mughals
- (2) Fire arms, military technology and warfare
- (3) Sher Shah: Administrative and Revenue reforms

Unit-III: Consolidation of Mughal rule:

- (1) Incorporation of Rajputs and other indigenous groups in Mughal Nobility
- (2) Evolution of administrative institutions: *zabti*, *mansab*, *jagir*, *madad-i-maash*
- (3) Beginning of the crisis: Agrarian and Jagir crises; Revolts
- (4) Emergence of the Marathas; Shivaji; expansion under the Peshwas

Unit-IV: Society and Economy:

- (1) Land rights and revenue system: Zamindars and peasants
- (2) Trade routes and patterns of internal commerce; overseas trade
- (3) Urban Centres, Craft and Technology

Unit-V: Cultural ideals:

- (1) Religious tolerance and *sulh-i-kul*; Sufi mystical and intellectual interventions
- (2) Mughal Art and Architecture
- (3) Mughal and Rajput Paintings: Themes and Perspectives

Reading List:

M. Athar Ali, The Mughal Nobility under Aurangzeb.
Muzaffar Alam and Sanjay Subramanian, eds, The Mughal State, 1526 - 1750.
J.F. Richards, The Mughal Empire.
Satish Chandra, Essays on Medieval Indian History.-----, Medieval India, vol.2, Har Anand Publications, New Delhi
Irfan Habib, Agrarian System of Mughal India, 1526-1707. S.A.A. Rizvi, Muslim Revivalist Movements in Northern India.
S. Arasaratnam, Maritime India in the Seventeenth Century. Satish Chandra, Parties and Politics at the Mughal Court.
Andre Wink, Land and Sovereignty in India. Harbans Mukhia, The Mughals of India.
Iqbal Husain, Ruhela Chieftancies in 18th Century India.

C.C. X: HISTORICAL THEORIES & METHODS

Unit-I: Meaning and Scope of History

1. Definition, Nature and Scope of History.
2. Object and Value of History.
3. History, Science and Morality.

Unit-II: Traditions of Historical Writing

1. Ancient Greek Traditions – Herodotus, Thucydides
2. Ancient Roman Traditions - Polybius, Tacitus
3. Medieval Understanding: Western – St. Augustine, Arabic – Ibn Khaldun.

Unit-III: History as Interdisciplinary Practice

1. History and Archaeology, History and Anthropology.
2. History and Psychology, History and Literature.
3. History and Political Science

Unit-IV: Modern Theories

1. Scientific History: Ranke, Croce, Comte
2. Karl Marx, RG Collingwood, Toynbee
3. Total History: Marc Bloch, Lucien Febver, Fernand Braudel

Unit-V: Historical Methods

1. Sources of History: Written, Oral. Visual & Archaeological.
2. Historical facts.
3. Historical Causation.
4. Historical Objectivity

Reading List:

Arthur Marwick, New Nature of History: Knowledge Evidence, Language (Chapter V: The Historian at work: Forget 'facts' Foreground Sources), Lyceum Books Incorporated, 2001.

-----, The Nature of History (Chapter IV: History, Science and Social Science), London: Macmillan, 1989.

B. Sheik Ali, History: Its Theory and Method, Macmillan, Reprinted, 1996.

E. H. Carr, What is History? , Penguin Books, Reprinted, 1983.

E. Sreedharan, A Text Book of Historiography, Orient Longman, Reprinted, 2004.

Irfan Habib, Interpreting Indian History, Northeastern Hill University Publications, Shillong, 1988.

Marc Bloch, The Historian's Craft, Vintage Book, New York, 1953.(Introduction and Chapter-I: History Men and Time)

Maurice Aymard and Harbans Mukhia (eds), French Studies in History, Vols- I & II, Orient Longman, 1989.

Romila Thapar, Past and Prejudice, NBT, New Delhi, 1975.

S. K. Bajaj, History: It's Philosophy, Theory & Methodology, Patiala, 1987.

SEC.II: Understanding Popular Culture

The paper examines some popular cultures expressed in different mediums like visual, oral and cultural. In the process of their evolution, these cultures eclectically draw from traditions, articulate anxieties, and even give rise to new traditions. The paper endeavours to equip students with understanding such phenomena historically, with special reference to India. It is imperative that the Students use electronic devices to view, record, and document the subject matter.

Unit-I: Introduction of Popular Culture

- [1] Meaning and Definition of popular culture
- [2] Understanding it historically

Unit-II: Visual expressions:

- [1]Folk art,
- [2] Calendar art
- [3] Photography

Unit-III: Performance:

- [1] Theatres
- [2] Music
- [3] Folk tales/songs/Suang, Yatra and Nautanki: Identifying themes, functionality

Unit-IV: The audio-visual: cinema and television:

- [1] Indian cinema: Mapping the influence of the national struggle for independence

(1930s and 40s)

[2] Idealized nationalism (1950s), disillusionment and the anti-establishment mood (1970s and 80s)

[3] Documentary films, Expressions of popular culture in television; the impact of the Internet and audio-visual media

Unit-V: Fairs, Festivals and Rituals:

[1] Disentangling mythological stories

[2] Patronage

[3] Regional variations

[4] Impact on Society

Reading List:

Dissanayake, W. and K. M. Gokul Singh, Indian Popular Cinema, Trentham Book, London, 2004

John Storey, Cultural Theory and Popular Culture, London, 2001.

Oberoi, Patricia, Freedom and Destiny: Gender, Family and Popular Culture in India, Delhi, 2009

Christopher Princy, Camera Indica: The Social Life of Indian Photographs, Chicago, 1998

Pankaj Rag, Dhuno ke Yatri, Rajkamal, New Delhi, 2006(Hindi)

Ramanujan, A.K. Folktales from India A Selection of Oral Tales from Twenty-two Languages (Only Introduction).

Ramaswamy, V. 'Women and the 'Domestic' in Tamil Folk Songs' in Kumkum Sangari and Uma Chakravarti, eds., From Myths to Markets: Essays on Gender, Shimla, 1999

Singh, Lata (ed.), Theatre in Colonial India: Playhouse of Power, New Delhi, 2009

G.E. IV:(For non-History students, Minor-2)

Semester V

C.C.XI: History of Modern Europe- I (c. 1780-1939)

Unit-I: The French Revolution:

[1] Crisis of Ancient Regime

[2] Intellectual currents.

[3] Social classes and emerging gender relations.

Unit-II: Revolution and its European repercussions:

[1] Phases of the French Revolution 1789 - 99.

[2] Art and Culture of French Revolution.

[3] Napoleonic consolidation - reform and empire.

Unit-III: Restoration and Revolution: c. 1815 - 1848:

[1] Forces of conservatism & restoration of old hierarchies.

[2] Social, Political and intellectual currents.

[3] Revolutionary and Radical movements, 1830 - 1848.

Unit-IV: Capitalist Industrialization and Socio-Economic Transformation (Late 18th century to AD 1914)

[1] Process of capitalist development in industry and agriculture: case Studies of Britain,

France, the German States and Russia.

[2] Evolution and Differentiation of social classes: Bourgeoisie, Proletariat, land owning

classes and peasantry.

[3] Changing trends in demography and urban patterns.

[4] Family, gender and process of industrialization.

Unit-V: Varieties of Nationalism and the Remaking of States in the 19th and 20th Centuries.

[1] Intellectual currents, popular movements and the formation of National identities in Germany, Italy

[2] Specificities of economic development, political and administrative Reorganization

-

Italy, Germany

Reading List:

C.M. Cipolla: Fontana Economic History of Europe, Volume III: The Industrial Revolution.

Norman Davies, Europe.

J. Evans: The Foundations of a Modern State in 19th Century Europe.

T.S. Hamerow: Restoration, Revolution and Reaction: Economics and Politics in

Germany [1815 - 1871]. E.J. Hobsbawm: The Age of Revolution.

Lynn Hunt: Politics, Culture and Class in the French Revolution.

James Joll, Europe Since 1870. George Lefebvre, Coming of the French Revolution.

George Lichtheim : A Short History of Socialism. Alec Nove: An Economic History of the USSR.

Andrew Porter, European Imperialism, 1876-1914 (1994). Anthony Wood, History of Europe, 1815 - 1960 (1983).

Stuart Woolf: History of Italy, 1700-1860. G. Barrowclough, An Introduction to Contemporary History.

Fernand Braudel, History and the Social Science in M. Aymard and H. Mukhia Ed. French Studies in History, Vol. I (1989).

Maurice Dobb: Soviet Economic Development Since 1917. M. Perrot and G. Duby [eds.]: A History of Women in the West, Volumes 4 and 5.

H.J. Hanham; Nineteenth Century Constitution, 1815 - 1914. E.J. Hobsbawm, Nations and Nationalism.

Charles and Barbara Jelavich: Establishment of the Balkan National States, 1840 - 1920. James Joll, Origins of the First World War (1989).

Jaon B. Landes: Women and the Public Sphere in the Age of the French Revolution. Colin Lucas: The French Revolution and the Making of Modern Political Culture, Volume 1. Nicholas Mansergh: The Irish Question, 1840 - 1921.

K.O. Morgan: Oxford Illustrated History of Britain, Volume 3 [1789 - 1983].

R.P. Morgan: German Social Democracy and the First International.

N.V. Riasanovsky: A History of Russia.

J.M. Robert, Europe 1880 - 1985. J.J. Roth (ed.), World War I : A Turning Point in Modern History.

Albert Soboul: History of the French Revolution (in two volumes).

Lawrence Stone, History and the Social Sciences in the Twentieth Century The Past and the Present (1981).

Dorothy Thompson: Chartists: Popular Politics in the Industrial Revolution.

E.P. Thompson: Making of the English Working Class.

Michel Vovelle, fall of the French Monarchy (1984).

H. Seton Watson: The Russian Empire.

Raymond Williams: Culture and Society.

C.C.XII: HISTORY OF INDIA VII (c. 1750 - 1857)

Unit-I: India in the mid 18th Century; Society, Economy, Polity

Unit-II: Expansion and Consolidation of colonial Power:

[1] Foreign trade and early forms of exactions from Bengal.

[2] Dynamics of expansion, with special reference to Bengal, Mysore, Awadh, Punjab

Unit-III: Colonial State and Ideology:

[1] Arms of the colonial state: army, police, law

[2] Ideologies of the Raj and racial attitudes

[3] Education: indigenous and modern

Unit-IV: Economy and Society:

[1] Land revenue systems- Permanent, Ryotwari and Mahalwari

[2] Commercialization of Agriculture- Consequences

[3] Drain of Wealth-causes and consequences

[4] Growth of modern industry

Unit-V: Popular Resistance: Causes and Consequences

[1] Santhal uprising (1856-57), Indigo rebellion (1860)

[2] Pabna agrarian Leagues (1873), Deccan riots (1875)

[3] Movement of 1857-causes and consequences

Reading List:

C. A. Bayly, Indian Society and the Making of the British Empire,
New Cambridge History of India.

Bipan Chandra, Rise and Growth of Economic Nationalism in India.

Suhash Chakravarty, The Raj Syndrome: A Study in Imperial Perceptions, 1989.

J.S. Grewal, The Sikhs of the Punjab, New Cambridge History of India

Ranajit Guha, ed., A Subaltern Studies Reader.

Dharma Kumar and Tapan Raychaudhuri, eds., The Cambridge
Economic History of India, Vol. II.

P.J. Marshall, Bengal: The British Bridgehead, New Cambridge History of India.

R.C. Majumdar, ed., History and Culture of Indian People, Vols. IX

and X. British Paramountcy and Indian Renaissance.

David Arnold and Ramchandra Guha, eds, Nature, Culture and Imperialism.

Amiya Bagchi, Private Investment in India.

Bipan Chandra, K.N. Panikkar, Mridula Mukherjee, Sucheta Mahajan
and Aditya Mukherjee, India's Struggles for Independence.

A.R. Desai, Peasant Struggles in India.

R.P. Dutt, India today.

M.J. Fisher, ed., Politics of Annexation (Oxford in India Readings).

Ranajit Guha, Elementary Aspects of Peasant Insurgency in Colonial
India (1983).

P.C. Joshi, Rebellion 1857: A Symposium.

J. Krishnamurti, Women in Colonial India.

Dadabhai Naroji, Poverty and Un-British Rule in India.

Rajat K. Ray, ed., Entrepreneurship and Industry in India, 1800-1947, Oxford In India
Readings.

Eric Stokes, English Utilitarians and India

Thomas R. Metcalf, The Ideologies of the Raj

D.S.E-I: HISTORY OF THE UNITED STATES OF AMERICA (c.1776-1945)

Unit-I: The Background:

[1] The land and indigenous people: settlement and colonization by Europeans

[2] Early colonial society and politics; indentured labour-White and Black

Unit-II: Making of the Republic:

[1] Revolution, Sources of conflict: Revolutionary groups, Ideology:

[2] The American War of Independence- Causes and consequences

[3] Processes and Features of Constitution making

Unit-III: Evolution of American Democracy:

[1] Federalists: Jeffersonianism: Jacksonianism, Rise of political parties-1840-1960; Judiciary-role of the Supreme Court

[2] Limits of democracy: Blacks and women.

Unit-IV: Early Capitalism:

[1] Beginnings of Industrialization.

[2] Immigrants and changing composition of Labour; Early Labour Movements.

Unit-V: The Agrarian South and Civil War:

[1] Plantation economy.

[2] Slave Society and Culture: Slave resistance.

[3] Rise of Republicanism, Emancipation and Lincoln

Reading List:

Bernard Bailyn, The Great Republic.

Bernard Bailyn, The Ideological Origins of the American Revolution.

Charles Beard, An Economic Interpretation of the American Constitution.

Peter Carroll and David Noble, Free and Un-free: A New History of the United States.

David B. Davis, The Problem of Slavery in the Age of Revolution.

U. Faulkner, American Economic History.

Eric Foner, America's Black Past.

John Hope Franklin, From Slavery to Freedom.

Gerald N. Grobb and George A. Billias, Interpretations of American History: Patterns and Perspectives, 2 Vols.

David M. Potter, The Impending Crisis.

J. G. Randall and David Donald, The Civil War and Reconstruction.

Kenneth Stampp, The Peculiar Institution, Slavery in the Antebellum South.

Federick Jackson Turner, The Frontier in American History.

Lee Benson, The Concept of Jackson Democracy.

Ray A. Billington, Westward Expansion.

Paul Boyer, Harvard Sitkoff, Nancy Woloch, The Enduring Vision: A History of the American People, Vols. Land 2.

Thomas Cochran, The Inner Revolution.

A. O. Craven, The Growth of Southern Nationalism, 1848 - 1861.

Carl N. Degler, At Odds: Women and Family in America from the Revolution to the Present.

Lewis L. Gould (ed.), The Progressive Era.

John D. Hicks, The Federal Union: A History of USA Since 1865.

R.P. Kaushik, Significant Themes in American History.

Irving Kristol, Gordon Wood and others, America's Continuing Revolution.

Richard W. Leopold, The Growth of American Foreign Policy.

Perry Miller, From Colony to Province.

Gary Nash (ed.), Retracing the Past.

Henry Pelling, American Labor.

Edward Pessen, Jacksonian Panorama.
Charles Sellers, Henry May and Neil McMillen, A Synopsis of American History; 2 Vols.
Donald Shiham, The Making of American History: The Emergence of the Nation, Vols. II & I.
Dwijendra Tripathi and S.C. Tiwari, Themes and Perspectives in American History.

DSE.II: History and Culture of Odisha

Unit-I: Socio-political life of Early and Medieval Odisha:

- [1] Kalinga War (261 B.C.) and its significance
- [2] Mahameghavahan Kharavela: His time and achievements
- [3] The Bhauma Karas and The Somavamsis
- [4] The Gangas and The Suryavamsis

Unit-II: Religion, Art and Literature of Early and Medieval Odisha:

- [1] Buddhism, Jainism and Sanatana Dharma in Odisha.
- [2] Development of Art and Architecture: Buddhist Art, Temples and Jain Sculptures
- [3] Evolution and Growth of Odia Language
- [4] Development of Odia Literature-Sarala Mohabharata
- [5] Panchasakhas, Sri Chaitanya and Bhakti Movement in Odisha

Unit-III: Political and Economic structure in Medieval Odisha:

- [1] Mughal Administration
- [2] Maratha Administration
- [3] Impact on Odisha's Socio-Economic Condition

Unit-IV: Colonialism in Odisha:

- [1] The Early British Administration: Its Socio-economic impact
- [2] The Odia Identity Movement
- [3] Freedom Struggle in Odisha

Unit-V: Socio-cultural Changes in Modern Odisha:

- [1] Development of Modern Education
- [2] Social Reform Movements in Odisha
- [3] Modern Odia Literature: Radhanath Roy, Phakir Mohan Senapati & Gangadhar Meher

Reading List:

A. Easchman et al (eds) The Cult of Jagannath and Regional Tradition of Orissa, Manohar, New Delhi, 1978.

A. K. Mishra, Intellectual Tradition of Orissa: 2006.

A. K. Mishra, The Raj, Nationalists and Reforms, 2007.

A.K. Mishra, Indian Culture, Science and Technology (with special emphasis on Odisha), 2011.

B.K. Mallik; Paradigms of Dissent and Protest: Social Movements in Eastern India (1400-1700 AD Manohar, New Delhi, 2004.

J. Dora, Sakta Monuments of Orissa, A Study of Art, Architecture and Iconography, New Delhi, 2010.

K.C. Mishra, The Cult Jagarnath.

M.N. Das (ed) Sidelights on History and Culture of Orissa, Vidyapuri

A.C. Pradhan, A Study of History of Orissa, Bhubaneswar, Panchsheel

K.C. Panigrahi, History of Orissa, Cuttack, Kitab Mahal, First edition, 1981

Chittaranjan Das, A Glimpse into Oriya Literature, Orissa Sahitya Akademi, Bhubaneswar, 1962

K.B. Tripathi, The Evolution of Oriya Language and Script, Utkal University, Bhubaneswar

K.C. Panigrahi, Sarala Dasa, Sahitya Akademi, New Delhi, 1975

Khageswar Mahapatra, (ed), Charyagitika

Semester VI

C.C. XIII: HISTORY OF INDIA VIII (c. 1857 - 1950)

Unit-I: Cultural changes and Social and Religious Reform Movements:

- [1] The advent of printing and its implications
- [2] Reform and Revival: Brahmo Samaj, Arya Samaj, Aligarh Movement
- [3] Emancipation of Women, Sanskritization and Anti-Caste Movements

Unit-II: Nationalism: Trends up to 1919:

- [1] Political ideology and organizations, formation of INC
- [2] Moderates and Extremists.
 - [3] Swadeshi Movement
 - [4] Revolutionary Movements

Unit-III: Gandhian nationalism after 1919: Ideas and Movements:

- [1] Mahatma Gandhi: Perspectives and Methods
- [2] Non- Cooperation, Civil Disobedience, Quit India, and INA
- [3] Princely India: States' Peoples' Movement
- [4] Nationalism and Social Groups: Peasants, Tribals, Dalits and Women

Unit-IV: Communalism and Partition:

- [1] Ideologies and practices, Hindu Mahasabha, Muslim League
- [2] Partition and Independence

Unit-V: Emergence of a New State:

- [1] Making of the Constitution
- [2] Integration of Princely States
- [3] Land Reforms and beginnings of Planning

Reading List:

Judith Brown, Gandhi's rise to Power, 1915-22.
Paul Brass, The Politics of India Since Independence, OUP, 1990.
Bipan Chandra, Nationalism and Colonialism in Modern India, 1979.
Bipan Chandra, Rise and Growth of Economic Nationalism in India.
Mohandas K. Gandhi, An Autobiography or The Story of My Experiments with Truth.
Ranajit Guha, ed., A Subaltern Studies Reader.
Peter Hardy, Muslims of British India.
Mushirul Hasan, ed., India's Partition, Oxford in India Readings.
D.A. Low, ed., Congress and the Raj.
John R. McLane, Indian Nationalism and the Early Congress.
Jawaharlal Nehru, An Autobiography.
Gyanendra Pandey, The Construction of Communalism in colonial north India.
Sumit Sarkar, Modern India, 1885-1947.
Anil Seal, Emergence of Indian Nationalism.
Ram Lakhan Shukla (ed.), Adhunik Bharat ka Itihas.
Eleanor Zelliot, From Untouchable to Dalit: Essays on the Ambedkar Movement.
Judith Brown, Gandhi: (et al) A Prisoner of Hope.
Bipan Chandra, Communalism in Modern India, 2nd ed., 1987.
Bipan Chandra, K.N. Panikkar, Mridula Mukherjee, Sucheta Mahajan and Aditya Mukherjee, India's, Struggles for Independence.
A.R. Desai, Social Background of Indian Nationalism.
A.R. Desai, Peasant Struggles in India.
Francine Frankel, India's Political Economy, 1947-77.
Ranajit Guha, and G.C. Spivak, eds. Select Subaltern Studies.
Charles Heimsath, Indian Nationalism and Hindu Social Reform.
F. Hutchins, Illusion of Permanence.
F. Hutchins, Spontaneous Revolution.
V.C. Joshi (ed.), Rammohan Roy and the process of Modernization in India.
J.Krishnamurti, Women in Colonial India

C.C. XIV: HISTORY OF MODERN EUROPE II (c. 1780 -1939)

Unit-I: Liberal Democracy, Working Class Movements and Socialism in the 19th and 20th Centuries:

- [1] The struggle for parliamentary democracy and civil liberties in Britain.
- [2] Forms of protest during early capitalism: food riots in France and England: Luddites and Chartism.
- [3] Early Socialist Thought; Marxian Socialism

Unit-II: The Crisis of Feudalism in Russia and Experiments in Socialism:

- [1] Emancipation of serfs.
- [2] Revolutions of 1905; the Bolshevik Revolution of 1917.
- [3] Programmes of Socialist Construction.

Unit-III: Imperialism, War and Crisis: c. 1880-1939:

- [1] Theories and mechanisms of imperialism; Growth of Militarism; Power blocks and alliances: expansion of European empires –First World War(1914 – 1918)
- [2] The post 1919 World Order: economic crises, the Great Depression and Recovery.
- [3] Fascism and Nazism.
- [4] Origins of the Second World War.

Unit-IV: Cultural Transformation since circa 1850:

- [1] Changing contexts: [i] Notions of Culture [ii] Creation of a New public sphere and mass media
- [2] Creation of new cultural forms: from Romanticism to Abstract Art.
- [3] Culture and the making of ideologies: Constructions of Race, Class and Gender, ideologies of Empire.

Unit-V: Intellectual Developments since circa 1850:

Major intellectual trends:

- [1] Mass education and extension of literacy.
- [2] Institutionalization of disciplines: History, Sociology and Anthropology.
- [3] Darwin and Freud.

Reading List:

- Gerald Brennan: The Spanish Labyrinth: An Account of the Social and Political Background of the Civil War
- C.M. Cipolla: Fontana Economic History of Europe, Volume II the Present (1981).
- I : The Industrial Revolution.
- Norman Davies, Europe.
- J. Evans: The Foundations of a Modern State in 19th Century Europe.
- T.S. Hamerow: Restoration, Revolution and Reaction: Economics and Politics in Germany [1815 - 1871].
- E.J. Hobsbawm : The Age of Revolution.Lynn Hunt: Politics, Culture and Class in the French Revolution.
- James Joll, Europe Since 1870.David Landes: Prometheus Unbound.George Lefebvre, Coming of the French Revolution.
- George Lichtheim: A Short History of Socialism.Peter Mathias, First Industrial Revolution.
- Alec Nove: An Economic History of the USSR.Andrew Porter, European Imperialism, 18760 -1914 (1994).
- Anthony Wood, History of Europe, 1815 û 1960 (1983).Stuart Woolf: History of Italy, 1700 û 1860.
- G. Barrowclough, An Introduction to Contemporary History.
- Fernand Braudel, History and the Social Science in M. Aymard and H. Mukhia eds. French Studies in History, Vol. I (1989).
- Maurice Dobb: Soviet Economic Development Since 1917.
- M. Perrot and G. Duby [eds.]: A History of Women in the West, Volumes 4 and 5.
- H.J. Hanham; Nineteenth Century Constitution, 1815 û 1914.
- E.J. Hobsbawm, Nations and Nationalism.
- Charles and Barbara Jelavich: Establishment of the Balkan National States, 1840 û 1920.
- James Joll, Origins of the First World war (1989).
- Jaon B. Landes: Women and the Public Sphere in the Age of the French Revolution.
- David Lowenthal, The Past is a Foreign Country.
- Colin Lucas: The French Revolution and the Making of Modern Political Culture, Volume 2.

Nicholas Mansergh: The Irish Question, 1840 - 1921. K.O. Morgan: Oxford Illustrated History of Britain, Volume 3 [1789 - 1983].
 R.P. Morgan: German Social Democracy and the First International. N.V. Riasanovsky: A History of Russia.
 J.M. Robert, Europe 1880 - 1985.
 J.J. Roth (ed.), World War I: A Turning Point in Modern History. Albert Soboul: History of the French Revolution (in two volumes).

D.S.E. III: HISTORY OF THE UNITED STATES OF AMERICA-II (c.1776-1945)

Unit-I: Reconstructions: Political changes and Economic transformation:

- [1] Conservative and Radical phases.
- [2] The New South: Participants and Reactions, Carpetbaggers; Scalawags, Blacks, Ku Klux Klan.
- [3] Growth of Capitalism
- [4] Depression.

Unit-II: Resistance and Reform:

- [1] Agrarian crises and populism
- [2] Urban corruption and progressivism
- [3] Labour movements and Unionization.
- [4] New Deal.

Unit-III: U.S. Imperialism:

- [1] Spanish-American War
- [2] Expansion in the Far East and Latin America
- [3] World War I and Fourteen Points
- [4] Americans in World War II: Bombing of Hiroshima and Nagasaki

Unit-IV: Afro-American Movements:

Black Movements: Booker T. Washington, W.E.B. Dubois; NAACP and Marcus Garvey.

Unit-V: Socio-Cultural, Religious and Intellectual Movements:

- [1] Abolitionists, Women's rights movement and Suffrage
- [2] Religious movements: Early Revivalism; Puritans, Quakers, Mormons; Temperance
- [3] Mass culture (circa 1900 - 1945)
- [4] Major literary trends (circa 1900 – 1945)

Reading List:

Bernard Bailyn, The Great Republic.
 Bernard Bailyn, The Ideological Origins of the American Revolution.
 Charles Beard, An Economic Interpretation of the American Constitution.
 Dee Brown, Bury My Heart at Wounded Knee, An Indian History of the American West.
 Peter Carroll and David Noble, Free and Unfree: A New History of the United States.
 David B. Davis, The Problem of Slavery in the Age of Revolution.
 32
 U. Faulkner, American Economic History.
 Robert Fogel, Railroads and American Economic Growth.
 Eric Foner, America's Black Past.
 John Hope Franklin, From Slavery to Freedom.
 Gerald N. Grobb and George A. Billias, Interpretations of American

History: Patterns and Perspectives, 2 Vols.
 Richard Hofstadter, The Age of Reform, From Bryan to FDR
 Linda Kerber, Women's America: Refocusing the Past.
 David M. Potter, The Impending Crisis.
 W. Pratt, A History of the United States Foreign Policy.
 James Randall, The Civil War and Reconstruction.
 J. G. Randall and David Donald, The Civil War and Reconstruction.
 Kenneth Stampp, The Peculiar Institution, Slavery in the Antebellum South.
 Frederick Jackson Turner, The Frontier in American History.
 Robert Wiebe, The Search for Order.
 Lee Benson, The Concept of Jackson Democracy.
 Ray A. Billington, Westward Expansion.
 Paul Boyer, Harvard Sitkoff, Nancy Woloch, The Enduring Vision: A History of the American People, Vols. Land 2.
 Thomas Cochran, The Inner Revolution.
 A. O. Craven, The Growth of Southern Nationalism, 1848 - 1861.
 Lance E. Davis (ed.), American Economic Growth.
 Carl N. Degler, At Odds: Women and Family in America from the Revolution to the Present.
 Fogel and Engerman? Time on the Cross-.
 Lewis L. Gould (ed.), The Progressive Era.
 John D. Hicks, The Federal Union: A History of USA Since 1865.
 R.P. Kaushik, Significant Themes in American History.
 David M. Kennedy, Thomas Bailey and Mel Piehl, The Brief American Pageant.
 Irving Kristol, Gordon Wood and others, America's Continuing Revolution.
 Richard W. Leopold, The Growth of American Foreign Policy.
 Perry Miller, From Colony to Province.
 Gary Nash (ed.), Retracing the Past.
 Henry Pelling, American Labor.
 Edward Pessen, Jacksonian Panorama.
 Charles Sellers, Henry May and Neil McMillen, A Synopsis of American History; 2 Vols.
 Donald Shiham, The Making of American History: The Emergence of the Nation, Vols. II & I.
 Dwijendra Tripathi and S.C. Tiwari, Themes and Perspectives in American History.
 James Weinstein, The Corporate Ideal in the Liberal state.

GENERIC ELECTIVE (GE) PAPERS

(For non-History students)

(1) HISTORY AND CULTURE OF ODISHA

Unit-I: Socio-political life of Early and Medieval Odisha:

[1] Kalinga War (261 B.C.) and its significance

- [2] Mahameghavahan Kharavela: His times and achievements
- [3] The Bhauma Karas and The Somavamsis
- [4] The Gangas and The Suryavamsis

Unit-II: Religion, Art and Literature of Early and Medieval Odisha:

- [1] Buddhism, Janisim and Sanatana Dharma in Odisha.
- [2] Development of Art and Architecture: Buddhist Art, Temples and Jaina Sculptures
- [3] Evolution and Growth of Odia Language and Literature: Sarala Mohabharata
- [4] Panchasakhas, Sri Chaitanya and Bhakti Movement in Odisha

Unit-III: Political and Economic structure in Medieval Odisha:

- [1] Mughal Administration
- [2] Maratha Administration
- [3] Impact on Odisha's Socio-Economic Condition

Unit-IV: Colonialism in Odisha:

- [1] The Early British Administration: Its Socio-economic impact
- [2] The Odia Identity Movement
- [3] Freedom Struggle in Odisha

Unit-V: Socio-cultural Changes in Modern Odisha:

- [1] Development of Modern Education
- [2] Social Reform Movements in Odisha
- [3] Modern Odia Literature: Radhanath Roy, Phakir Mohan Senapati and Gangadhar Meher

Reading List:

- A. Easchman et al (eds) The Cult of Jagannath and Regional Tradition of Orissa, Manohar, New Delhi, 1978.
- A. K. Mishra, Intellectual Tradition of Orissa, Bhubaneswar, 2006.
- , The Raj, Nationalists and Reforms, Bhubaneswar, 2007.
- , Indian Culture, Science and Technology (with special emphasis on Odisha), 2011.
- B.C. Ray, Orissa under the Mughals
- , Orissa under the Marahatas
- , Foundation of British Orissa
- B.K. Mallik, Medieval Orissa: Literature, Society, Economy, Bhubaneswar, 1996
- , Paradigms of Dissent and Protest: Social Movements in Eastern India (1400-1700 AD Manahar, New Delhi, 2004.
- J. Dora, Sakta Monuments of Orissa, A Study of Art, Architecture and Iconography, New Delhi, 2010.
- K.C. Mishra, The Cult Jagannath.
- M.N. Das (ed) Sidelights on History and Culture of Orissa, Vidyapuri
- M. A. Haq, Muslim Administration in Orissa
- A.C. Pradhan, A Study of History of Orissa, Bhubaneswar, Panchsheel
- K.C. Panigrahi, History of Orissa, Cuttack, Kitab Mahal, First edition, 1981
- Chittaranjan Das, A Glimpse into Oriya Literature, Orissa Sahitya Akademi, Bhubaneswar, 1962
- K.B. Tripathi, The Evolution of Oriya Language and Script, Utkal University, Bhubaneswar
- K.C. Panigrahi, Sarala Dasa, Sahitya Akademi, New Delhi, 1975
- Khageswar Mahapatra, (ed), Charyagitika

(2)FREEDOM MOVEMENT IN INDIA

Unit-I: Growth of National Consciousness in 19th century:

- [1] Socio-Economic impact of British Rule
- [2] Role of Press and Journalism
- [3] Formation of Political associations prior to 1885

Unit-II: Nationalism: Trends up to 1919:

- [1] Formation of Indian National Congress: Its ideology and Performance
- [2] Moderates and Extremists
- [3] Swadeshi Movement and its impact

Unit-III: Gandhian nationalism after 1919: Ideas and Movements:

- [1] Mahatma Gandhi: Perspectives and Methods
- [2] Non- Cooperation, Civil Disobedience, Quit India Movements
- [3] Indian National Army (INA) and Subash Chandra Bose

Unit-IV: Communalism and Partition:

- [1] Ideologies and practices: Hindu Mahasabha, Muslim League
- [2] Partition and Independence

Unit-V: Emergence of a New Nation:

- [1] Making of the Constitution
- [2] Integration of Princely States
- [3] Land Reforms and beginnings of Planning

Reading List:

Judith Brown, Gandhi's rise to Power, 1915-22.
Paul Brass, The Politics of India Since Independence, OUP, 1990.
Bipan Chandra, Nationalism and Colonialism in Modern India, 1979.
Bipan Chandra, Rise and Growth of Economic Nationalism in India.
Mohandas K. Gandhi, An Autobiography or The Story of My Experiments with Truth.
Ranajit Guha, ed., A Subaltern Studies Reader.
Peter Hardy, Muslims of British India.
Mushirul Hasan, ed., India's Partition, Oxford in India Readings.
D.A. Low, ed., Congress and the Raj.
John R. McLane, Indian Nationalism and the Early Congress.
Jawaharlal Nehru, An Autobiography.
Gyanendra Pandey, The Construction of Communalism in colonial north India.
Sumit Sarkar, Modern India, 1885-1947.
Anil Seal, Emergence of Indian Nationalism.
Ram Lakhan Shukla (ed.), Adhunik Bharat ka Itihas.
Eleanor Zelliot, From Untouchable to Dalit: Essays on the Ambedkar Movement.
Judith Brown, Gandhi: (et al) A Prisoner of Hope.
Bipan Chandra, Communalism in Modern India, 2nd ed., 1987.
Bipan Chandra, K.N. Panikkar, Mridula Mukherjee, Sucheta Mahajan and Aditya Mukherjee, India's, Struggles for Independence.
A.R. Desai, Social Background of Indian Nationalism.
A.R. Desai, Peasant Struggles in India.
Francine Frankel, India's Political Economy, 1947-77.
Ranajit Guha, and G.C. Spivak, eds. Select Subaltern Studies.
Charles Heimsath, Indian Nationalism and Hindu Social Reform.
F. Hutchins, Illusion of Permanence.
F. Hutchins, Spontaneous Revolution.
V.C. Joshi (ed.), Rammohan Roy and the process of Modernization in India.

(3) MAKING OF CONTEMPORARY INDIA

Unit-I: Towards Independence and Emergence of the New State :

Government of India Act 1935; Working of the GOI Act; Negotiations for Independence

and Popular Movements; Partition: Riots and Rehabilitation

Unit-II: Making of the Republic -The Constituent Assembly:

Drafting of the Constitution, Integration of Princely States

Unit-III: Indian Democracy at Work c1950- 1970s:

Language, Region, Caste and Religion; Electoral Politics and the Changing Party System;

Regional Experiences, India and the World (Non Aligned Movement)

Unit-IV: Economy c 1950-1970s:

The Land Question, Planning and Economy, Industry and Labour

Unit-V: Society and Culture c 1950-1970s:

The Women's Question: Movements and Legislation

Cultural Trends: Education, Institutions and Ideas, Science, Literature, Media, Arts

Reading List:

Granville Austin, Indian Constitution: Cornerstone of a Nation, New Edition, OUP, 2011

Francine Frankel, India's Political Economy, 1947-2004, New Delhi: Oxford University Press, 2006.

Paul Brass, The Politics of India Since Independence, Cambridge: Cambridge University Press, 1994.

Ram Chandra Guha, India after Gandhi: The History of the World's Largest Democracy, New Delhi: Picador, 2007

Bipan Chandra, et al (ed) India after Independence, New Delhi: Penguin Books, 1999

Appadurai, Domestic Roots of India's Foreign Policy 1947-1972. New Delhi: Oxford University Press, 1979.

Rajni Kothari, Politics in India, New Delhi: Orient Longman, 1970.

Joya Chatterji, The Spoils of Partition: Bengal and India, 1947-67, Cambridge: Cambridge University Press, 2007.

Sunil Khilnani, The Idea of India, Penguin Books, New Delhi, 2004

(4) ISSUES IN THE CONTEMPORARY WORLD

Unit-I: Colonialism and Nationalism: Social Transformation after the Second World War; United Nations and UNESCO; NAM, Cold War: the character of Communist States

Unit-II: Perspectives on Development and

Underdevelopment: Globalization and Liberalization--Impact

Unit-III: Social Movements in the North and the South:

Feminist & Human Rights issues

Unit-IV: Ecological Movements: Recent Issues and Developments

Unit-V: Modernity and Cultural Transformation: Emerging trends in Culture, Media and Consumption

Reading List:

E.J. Hobsbawm, The Age of Extremes, 1914 – 1991, New York: Vintage, 1996

Carter V. Findley and John Rothay, *Twentieth-Century World*, Boston: Houghton-Mifflin, 5th ed., 2003.

Norman Lowe, *Mastering Modern World History*, London: Palgrave Macmillan, 1997

Mark Mazower, *The Balkans: A Short History* [especially chap. 4], New York: Modern Library, 2000: paperback, 2002

Basil Davidson, *Modern Africa: A Social and Political History*, 3d edn. London / New Jersey: Addison – Wesley, 1995

I, Rigoberta Menchu, *An India Woman in Guatemala* [Memoir of 1992 Nobel Peace Prize Winner, London: Verso. 1987 {Hindi translation available}]

Jonathan Spence, *The Gate of Heavenly Peace: The Chinese and Their Revolution, 1895 – 1980*, Penguin, 1982.

**B.A. Regular (Pass) History Syllabus
Choice Based Credit System (CBCS)
2016-17**



**P.G. DEPARTMENT OF HISTORY
UTKAL UNIVERSITY, VANI VIHAR
BHUBANESWAR-751004**

IST YEAR B.A. (Pass), SEMESTER 1

Core Courses:

History of India from the Earliest Times to 300 CE

IST YEAR B.A. (Pass), SEMESTER 2

Core Courses:

Course I: History of India from c. 300 to 1206

IIND YEAR B.A. (Pass), SEMESTER 3

Core Courses:

Course II: History of India from c. 1206-1707

IIND YEAR B.A. (Pass), SEMESTER 4

Core Courses:

Course III: History of India from c. 1707-1950

IIIRD YEAR B.A. (Pass), SEMESTER 5

Discipline Specific Elective (DSE)

Society and Economy of Modern Europe (c. 15th to 18th Century)

IIIRD YEAR B.A. (Pass), SEMESTER 6

Discipline Specific Elective (DSE)

Some Aspects of European History (1780-1945)

IST YEAR B.A. (Pass), SEMESTER 1

Core Courses: 1. History of India from Earliest Times up to 300 CE

- I. A broad survey of Paleolithic, Mesolithic and Neolithic Cultures.
- II. Harappan Civilization: Origin, Extent, dominant features & decline.
- III. The Vedic Period: Polity, Society, Economy and Religion.

IV. Territorial States and the rise of Magadha, Conditions for the rise of Mahajanpadas and the Causes of Magadha's success

V. Alexander's Invasion and impact

VI. Jainism and Buddhism: Causes, Doctrines, Spread, Decline and Contributions

VII. The Satvahanas Phase; Aspects of Political History, Material Culture, Administration, Religion

VIII. Emergence and Growth of Mauryan Empire; State, Administration, Economy, Ashoka's Dhamma, Art & Architecture

IX. The Sangam Age: Sangam Literature, Polity, Society & Culture

X. The Kushanas: Aspects of Polity, Society, & Religion.

References:

1. Agrawal, D.P. *The Archaeology of India*
2. Basham, A.L. *The Wonder that was India*
3. Chakrabarti, D.K. *Archaeology of Ancient Indian Cities*
4. Jaiswal, Suvira, *Caste: Origin, Function and Dimensions*
5. Subramanian, N. *Sangam Polity*
6. Thapar, Romila, *History of Early India*
7. Allchin, F.R. and B., *Origins of a Civilization: The Prehistory and Early Archaeology of South Asia*
8. Basham, A.L. *The Wonder That was India*
9. Jha, D.N., *Ancient India in Historical Outline* (1998 edn.)
10. Kosambi, D.D., *Culture and Civilization of Ancient India*
11. Ray, H.P., *Monastery and Guild India in Historical Outline*
12. Sastri, K.A.N., *A History of South India*
13. R.S Sharma, *India's Ancient Past*
14. Ray, Niharranjan., *Maurya and Post Maurya Art*
15. Sharma, R.S., *Aspects of Political Ideas and Institutions in Ancient India* (1991 edn.)
16. Thapar, Romila., *Ashoka and the Decline of the Mauryas* (1997 edn)
17. Yazdani, G., *Early History of Deccan*
18. Thapar, Romila., *Ashoka and the Decline of the Mauryas* (1997 edn)

IST YEAR B.A. (Pass), SEMESTER 2

Core Courses: Paper-2: History of India from. C.300 to1206

- I. The Rise & Growth of the Guptas: Administration, Society, Economy, Religion, Art, Literature, and Science & Technology.
- II. Harsha & His Times: Harsha's Kingdom, Administration, Buddhism & its spread
- III. The Cholas and Pandyas: Polity, Society, and Economy & Culture
- IV. Towards the Early Medieval: Changes in Society, Polity Economy and Culture with reference to the Pallavas, & Chalukayas
- V. Arabs in Sindh: Polity, Religion & Society.
- VI. Struggle for power in Northern India & Establishment of Sultanate: Mahmud of Ghazani, Muhammad of Ghor.

References:

1. R. S. Sharma: *Indian Feudalism-India's Ancient Past*
2. B. D. Chattopadhyaya: *Making of Early Medieval India*
3. Derryl N. Maclean: *Religion and Society in Arab Sindh*
4. K. M. Ashraf: *Life and Conditions of the People of Hindustan*
5. M. Habib and K.A. Nizami: *A Comprehensive History of India Vol.V*
6. Tapan Ray Chaudhary and Irfan Habib (ed.) : *The Cambridge Economic History of India, Vol.I*
7. Peter Jackson: *Delhi Sultanate: A Political and Military History*
8. Tara Chand: *Influence of Islam on Indian Culture*
9. Satish Chandra: *A History of Medieval India, 2 Volumes*
10. Percy Brown, : *Islamic Architecture*

2ND YEAR B.A. (Pass), SEMESTER 3

Core Courses: Paper -3: History of India from 1206 to 1707

- I. Foundation, Expansion & consolidation of the Delhi Sultanate: Iltutmish & Balban
- II. Military, administrative & economic reforms under the Khiljis & the Tughlaqs: Alauddin Khilji & Mahmud-bin-Tughlaq
- III. Bhakti & Sufi Movements.

IV. Emergence and consolidation of Mughal State: Babur and Akbar

V. Akbar to Aurangzeb: administrative structure-Mansab & Jagirs, State & Religious policies.

VI. Economy, Society & Culture under the Mughals.

VII. Emergence of Maratha Power: Shivaji, Conquest & Administration.

References:

1. Irfan Habib: *The Agrarian System of Mughal India 1556-1707*.
2. M. Athar Ali: *Mughal Nobility under Aurangzeb*.
3. Shireen Moosvi: *The Economy of the Mughal Empire*
4. S.A.A. Rizvi: *Muslim Revivalist Movements in Northern India during 16th and 17th Centuries*
5. R.P. Tripathi: *The Rise and Fall of the Mughal Empire*, 2 vol.
6. I. H. Siddiqui: *Some Aspects of Afghan Despotism*
7. Kesvan Veluthat: *Political Structure of Early Medieval South India*
8. P.J. Marshall: *The Eighteenth Century in Indian History*.
9. Stewart Gordon, : *The Marathas 1600-1818*
10. Percy Brown, : *Islamic Architecture*

2ND YEAR B.A. (Pass), SEMESTER 4

Core Courses: Paper-4: History of India; 1707-1950

- I. Political condition of India and Advent of European Trading Companies.
- II. Expansion & consolidation of Colonial Power up to 1857: Anglo-French Rivalry, Battle of Plassey & Buxar, Subsidiary Alliance & Doctrine of Lapse.
- III. Revolt of 1857: Causes, Nature & Aftermath.
- IV. Colonial economy: Agriculture, Trade & Industry- Permanent Settlement, Ruin of Indigenous Industries & Monopoly of Trade
- V. Socio-Religious Movements in the 19th century: Raja Rammohan Ray, Dayananda Saraswati, Ramakrishna Paramahansa, Swami Vivekananda & Theosophical Society.
- VI. Emergence & Growth of Nationalism: Causes, Swadeshi Movement, Non-cooperation Movement, Civil Disobedience Movement & Quit India Movement
- VII. Communalism: Origin, Growth and partition of India.
- VIII. Advent of Freedom: Constituent Assembly, establishment of Republic & Salient Features of Indian Constitution.

References:

1. Sugata Bose and Ayesha Jalal: *Modern South Asia: History, Culture, Political Economy*, New Delhi, 1998
2. Sekhar Bandyopadhyay: *From Plassey to Partition*
3. Barbara D Metcalf and T.R. Metcalf: *A Concise History of India*, Cambridge, 2002
4. C.A. Bayly: *An Illustrated History of Modern India 1600-1947*, London 1990
5. Sumit Sarkar: *Modern India 1885 to 1947*, Mamillan, 1983
6. Mushirul Hasan: *John Company to the Republic: A story of Modern India*
7. R.P. Dutt: *India Today*.
8. Thomas Metcalf: *Ideologies of the Raj*.
9. R. Jeffery, J Masselos: *From Rebellion to the Republic*.
10. Bipan Chandra: *Nationalism and Colonialism*.
11. Urvashi Butalia: *The Other side of Silence*.
12. Francine Frankel: *India's Political Economy 1947- 1977*.
13. Parul Brass: *The Politics of India since Independence*.
14. Lloyd and Susan Rudolph: *In Pursuit of Laxmi: the Political Economy of the Indian State*, Chicago, 1987
15. Bipan Chandra, Aditya Mukherjee: *India After Independence*, Viking, 1999.
16. Gail Omvedt: *Dalits and Democratic Revolution*.
17. Ramachandra Guha: *The Fissured Land*.
18. K.G. Subramanian: *The Living Tradition: Perspectives on Modern Indian Art*.
19. Radha Kumar: *A History of Doing*.

IIIRD YEAR B.A. (Pass), SEMESTER 5

Discipline Specific Elective (DSE)

Society & Economy of Modern Europe: 15th – 18th Century

- I: Feudalism: Origin, Growth & Decline
- II. Renaissance: Origin, Spread & its Impact
- III. European Reformation: Origin, nature & Impact
- IV. Geographical Discovery
- V. Beginning of Colonization and Economic Exploitation
- VI. Growth of Capitalism; Industrial Revolution- Causes and Consequences

References:

1. J H Plumb, *The Pelican Book of the Renaissance*, Penguin, 1982
2. G. R. Elton, *Reformation Europe 1517, 1559*, Wiley, 1999
3. Ralph Davis, *The Rise of the Atlantic Economies*, New York, 1973
4. Arvind Sinha, *Europe in Transition*, Delhi, 2010
6. Rodney Hilton, *The Transition from Feudalism to Capitalism*, Delhi, 2006.
7. Fernand Braudel, *Civilization and Capitalism*, Vols. I, II, III, California, 1992
8. Butterfield, Herbert, *The origins of modern science*. Vol. 90507. Free Press, 1997

IIIRD YEAR B.A. (Pass), SEMESTER 6

Discipline Specific Elective (DSE)

Some Aspects of European History: C.1780-1945

- I. The French Revolution: Causes, Nature & Consequences
- II. Napoleonic Era: First Consul, Achievements & Downfall.
- III. Revolutions of 1830 & 1848: Causes & Effects.
- IV. Unification of Italy & Germany.
- V. Imperialist Conflicts: First World War-Causes and Consequences.
- VI. League of Nations
- VI. Rise of Fascism in Italy and Nazism in Germany.
- VII. Second World War-Causes and Consequences.

References:

- 1. E.J. Hobsbawn: *The Age of Revolution*.
- 2. Lynn Hunt: *Politics, Culture and Class in the French Revolution*.
- 3. Andrew Porter: *European Imperialism, 18760 -1914* (1994).
- 4. E.J. Hobsbawm: *The Age of Extremes, 1914 - 1991*, New York: Vintage, 1996
- 5. Carter V. Findley and John Rothey: *Twentieth-Century World*, Boston: Houghton-Mifflin, 5th ed. 2003

CBCS + 3 COURSES - CURRICULUM (ARTS)

Subject - Law (Pass)

Four Core pass paper in Law

1. JURISPRUDENCE

FULL MARKS: 100

UNIT.1 INTRODUCTORY CONCEPTS

- a) Definition or meaning of Jurisprudence
- b) Meaning of Legal Theory
- c) Scope of Jurisprudence
- d) Purpose of Jurisprudence in Contemporary Society

UNIT.2 SCHOOLS OF JURISPRUDENCE

- a) Historical School
- b) Analytical School
- c) Sociological School
- d) Realistic School

UNIT.3 SOURCES OF LAW

- a) Custom
- b) Precedent
- c) Legislation
- d) Codification

UNIT-4 CONCEPT

- a) Liability, meaning and nature
- b) Rights and Duties
- c) Possession
- d) Ownership

Reference Books

1. Jurisprudence & Legal Theory – V. D Mahajan , Eastern Book Company ,5Ed Rp 2014
2. Introduction to Jurisprudence – Dr. Avtar Singh ,Eastern Book Company,2Ed Rp 2014
3. Jurisprudence Legal Theory – S.R Myneni ,Asia Law House, 2Ed Rp 2014
4. Guides Jurisprudence –I & II Paperback – 2014 by [Garima Tiwari](#)
5. Jurisprudence & Legal Theory – S.N. Dhyani, Jain Book Agency, 2014.
6. Jurisprudence & Legal Theory- N.V. Paranyajepee, Jain Book Agency, 2014
7. Jurisprudence & Legal Theory-G.C. Venkata Subbarao, Eastern Book Company, 1980.

8. An Introduction to the Philosophy of Law-Roscoe Pound, Universal Law Publishing Co. Pvt. Ltd. 2013.

2. INDIAN CONSTITUTION

FULL MARK: 100

UNIT-1 BASIC CONCEPT AND FUNDAMENTAL RIGHTS

- a) Meaning and scope of constitution and Spirit of Preamble
- b) Concept of State (Art.12)
- c) Right to Equality
- d) Right to Freedom and Right to Life and Personal Liberty.

UNIT-2 FUNDAMENTAL RIGHTS AND CONSTITUTIONAL REMEDIES

- a) Right against Exploitation and Right to Freedom of Religion
- b) Right to Constitutional Remedies U/Art.32&226
- c) Directive principles of state policy
- d) Fundamental duties

UNIT- 3 LEGISLATURE AND EXECUTIVE UNDER CONSTITUTION

- a) Composition, Powers and functions of Parliament
- b) Composition, Powers and functions of the State Legislature
- c) Appointment , Power and functions of President of India
- d) Appointment, Powers and functions of the Council of Minister

UNIT- 4 JUDICIARY UNDER CONSTITUTION

- a) *Supreme Court- Appointment of Judges, Powers and Jurisdiction*
- b) *High Court- Appointment of Judges, Powers and Jurisdiction and Transfer of Judges*
- c) *Subordinate Judiciary*
- d) *Independence of Judiciary – Judicial Accountability.*

Reference Books

- 1. Introduction to the Constitution of India –Dr. D.D Basu ,LexisNexis, Butterworths.2013
- 2. The Constitution of India -Prof. Narendra Kumar ,Allahabad Law Agency,1998
- 3. The Constitution of India - Dr. Kailash Rai,CLP, 2013.
- 4. Constitutional Law of India –J.N Pandey ,Central Law Agency, 2015
- 5. Constitution of India (Free e-book) by **Ministry of Law and Justice.**

3. LAW OF CONTRACT

FULL MARKS: 100

UNIT- 1 JUDICIAL PERSPECTIVE OF LAW OF CONTRACT

- a) Development of the Contract, Definition of the Contract
- b) Contractual Relationship, Agreement, Obligation
- c) Acceptance , Offer, Communication
- d) Standard form of Contract

UNIT- 2 ELEMENTS OF CONTRACT

- a) Consideration
- b) Minors Contract
- c) Position of Unsound Mind
- d) Position of other Incompetent Person

UNIT- 3 FREE CONSENT

- a) Coercion and Undue Influence
- b) Fraud & Misrepresentation
- c) Mistake and Legality of Object
- d) Agreement in Restraint of Trade, Wagering Agreement and Contingent Contract.

UNIT- 4 DISCHARGE OF CONTRACT AND DAMAGES

- a) Discharge by performance and breach
- b) Discharge by impossibility of performance
- c) Quasi Contracts
- d) Damages

Reference Books

1. Indian Contract Act-Dr.R.K Bangia,Allahabad law agency,Ed14 Rp. 2015
2. Law of Contract –I &II- S.S. Srivastav, Central Law Agency, 2015
3. Indian Contract Act; Dr.S.K Kapoor,Ed.2012
4. Indian Contract Act ; Dr.Avtar Singh , Eastn Book Company, 11 Ed Rp. 2014
5. Law of Contract& Specific Relief-Kailash Rai, Central Law Agency, 2014

4. LAW OF TORTS

FULL

MARKS: 100

UNIT- 1 JURISPRUDENTIAL PERSPECTIVE OF LAW OF TORT & ITS ESSENTIALS

- a) Concept of Tort and Civil Rights
- b) Nature and Definition of the Law of Torts in India & its relation with other branches of Law
- c) Act or omission
- d) Injuria sine damnum and Damnum sine injuria

UNIT- 2 DEFENCES AGAINST TORTIOUS LIABILITY

- a) Volenti non fit injuria
- b) Plaintiff the wrongdoer
- c) Inevitable accident
- d) Act of God

UNIT- 3 LIABILITY & SPECIFIC TORT

- a) Vicarious Liability & Strict Liability
- b) Defamation
- c) Negligence and Nuisance
- d) Assault and Battery

UNIT- IV REMEDIES

- a) Damages
- b) Injunction
- c) Specific Restitution of Property
- d) Extra – Judicial Remedies

Reference Books

1. Law of Torts and Consumer Protection– R.K Bangia, Allahabad Law Agency, RP. 2015.
2. Law of Torts - Dr U.P.D Kesari, Central Law Publication, 2013
3. Dr. Avtar Singh's Introduction to the Law of Torts (and Consumer Protection, Lexis/Nexis Butterworth's Wadhwa Nagpur, 2013.
4. Law of Torts -J. N Pandey, Central Law Publication, 2014.



UTKAL UNIVERSITY

COURSES OF STUDIES

FOR

+ 3 EXAMINATION (ARTS)

SUBJECT-LAW (HONOURS)

CHOICED BASED CREDIT SYSTEM

(SEMESTER SYSTEM)

(EFFECTIVE FROM ACADEMIC SESSION 2016-2017 AND ONWARDS)

UTKAL UNIVERSITY

VANI VIHAR- BHUBANESWAR-751004

CBCS + 3 COURSE - CURRICULUM (ARTS)

				Maximum Marks	End-Term	Mid-Term	Exam Hours	Credit Allotted
SEMESTER-I								
B.A. (Hons)	Law	Core Course-I	Jurisprudence	100	80	20	3	6
B.A. (Hons)	Law	Core Course-II	Constitution of India-I	100	80	20	3	6
B.A. (Hons)	Law	AECC-I		50	40	10	2	2
B.A. (Hons)	Law	GE-I		100	80	20	3	6

Subject - Law (Hons.)

				Maximum Marks	End-Term	Mid-Term	Exam Hours	Credit Allotted
SEMESTER-II								
B.A. (Hons)	Law	Core Course-III	Law of Crime-I	100	80	20	3	6
B.A. (Hons)	Law	Core Course-IV	Constitution of India-II	100	80	20	3	6
B.A. (Hons)	Law	AECC-II		50	40	10	2	2
B.A. (Hons)	Law	GE-II		100	80	20	3	6

				Maximum Marks	End-Term	Mid-Term	Exam Hours	Credit Allotted
SEMESTER-III								
B.A. (Hons)	Law	Core Course-V	Law of Crime-II	100	80	20	3	6
B.A. (Hons)	Law	Core Course-VI	Criminal Procedure Code-I	100	80	20	3	6
B.A. (Hons)	Law	Core Course-VII	Human Rights	100	80	20	3	6
B.A. (Hons)	Law	SEC-I		50	40	10	2	2
B.A. (Hons)	Law	GE-III		100	80	20	3	6

				Maximum Marks	End-Term	Mid-Term	Exam Hours	Credit Allotted
SEMESTER-IV								
B.A. Law (Hons)	Core Course-VIII	Law of Contract		100	80	20	3	6
B.A. Law (Hons)	Core Course-IX	Criminal Procedure Code-II		100	80	20	3	6
B.A. Law (Hons)	Core Course-X	Law of Torts		100	80	20	3	6
B.A. Law (Hons)	SEC-II			50	40	10	2	2
B.A. Law (Hons)	GE-IV			100	80	20	3	6

				Maximum Marks	End-Term	Mid-Term	Exam Hours	Credit Allotted
SEMESTER-V								
B.A. Law (Hons)	Core Course-XI	Transfer of Property Act		100	80	20	3	6
B.A. Law (Hons)	Core Course-XII	Hindu Law		100	80	20	3	6
B.A. Law (Hons)	DSC-I			100	80	20	3	6
B.A. Law (Hons)	GE-V			100	80	20	3	6

				Maximum Marks	End-Term	Mid-Term	Exam Hours	Credit Allotted
SEMESTER-VI								
B.A. Law (Hons)	Core Course-XIII	Consumer Protection Act		100	80	20	3	6
B.A. Law (Hons)	Core Course-XIV	Right to Information Act		100	80	20	3	6
B.A. Law (Hons)	DSC-II			100	80	20	3	6
B.A. Law (Hons)	Project Report			100	75	25 (Viva-Voce)	-	6

UTKAL UNIVERSITY

COURSES OF STUDIES FOR +3 (LAW) EXAMINATIONS

(Semester Course)

CHOICE BASED CREDIT SYSTEM

(Effective from the Academic Session 2015-16)

SEMESTER-I

Hons.(Law)

Core Course-II

JURISPRUDENCE

FULL MARKS: 100

UNIT.1 INTRODUCTORY CONCEPTS

- e) Definition or meaning of Jurisprudence
- f) Meaning of Legal Theory
- g) Scope of Jurisprudence
- h) Purpose of Jurisprudence in Contemporary Society

UNIT.2 SCHOOLS OF JURISPRUDENCE

- e) Historical School
- f) Analytical School
- g) Sociological School
- h) Realistic School

UNIT.3 SOURCES OF LAW

- e) Custom
- f) Precedent
- g) Legislation
- h) Codification

UNIT-4 CONCEPT

- e) Liability, meaning and nature
- f) Rights and Duties
- g) Possession
- h) Ownership

Reference Books

9. Jurisprudence & Legal Theory – V. D Mahajan , Eastern Book Company ,5Ed
Rp 2014
10. Introduction to Jurisprudence – Dr. Avtar Singh ,Eastern Book Company,2Ed
Rp 2014
11. Jurisprudence Legal Theory – S.R Myneni ,Asia Law House, 2Ed Rp 2014

12. Guides Jurisprudence –I & II Paperback – 2014 by [Garima Tiwari](#)
13. Jurisprudence & Legal Theory – S.N. Dhyani, Jain Book Agency, 2014.
14. Jurisprudence & Legal Theory- N.V. Paranyajepee, Jain Book Agency, 2014
15. Jurisprudence & Legal Theory-G.C. Venkata Subbarao, Eastern Book Company, 1980.
16. An Introduction to the Philosophy of Law-Roscoe Pound, Universal Law Publishing Co. Pvt. Ltd. 2013.

Hons.(Law)

Core Course-II

INDIAN CONSTITUTION- I

FULL MARK: 100

UNIT-1 JURISPRUDENCE OF CONSTITUTION

- e) Meaning and scope of constitution
- f) Spirit of Preamble
- g) Independence of Judiciary
- h) Parliament form of Government

UNIT-2 BASIC CONCEPT

- a) Concept of State (Art.12)
- b) Doctrine of Ultra-Vires(Art.13)
- c) Social Justice
- d) Basic structure of Constitution

UNIT-3 FUNDAMENTAL RIGHTS

- a) Right to Equality
- b) Abolition of Untouchability
- c) Right to Life and Personal Liberty
- d) Safeguard against Arbitrary Arrest and Detention

UNIT-4 RIGHT TO FREEDOM

- e) Right to Freedom of Speech and expression
- f) Freedom of Profession , Occupation, Trade and Business
- g) Freedom to form Association or Unions
- h) Right to Freedom of Religion

Reference Books

6. Introduction to the Constitution of India –Dr. D.D Basu ,LexisNexis, Butterworths.2013
7. The Constitution of India -Prof. Narendra Kumar ,Allahabad Law Agency,1998
8. The Constitution of India - Dr. Kailash Rai,CLP, 2013.
9. Constitutional Law of India –J.N Pandey ,Central Law Agency, 2015
10. Constitution of India (Free e-book) by **Ministry of Law and Justice.**

SEMESTER-II

Hons.(Law)

Core Course-III

LAW OF CRIMES- I

FULL MARK: 100

UNIT- 1 CRIMINAL JURISPRUDENCE

- a) Elements of Crime and offence
- b) Mens-rea in Indian Context
- c) Actus reus-Meanings and Elements
- d) Stages of Crime

UNIT- 2 PUNISHMENT

- a) Concept of Punishment
- b) Deterrent and Preventive theory of Punishment
- c) Reformatory and Retributive theory of Punishment
- d) Types of Punishment

UNIT- 3 GENERAL EXCEPTION

- a) Justifiable Acts, mistake of fact
- b) Excusable Acts, Doli-incapax
- c) Insanity
- d) Offence against State

UNIT .4 RIGHT OF PRIVATE DEFENCE

- a) Things done in private defence
- b) Right of private defence of body
- c) Right of private defence of property
- d) Right of private defence against the act of a person of unsound of mind

Reference Books

1. Indian Penal Code –C.K Takwani Eastern Book Company 1 Ed.2014
2. Text Book on Indian Penal Code-K.D Gaur, Universal Law Publishing Co. Pvt. Ltd. 5 Ed 2014
3. The Indian Penal Code –S.N Misra, Central Law Agency, 2014
4. The Indian Penal Code- M.P Tandon, Allahabad Law Agency,2010
5. The Indian Penal Code –S.K. Mishra, Allahabad Law Agency,2014

Hons.(Law)

Core Course-IV

CONSTITUTION II

FULL MARK: 100

UNIT- 1 REMEDIAL RIGHTS AND D.P. S. P.

- a) Right to Constitutional Remedies U/Art.32&226
- b) Types and Nature of Writs
- c) Directive principles of state policy
- d) Fundamental duties

UNIT- 2 LEGISLATURE UNDER CONSTITUTION

- e) Composition, Powers and functions of Rajya Sabha
- f) Composition, Powers and functions of Lok Sabha
- g) Powers and Functions of the State Legislature
- h) Privileges of the Parliament

UNIT- 3 EXECUTIVES UNDER CONSTITUTION

- a) Appointment , Power and functions of President of India
- b) Appointment and Powers of the Council of Minister
- c) Appointment and Power of the Governor
- d) Powers and Functions of the State Council of Minister.

UNIT- 4 JUDICIARY UNDER CONSTITUTION

- e) *Supreme Court- Appointment of Judges, Powers and Jurisdiction*
- f) **High Court-** *Appointment of Judges, Powers and Jurisdiction and Transfer of Judges*
- g) *Subordinate Judiciary*
- h) *Independence of Judiciary – Judicial Accountability.*

Reference Books

1. Introduction to the Constitution of India –Dr. D.D Basu ,LexisNexis, Butterworths.2013
2. The Constitution of India -Prof. Narendra Kumar ,Allahabad Law Agency,1998
3. The Constitution of India - Dr. Kailash Rai,CLP, 2013.
4. Constitutional Law of India –J.N Pandey ,Central Law Agency, 2015
5. Constitution of India (Free e-book) by **Ministry of Law and Justice.**

SEMESTER- III

Hons.(Law)

Core Course-V

LAW OF CRIMES II

FULL MARK: 100

UNIT-I- 1 ELEMENTS OF COMMON OFFENCES

- a) Common Intention and Common object
- b) Abetment
- c) Criminal Conspiracy
- d) Attempt Preparation

UNIT- 2 OFFENCES EFFECTING HUMAN BODY & PROPERTY

- a) Culpable Homicide amounting to murder

- b) Culpable Homicide not amounting to murder
- c) Hurt, Grievous Hurt
- d) Theft, Extortion, Robbery & Dacoity

UNIT- 3 SPECIFIC OFFENCE

- a) Rape
- b) Adultery & Bigamy
- c) Outraging the modesty of women and insulting the modesty of women
- d) Kidnapping and abduction

UNIT- 4 MISCELLANEOUS OFFENCES

- a) *Offences by or relating to public servants*
- b) *Offences relating to Marriage and Cruelty by husband and relatives of husband*
- c) *Defamation*
- d) Criminal intimidation

Reference Books

1. Indian Penal Code –C.K Takwani Eastern Book Company 1 Ed.2014
2. Text Book on Indian Penal Code-K.D Gaur, Universal Law Publishing Co. Pvt. Ltd. 5 Ed 2014
3. The Indian Penal Code –S.N Misra, Central Law Agency, 2014
4. The Indian Penal Code- M.P Tandon, Allahabad Law Agency,2010
5. The Indian Penal Code –S.K. Mishra, Allahabad Law Agency,2014
6. The Indian Penal Code -Ratanlal and Dhirajlal, Wadhwa Publication,1997.

Hons.(Law)

Core Course-VI

CRIMINAL PROCEDURE CODE- I

FULL MARK: 100

UNIT-1 JURISPRUDENTIAL PERSPECTIVE AND ADJECTIVE LAW

- a) Concept and scope of adjective law with special reference to Cr.P.C
- b) Object
- c) Principles of fair trial and Natural Justice
- d) Speedy Trial

UNIT- 2 DEFINITION OF SOME IMPORTANT TERMS

- a) Cognizable and Non cognizable offences
- b) Complaint, Warrant and Summon Cases
- c) Inquiry and Investigation
- d) Bailable and Non- Bailablecases

UNIT- 3 POWER AND FUNCTIONS OF CRIMINAL COURTS

- a) Types of Criminal Courts
- b) Powers of Criminal Courts
- c) Functions of Criminal Courts
- d) Difference between Executive Magistrate and Judicial Magistrate

UNIT- 4 CHARGE

- a) Contents of Charge
- b) Particulars of Charge
- c) When court may alter charge
- d) What persons may be charged jointly

Reference Books

1. The Code of Criminal Procedure -Ratanlal and Dhirajlal, Lexis Nexis, RP 2014
2. The Code of Criminal Procedure -Batuk lal
3. The Code of Criminal Procedure -S.N Mishra, Jain Book Agency, 19th Edition, 2015.
4. The Code Criminal Procedure -M.P Tandoon, Jain Book Agency 18th Edition, Rp 2012
5. The Code of Criminal Procedure -Avtar Singh, Eastern Book Company
6. The Criminal Procedure Code- Dr. Myneni, Allahabad Law Agency, 2013
7. The Criminal Procedure Code -M.P. Tandon / Shailender Malik, Allahabad Law Agency, 2013
8. Criminal Procedure Code- LexisNexis Quick Reference Guide, 2015
9. The Criminal Procedure Code- A.K. Jain, Jain Book Agency, 2014

Hons.(Law)

Core Course-VII

HUMAN RIGHTS

FULL MARK: 100

UNIT- 1 CONCEPT OF HUMAN RIGHTS

- a) Meaning of Human Rights
- b) Kinds of Human Rights
- c) Sources of Human Rights
- d) Human Rights under the United Nations Charter

UNIT- 2 UNIVERSAL DECLARATION OF HUMAN RIGHTS

- a) Preparation of U.D.H.R
- b) Preamble of the Universal Declaration
- c) Legal effect of the Declaration
- d) India and the Universal Declaration

UNIT- 3 HUMAN RIGHTS COMMISSION AND HUMAN RIGHTS INSTITUTIONS IN INDIA

- a) Development of Human Rights Commission in India
- b) Constitutional perspective of Human Rights Commission
- c) National Human Rights Institutions.
- d) Recent trends of Human Rights

UNIT - 4 NATIONAL HUMAN RIGHTS COMMISSION & STATE HUMAN RIGHTS COMMISSION

- a) Constitution of NHRC
- b) Power and Function of NHRC
- c) Constitution of State Human Rights Commission
- d) Power and Function of State Human Rights Commission

Reference Books

- 1. Human Rights and Indian Law –S.K. Kapoor, Jain Book Agency, 2014
- 2. Human Rights and International Law- H.O.Agarwal, Jain Book Agency, 2014
- 3. Human Rights- V. K. Anand, Allahabad Law Agency, 2012
- 4. Human Rights- Umesh Chandra, Allahabad Law Agency, 2013
- 5. Human Rights and International Law, Allahabad Law Agency, 2013
- 6. Human Rights- A.N. Sen, Allahabad Law Agency, 2013

SEMESTER-IV

Hons.(Law)

Core Course-VIII

LAW OF CONTRACT

FULL MARKS: 100

UNIT- 1 JUDICIAL PERSPECTIVE OF LAW OF CONTRACT

- e) Development of the Contract, Definition of the Contract
- f) Contractual Relationship, Agreement, Obligation
- g) Acceptance , Offer, Communication
- h) Standard form of Contract

UNIT- 2 ELEMENTS OF CONTRACT

- e) Consideration
- f) Minors Contract
- g) Position of Unsound Mind
- h) Position of other Incompetent Person

UNIT- 3 FREE CONSENT

- e) Coercion and Undue Influence
- f) Fraud & Misrepresentation
- g) Mistake and Legality of Object
- h) Agreement in Restraint of Trade, Wagering Agreement and Contingent Contract.

UNIT- 4 DISCHARGE OF CONTRACT AND DAMAGES

- e) Discharge by performance and breach
- f) Discharge by impossibility of performance
- g) Quasi Contracts
- h) Damages

Reference Books

6. Indian Contract Act-Dr.R.K Bangia,Allahabad law agency,Ed14 Rp. 2015
7. Law of Contract –I &II- S.S. Srivastav, Central Law Agency, 2015
8. Indian Contract Act; Dr.S.K Kapoor,Ed.2012
9. Indian Contract Act ; Dr.Avtar Singh , Eastrn Book Company, 11 Ed Rp. 2014
10. Law of Contract& Specific Relief-Kailash Rai, Central Law Agency, 2014

Hons.(Law)

Core Course-IX

CODE OF CRIMINAL PROCEDURE- II

FULL MARKS: 100

UNIT- 1 POWER AND FUNCTIONS OF POLICE

- a) First Information Report (F.I.R)
- b) Arrest of persons by Police
- c) Rights of a Arrested person
- d) General provisions relating to search and seizures

UNIT- 2 ORDER OF MAINTENANCE AND PREVENTIVE ACTION OF POLICE

- a) Order of maintenance of wives,
- b) Maintenance of children and parents
- c) Maintenance of Public Tranquility
- d) Preventive action of Police

UNIT- 3 GENERAL PROVISIONS AS TO INQUIRIES AND TRIALS

- a) Autrefois acquit and Autrefois Convict
- b) Tender of Pardon
- c) Provision for inquiries and trial being held in the absence of accused in certain cases
- d) Compoundable and Non-compoundable cases

UNIT - 4 LAW RELATING TO BAIL

- a) Object and meaning of bail
- b) Bailable and Non-bailable offences
- c) Cancellation of Bail
- d) Anticipatory Bail

Reference Books

1. The Code of Criminal Procedure -Ratanlal and Dhirajlal, Lexis Nexis, RP 2014
2. The Code of Criminal Procedure -Batuk Lal
3. The Code of Criminal Procedure -S.N Mishra, Jain Book Agency, 19th Edition, 2015.
4. The Code Criminal Procedure -M.P Tandon, Jain Book Agency 18th Edition, Rp 2012
5. The Code of Criminal Procedure -Avtar Singh, Eastern Book Company

6. The Criminal Procedure Code- Dr. Myneni, Allahabad Law Agency, 2013
7. The Criminal Procedure Code -M.P. Tandon / Shailender Malik, Allahabad Law Agency, 2013
8. Criminal Procedure Code- LexisNexis Quick Reference Guide, 2015
9. The Criminal Procedure Code- A.K. Jain, Jain Book Agency, 2014

Hons.(Law)

Core Course- X

LAW OF TORTS

FULL MARKS: 100

UNIT- 1 JURISPRUDENTIAL PERSPECTIVE OF LAW OF TORT & ITS ESSENTIALS

- e) Concept of Tort and Civil Rights
- f) Nature and Definition of the Law of Torts in India & its relation with other branches of Law
- g) Act or omission
- h) Injuria sine damnum and Damnum sine injuria

UNIT- 2 DEFENCES AGAINST TORTIOUS LIABILITY

- e) Volenti non fit injuria
- f) Plaintiff the wrongdoer
- g) Inevitable accident
- h) Act of God

UNIT- 3 LIABILITY & SPECIFIC TORT

- e) Vicarious Liability & Strict Liability
- f) Defamation
- g) Negligence and Nuisance
- h) Assault and Battery

UNIT- IV REMEDIES

- e) Damages
- f) Injunction
- g) Specific Restitution of Property
- h) Extra – Judicial Remedies

Reference Books

5. Law of Torts and Consumer Protection– R.K Bangia, Allahabad Law Agency, RP. 2015.
6. Law of Torts - Dr U.P.D Kesari, Central Law Publication, 2013
7. Dr. Avtar Singh's Introduction to the Law of Torts (and Consumer Protection, Lexis/Nexis Butterworth's Wadhwa Nagpur, 2013.
8. Law of Torts -J. N Pandey, Central Law Publication, 2014.

SEMESTER-V

Hons.(Law)

Core Course- XI

TRANSFER OF PROPERTY ACT

FULL MARK: 100

UNIT- 1 NATURE AND CHARACTERISTIC

- a) Object and Scope and meaning of T.P Act
- b) Kinds of Property, Properties that cannot be Transferred
- c) Persons Competent to Transfer
- d) Conditional Transfer

UNIT- 2 BASIC TERMS

- a) Actionable claim,
- b) Notice
- c) Contingent & Vested Interest
- d) Rule against Perpetuity

UNIT- 3 TRANSFER OF IMMOVABLE PROPERTY

- a) Lispendences
- b) Fraudulent Transfer
- c) Doctrine of Part Performance
- d) Sale

UNIT- 4 TYPES OF TRANSFER

- a) Mortgage
- b) Exchange
- c) Lease
- d) Gift

Reference Books

1. The Transfer of Property Act- Dr .G.P Triparthi, Central Law Publications 19 Ed
Rp 2013
2. The Transfer of Property Act-Dr. R.K SinhaCentral Law Agency ,16 Ed 2014
3. The Transfer of Property Act –Dr. S.R Myneni ,Asia Law House, 2013
4. Transfer of Property Act –Dr. Avtar Singh, Universal Law Publishing Co Pvt.
Ltd,2014
5. Lectures on *Transfer of Property Act*, Rega Surya Rao, Asia publishing House,
2014
6. Transfer of Property Act- S.N. Shukla, Jain Book Agency, 2014.

Hons.(Law)

Core Course- XII

HINDU LAW

FULL MARKS: 100

UNIT-I HINDU JURISPRUDENCE

- a) Concept of Hindu
- b) Ancient Sources of Hindu Law
- c) Modern Sources of Hindu Law
- d) Schools of Hindu Law

UNIT-II CONCEPT OF MARRIAGE AND DIVORCE

- a) The Hindu Marriage Act,1955_ condition of marriage
- b) Void and voidable marriages
- c) Judicial separation
- d) Divorce

UNIT-III CONCEPT OF SUCCESSION & ADOPTION

- a) Scope of Hindu Succession Act,1956
- b) List of heirs specified in class-I & class-II in the schedule
- c) Requisites of a valid adoption
- d) Person who may be adopted ,person who may adopt

UNIT- 4 CONCEPT OF MINORITY & GUARDIAN

- a) Who is a minor
- b) Natural Guardian and his powers
- c) Testamentary Guardian and their powers
- d) De facto guardian

Reference Books

1. Hindu Jurisprudence – P.N Sen, Allhabad Law Agency, 2013
2. Family Laws –Paras Diwan, Allhabad Law Agency, Rp., 2014
3. Hindu Law – Dr. U.P.D Keshari, Central Law Publication, 2013
4. Principles of Hindu Law –Mullah, Lexis/Nexis, 2013

SEMESTER-VI

Hons.(Law)

Core Course- XIII

CONSUMER PROTECTION ACT

FULL MARK: 100

UNIT- 1 CONCEPT OF CONSUMER PROTECTION

- a) History, Development of Consumer Protection
- b) Definition- Who is a consumer and rights of the consumer

- c) Appropriate Authority, Complaint, & Complain under consumer protection Act
- d) Manufacturer, Consumer Dispute, Deficiency, Restrictive Trade Practices.

UNIT- 2 CONSUMER PROTECTION COUNCILS

- a) Central Consumer Protection Council
- b) Object of Central Consumer Protection Council
- c) State Consumer Protection Council and its object
- d) District Consumer Protection Council

UNIT- 3 CONSUMER DISPUTES REDRESSAL AGENCIES

- a) Establishment of Consumer Disputes Redressal Agencies
- b) Composition and Jurisdiction of District Forum
- c) Composition and Jurisdiction of State Commission
- d) Composition and Jurisdiction of National Commission

UNIT – 4 MISCELLANEOUS PROVISIONS

- a) Appeal , Penalty and period of Limitation
- b) Enforcement of the order of the District Forum, State Commission and National Commission.
- c) Protection of action in Good Faith and Services of Notice
- d) Removal of Difficulties.

Reference books

1. Consumer Protection Laws – Rakesh Khanna, Central Law Agency, 2011
2. Consumer Protection –Dr. S. Mustafa Alam Naqvi, Allahabad Law Agency, 2012
3. Consumer Protection Act- O.P Tewari, Allahabad Law Agency, 2010
4. Consumer Protection Act –R.K Bangia, Allahabad Law Agency, 2013
5. Consumer Protection Law- S.R. Myneni, Jain Book Agency, 2013

Hons.(Law)

Core Course- XIV

RIGHT TO INFORMATION ACT

FULL MARKS: 100

UNIT- 1 CONCEPT OF INFORMATION

- a) Historical development of Right to Information and constitutional mandate
- b) Obligation of public Authority
- c) Duties of Public Authority
- d) Exempted Information

UNIT- 2 APPELATE AUTHORITY

- a) Third party Information
- b) Severability of Information
- c) Constitution of the 1st Appellate Authority
- d) Power and function of 1st Appellate Authority

UNIT- 3 INFORMATION COMMISSION

- a) Constitution, Powers and function of Central Information Commission
- b) Constitution, Powers and function of State Information Commission

- c) Appeal Provision
- d) Penalties

UNIT – 4 MISCELLANEOUS PROVISIONS

- a) Protection of Action taken against Good Faith, Over-riding Effect, and Bar of jurisdiction of Courts
- b) Appointment & Obligation of Public Information Officer under Orissa Right to Information Rules, 2005
- c) Procedure of Obtaining Information under Orissa Right to Information Rules, 2005
- d) Guidelines by the Government under Orissa Right to Information Rules, 2005.

Reference books

1. Right to Information Act 2005 Paperback –Dr. Jyoti Rattan, Bharat Publication, 2013
2. A Practical Handbook On Right To Information Act, 2005-S R Kaneja, The Book Line, 2012
3. Right To Information Act- Dr. M.S. Dash, The Law House, 2014
4. Right To Information Act - S.S. Srivastava
5. R T I Law in India - Vinay N Praranjape

LIBRARY & INFORMATION SCIENCE

SEMESTER- I

FUNDAMENTALS OF LIBRARIANSHIP (THEORY & PRACTICE)

Paper- I	Core Course	Full Marks-100	Credit Points-06
UNIT-I	INTRODUCTION Library & Information Centers: Types, Characteristics Functions (i) Types of Libraries and Information Centers, Features and Functions (ii) Five Laws of Library Science and Their Implications (iii) Scope of Library & Information Science, National Information Policy (iv) Information Literacy		
UNIT- II	INFORMATION & COMMUNICATION (i) Data, Information and Knowledge : Characteristics (ii) Communication theories, models (iii) Barriers to Communication (iii) Emergence of Information Society		
UNIT -III	LIBRARY LEGISLATION (i) Salient features of Library Legislation (ii) Brief study of Library Acts in different states of India (iii) Library Acts of Odisha (iv) Intellectual Property Rights, Copy Right Act, Right to Information Act		
UNIT -IV	LIBRARY ASSOCIATION & INSTITUTIONS (i) Library Association: Objectives & functions (ii) Role of National & International Association & Institutions (iii) Role of UNESCO & IFLA for development of Libraries (iv) Library Education in India		
UNIT -V	LIBRARY & INFORMATION USERS (i) Categories of Library & Information Users (ii) Information Needs: Definition & Models (iii) Information Seeking Behaviors (iv) Techniques of Assessing Information Needs		
Practical	25 Marks (Information Literacy / Information Seeking Behavior)		

SEMESTER- I

LIBRARY CLASSIFICATION (THEORY & PRACTICE)

Paper-II	Core Course	Full Marks- 100	Credit Points-06
UNIT-I	LIBRARY CLASSIFICATION: BASICS (i) Definition need and function , (ii) Characteristics of classification scheme (iii) Enumerative and faceted classification scheme		
UNIT- II	KNOWLEDGE CLASSIFICATION & BOOK CLASSIFICATION (i) Features Knowledge classification (ii) Features of Book classification (iii) Use of Book Classification in Knowledge Classification		
UNIT -III	KNOWLEDGE ORGANIZATION IN DDC (i) Structure & Features of DDC, (ii) Schedules, Tables, Index (iii) Principles Construction of Class Numbers		
UNIT-IV	KNOWLEDGE ORGANIZATION IN CC (i) Features of CC (ii) Schedules, Tables, Index in CC (iii) Phase Relation, Devices , Common Isolates		
UNIT	NOTATION (i) Definition, Need, Purposes of Notations (ii) Structure of Notation (iii) Qualities of Notation		
Practical	Construction of Class number by using DDC & CC (Available Edition)		

SEMESTER- II

LIBRARY CATALOGUING(BIBLIOGRAPHIC DESCRIPTION OF PRINT MATERIALS) (THEORY& PRACTICE)

Paper -III	Core Course	Full Marks- 100	Credit Points-06
UNIT-I	BASICS OF CATALOGUING (i) Library catalogue-Definition, Purpose & Function (ii) Relationship between Library Catalogue & Bibliography (iii)Types of catalogue- Dictionary & Classified		
UNIT- II	BIBLIOGRAPHIC DESCRIPTION (i)Physical forms of Library Catalogue (ii)Kinds of entries- Main & Added Entries (iii)Overview of Document Description- Sources of Bibliographic Data		
UNIT -III	CATALOGUE CODES (i)Historical Development of Cataloguing Codes (ii)AACR- 2 (iii)Classified Catalogue Codes(CCC)		
UNIT-IV	CANONS OF CATALOGUING (i)Normative Principles & Cannons (ii)Rules of Choice of Headings of Personal Authors in AACR-2 (iii)Rules of Choice of Heading in Monographic Publications		
UNIT-V	LIST'SOF SUBJECT HEADINGS (i)List of Subject Headings – SLSH (ii)LCSH (iii)Subject Cataloguing		
Practical	Cataloguing of Book Materials According to AACR-2(Personal Authors & Simple Periodicals)		

SEMESTER- II

ORGANIZATION OF NON-BOOK MATERIALS (THEORY& PRACTICE)

Paper-IV	Core Course	Full Marks- 100	Credit Points-06
UNIT-I	NON-BOOK MATERIALS: NATURE & CHARACTERSTICS (i) Definition, Types, Importance (ii)Problems of Non-Book Materials & their nature. (iii) Cartographic Materials, Manuscripts & Music: their Nature & Scope		
UNIT- II	ORGANIZATION OF NON-BOOK MATERIALS (i)Microforms, Sound Recordings, Motion Pictures, Video Recordings, Magnetic Media & Optical Media: their Nature & Scope (ii)Management of Collection (iii)Identification & Arrangement: Methods indicating type of Non-Book Materials		
UNIT - III	NON-BOOK MATRIALS AS SOURCES OF INFORMATION (i) Non-Book Materials as a Sources of Information in Different Subjects (ii)Subject Analysis & Representation (iii) Methods of Storage: Shelving, Handling, Care & Preservation		
UNIT - IV	BIBLIOGRAPHIC DESCRIPTION (i) Problems of Bibliographic description (ii) Sources of Information for Bibliographic Description (iii)Standards of Bibliographic Description		
UNIT -V	CHOICE & RENDERING OF HEADINGS (i) Music (ii)Sound Recordings, Motion pictures and Video Recordings (iii) Cartographic Materials, Manuscripts		
Practical	Cataloguing of Non-Book materials According to AACR-2(Cartographic Materials: Map, Globe, Atlas)		

SEMESTER- III**COMPUTER BASICS & APPLICATION (THEORY& PRACTICE)**

Paper-V	Core Course	Full Marks- 100	Credit Points-06
UNIT-I	COMPUTER BASICS (i) Definition, History, Types & Functions of Computer (ii) Computer Hardware Components (iii) Input/ Output devices		
UNIT- II	OPERATING SYSTEMS (i)Meaning types and functions (ii)Computer Software: System Software & Application Software, (iii)Programming Languages: Types, characteristics and their applications		
UNIT -III	LIBRARY NETWORKING & CONSORTIUM (i)Library Networking: Concept & Types (ii) Library Consortium: Definition, Need, Function, Library Consortium initiatives in India (iii)Database		
UNIT -IV	LIBRARY AUTOMATION (i)Definition, Need & Purposes of Library Automation (ii)Retrospective Conversion (iii)Library House Keeping Operations(Acquisition, Serial Control, Cataloguing, Circulation Control)		
UNIT -V	LIBRARY SOFTWARE PACKAGES (i)Library Software Packages: Types & their features (ii)Evaluation Library Software Packages (iii)Study of individual automation software packages of CDS/ISIS, LIBSYS, SOUL, KOHA & E-Granthalaya		
Practical	Working with MS office		

SEMESTER- III**PRESERVATION & CONSERVATION OF LIBRARY MATERIALS (THEORY& PRACTICE)**

Paper-VI	Core Course	Full Marks- 100	Credit Points-06
UNIT-I	MANAGEMENT PRESERVATION (i)Definition, Need , Objective& Issues of Preservation (ii)Preservation Principles (iii)Materials to be Preserved		
UNIT- II	CAUSES OF DAMAGE (i)Human & Insects (ii)Disaster, Disaster Response &Contingency Planning (iii)Technology		
UNIT -III	PRESERVATION (i)Preservation of Non – Paper/ Non –Print Material (ii)Reformatting (iii)Setting Priority For Conservation & Preservation		
UNIT -IV	TYPES OF LIBRARY MATERIALS: THEIR NATURE AND PRESERVATION (i)Palm leaves (ii)Manuscripts, Books, Periodicals, Newspapers, Palm leaves (iii)Audio-Records: Plates, Tapes, Discs		
UNIT -V	BINDING (i)Different types of Binding of Library Documents (ii)Binding of Materials and their Varieties (iii)Binding Process (iv)Standards for Library Binding		
Practical	News Paper Clipping, Digitization Documents, Manuscripts		

SEMESTER- III**MANAGEMENT OF LIBRARY & INFORMATION CENTRES (THEORY& PRACTICE)**

Paper-VII	Core Course	Full Marks- 100	Credit Points-06
UNIT-I	BASIC CONCEPTS OF MANAGEMENT (i)Concept and principle of scientific management- definition and scope (ii)Application of scientific management principles to library and information centers (iii)Management school of thoughts		
UNIT- II	PERSONNEL MANAGEMENT (i)Staffing-recruitment- selection, training (ii)Staff formula, job analysis, job description, job evaluation and performance appraisal (iii)Motivation and supervision		
UNIT -III	FUNCTIONAL MANAGEMENT (i)Acquisition, technical and circulation (ii)Maintenance and preservation (iii)Documentation and readers service		
UNIT -IV	PHYSICAL & ENVIRONMENTAL MANAGEMENT PLANNING (i)Building: Site and Planning (ii)Furniture's and Fittings: Standards and Specification (iii)Maintenance, Binding, Preservation of Library Materials		
UNIT -V	FINANCEIAL MANAGEMENT& REPORTING (i)Library Resources (ii)Budgeting techniques and methods (iii)Cost effectiveness and cost benefit		
Practical	Preparation of Accession Register of 25 titles/books		

SEMESTER- IV**FUNDAMENTALS OF INFORMATION TECHNOLOGY (THEORY& PRACTICE)**

Paper-VIII		Core Course	Full Marks- 100	Credit Points-06
UNIT-I	BASICS OF INFORMATION TECHNOLOGY (i)Information Technology: Concept & Advantages (ii)Information Technology: Components (iii)Information Technology: Impact of IT on Society			
UNIT- II	INTERNET & INTRANET SERVICES (i)Definition, Growth & Development of Internet (ii)Basics Internet & Intranet Services: Email, FTP, Telnet, IRC, News Groups (iii)Web Browsers: Concept, Function, Features of Internet Explorer & Firefox			
UNIT -III	TYPES OF COMPUTER FILES (i)Business Files: Concept of Character, Field, Record and File. (ii)Types of Data Files: Master File, Transaction File, Archival File. (iii) File Organization: Sequential file, Indexed Sequential file, Randomfiles.			
UNIT -IV	IT & NETWORK SECURITY (i) Information Security and Integrity: Basic Concepts, Perverse Software, Preventive Measures and treatments. (ii)Web Development Tools: FrontPage, HTML. (iii) Advantages of Networking			
UNIT -V	COMPUTER OUTPUT FORMATS (i)Output Design: Objective of output, types of Output, Formats of Output, (ii)Designing printed Outputs, Guidelines for designing printed outputs. (iii) Multimedia Applications, Online Examination			
Practical	Library Automation Software Packages KOHA			

SEMESTER- IV**INFORMATION SOURCES & SERVICES (THEORY & PRACTICE)**

Paper-IX		Core Course	Full Marks- 100	Credit Points-06
UNIT-I	REFERENCE SERVICE (i)Definition, need, purpose and function (ii)Reference service in different types of libraries (iii)Types-Long range and short range Reference service			
UNIT- II	INFORMATION SOURCES (i)Documentary –Primary, secondary and Tertiary sources (ii)Non documentary i.e. electronic sources (iii)Institutional and human sources			
UNIT -III	STUDY & USE OF TYPE OF REFERENCE TOOLS (i)Dictionary / Encyclopedia (ii)Year Books / Directories (iii)Reference tools in Odia Language			
UNIT -IV	EVALUATIONS OF REFERENCE TOOLS (i)Criteria of evaluation of reference tools and sources (ii)Bibliography; Definition. types and compilation methods (iii)Bibliographical services-INB, BNB			
UNIT -V	INFORMATION SERVICES (i) Information Services: Concept, Type & Need (ii)Literature Search Service (iii)Document Delivery Services			
Practical	Evaluation of 5 Reference Tools			

SEMESTER- IV

USER'S STUDY & USER'S EVALUATION (THEORY & PRACTICE)

Paper-X		Core Course	Full Marks- 100	Credit Points-06
UNIT-I	BASIC CONCEPTS (i) User-Concept, Scope and Composition of User Community (ii) Assessment of Information Needs of users (iii) Information Seeking Behavior and ISB Models			
UNIT- II	USER'S STUDY (i) User Study-Basic Methods of Study (ii) User Education: Different Methods (iii) User Orientation: Different Methods			
UNIT -III	EVALUATION OF USER'S STUDY (i) Evaluation of User Studies-Concept, Need and Criteria for Evaluation (ii) Benefits of Users Study (iii) Impact of User studies in Collection Developments			
UNIT -IV	FACTORS TO BE TAKEN INTO ACCOUNT IN PREPARING A USER'S STUDY (i) Library-user interaction (ii) Information needs (iii) User behavior			
UNIT -V	GUIDELINES FOR USER STUDIES (i) Value of user studies (ii) User Education: Programs, Methods & Usefulness (iii) User Requirements			
Practical	Evaluation of User's Satisfaction			

SEMESTER- V

INFORMATION PROCESSING & RETRIEVAL (THEORY & PRACTICE)

Paper-XI		Core Course	Full Marks- 100	Credit Points-06
UNIT-I	BASIC CONCEPTS & THEORIES (i) Definition, needs and characteristics of information (ii) Generation and growth of information (iii) Theories of information			
UNIT- II	INDEXING TECHNIQUES (i) Definition and types of indexing systems (ii) Pre coordinate and post coordinate index system (iii) PRECIS, POPSI, CHAIN, UNITERM			
UNIT -III	SUBJECT ANALYSIS & REPRESENTATION (i) Problems of Subject Analysis representation, Contributions of Cutter, Kaiser, Ranganathan, Farradane & Coats (ii) Indexing Language & Controlled Vocabulary; Characteristics of Indexing Languages (iii) Thesaurus: Structure & Construction of Thesaurofacet			
UNIT -IV	ABSTRACT & ABSTRACTING SERVICES (i) Definition, needs and types of abstracts (ii) Methodology of compilation of abstract (iii) Abstracting and its services			
UNIT -V	INFORMATION SEARCHING & RETRIEVAL (i) Search Techniques; Boolean Searches (ii) On-line Searching Techniques & Retrieval (iii) Relevance of Judgments in Retrieval			
Practical	Preparing Keyword Indexing of ten titles			

SEMESTER- V**RESEARCH METHODOLOGY (THEORY& PRACTICE)**

Paper-XII	Core Course	Full Marks- 100	Credit Points-06
UNIT-I	FUNDAMENTAL CONCEPT OF RESEARCH (i)Research: Definition & Scope (ii) Research: Types of Research & its merits (iii) Research: Need & Usefulness		
UNIT- II	RESEARCH METHODS & DATA COLLECTION (i) Research: Methods & Collection of Data (ii) Research: Types of Data & its Use (iii)Scientific Method & its utility in research		
UNIT -III	RESEARCH DESIGN & PLANNING (i) Research: Design & Types (ii) Research: Types of Design (iii) Research: Need of Research Design		
UNIT -IV	RESEARCH HYPOTHESES (i) Research: Definitions of Hypothesis, So users of Hypothesis (ii) Research: Scope & Need of Hypothesis. (iii)Research: Need & Usefulness of Hypothesis		
UNIT -V	RESEARCH PRESENTATIONS (i) Research: Report Writing, Scope (ii) Research: Qualities of good Report Writing (iii) Research: Outline of Good Research Report Writing		
Practical	Preparation of research report .		

SEMESTER- V (DSE-I)**ACADEMIC LIBRARY SYSTEM (THEORY& PRACTICE)**

Paper-DSE-I	DSE(Discipline Specific Elective-I)	Full Marks- 100	Credit Points-06
UNIT-I	DEVELOPMENT OF ACADEMIC LIBRARIES (i)Higher Education and Libraries (ii)Academic Libraries: Definition, Meaning, Importance, Objective & functions, Services & Types of Academic Libraries (iii)Role of UGC in Development of Academic Libraries		
UNIT- II	COLLECTION DEVELOPMENT (i)Collection Development Policy, Weeding Out Policy (ii)Problems in Collection Organization (iii)Collection Development Programmes		
UNIT -III	STAFFING PATTERN & STAFF DEVELOPMENT FOR ACADEMIC LIBRARIES (i)Norms and Pattern of Staffing (ii)Continuing Education Programs (iii)Personnel Management		
UNIT -IV	IMPLEMENTATION OF ACADEMIC LIBRARIES SYSTEMS(ALS) (i) E-Resources Available in Academic Library System (ii)Changing Role of Academic Library in Digital Environment (iii)Challenges for Academic Library in Digital Age		
UNIT -V	LIBRARY & INFORMATION SERVICES IN ACADEMIC LIBRARIES (i)Reference Service/Bibliographic Service (ii)Documentation and Information Service (iii)Current Awareness and SDI Service		
Practical	Report on House Keeping Operations on visit to any Academic Library		

SEMESTER- V (DSE-II)**COLLECTION MANAGEMENT (THEORY& PRACTICE)**

Paper-II	DSE(Discipline Specific Elective-II)	Full Marks- 100	Credit Points-06
UNIT-I	COLLECTION MANAGEMENT: BASICS (i)Policy & Procedures For Print And Non Print Resources (ii)Selection Criteria & Tools (iii) Book selection and acquisition section		
UNIT- II	COLLECTION DEVELOPMENT i) Selection, Acquisition, Acquisition Plans, Maintenance. ii) Institutional Repositories, Consortia, Aggregators, J-store (iii)Budgets, Budgets Distribution		
UNIT -III	LIBRARY BUILDING (i)Building & Space Management of Library & Information Centers (ii)Equipment & Furniture (iii)Library Standards		
UNIT -IV	HOUSE KEEPING OPERATIONS (i) Library as a System (ii)Technical processing systems (iii)Policy Procedures & Methods of Maintenance & Stock Verification		
UNIT -V	COLLECTION DEVELOPMENT & THE NEW ELECTRONIC ENVIRONMENT (i)Expenses & distributors. (ii)New Suppliers. Cooperation & Interlibrary Loan. (iii)Development Policies. Interpretation & valuation of collection evaluation, f		
Practical	Periodic Collection Development of different Departments/Subjects of a Library		

SEMESTER- VI**INFORMATION SYSTEMS, PROGRAMMES (THEORY& PRACTICE)**

Paper-XIII	Core Course	Full Marks- 100	Credit Points-06
UNIT-I	INFORMATION SYSTEMS (i)Characteristics and Components of Information Systems (ii)Designing of Information Systems (iii)Library as Information Systems		
UNIT- II	NATIONAL INFORMATION SYSTEMS AND NETWORKS (i)National information systems and need and functions (ii)Features and objectives of national information policy an overview (iii) ENVIS,GIS, RIS,BIS		
UNIT -III	INTERNATION INFORMATION SYSTEMS (i)UNESCO & FID (ii)IFLA, INIS & AGRIS (iii)UNISIST & MEDLARS		
UNIT -IV	INFORMATION NETWORK PROGRAMS (i)NICNET (ii)NFLIBNET (iii)METROPOLITIAN LIBRARY NETWORKS		
UNIT -V	INFORMATION SYSTEM CONTROLL Management Information and Control Systems Information Systems Security Information Systems and Functional Area Applications		
Practical	Evaluation of Information Systems & their Programmes through their respective Home Page		

SEMESTER- VI**MARKETING OF INFORMATION (THEORY& PRACTICE)**

Paper-XIV	Core Course	Full Marks- 100	Credit Points-06
UNIT-I	INFORMATION MARKETING: BASICS (i)Concept of Marketing (ii)Information as a Commodity (iii)Production of Information		
UNIT- II	INFORMATION ENTREPRENEURSHIP & CONSULTANCY (i)Information Entrepreneurship (ii) Setting up of Information Business: Legal aspects (iii) Information Consultancy: Nature & Usefulness		
UNIT -III	PRICING OF INFORMATION PRODUCTS & SERVICES (i)Setting the Pricing Objectives (ii)Determining demand (iii)Estimating costs		
UNIT -IV	INFORMATION MARKETING STRATEGIES (i)Marketing Approach (ii)Marketing Segmentation (iii)Market Research/Analysis		
UNIT -V	MARKETING PROGRAMME & EVALUATION (i)Marketing Programme & Evaluation (ii)Marketing Audit (iii)Marketing Programme		
Practical	Compilation of Bibliography on a Subject following APA& MLA Style Manual		

SEMESTER- VI (DSE-III)**SPECIAL LIBRARY SYSTEM (THEORY& PRACTICE)**

Paper-III	DSE(Discipline Specific Elective-III)	Full Marks- 100	Credit Points-06
UNIT-I	DEVELOPMENT OF SPECIAL LIBRARY (i)Special Libraries: Objectives & Functions (ii)Growth of Special Libraries (iii)Services of Special Libraries		
UNIT- II	COLLECTION DEVELOPMENT (i)Collection Development Policy, Weeding out Policy (ii)Problems of Collection Organizations (iii)Collection Development Programs		
UNIT -III	MANAGEMENT OF SPECIAL LIBRARY SYSTEMS (i)Organization structure of Special Library Systems (ii)Planning & administration of Special Libraries (iii)Norms & patterns of staffing		
UNIT -IV	HUMAN RESOURCE MANAGEMENT IN SPECIAL LIBRARIES (i) Recruitment and Organizational Structure of staff. (ii)Job : Description, Analysis, Evaluation, Motivation & Human Relations (iii)Discipline, Grievances and Performance Evaluation.		
UNIT -V	FINANCIAL MANAGEMENT IN SPECIAL LIBRARIES (i)Resources Mobilization & Methods for Formulation of Budget (ii)CBA and Cost Effectiveness (iii)Budgetary control & Outsourcing		
Practical	Preparation of shelf list of any subject or Department of a Library		

SEMESTER- VI (DSE-IV)**PROJECT & FIELD WORK**

Paper-IV	DSE(Discipline Specific Elective-IV)	Full Marks- 100	Credit Points-06
Practical	<p>A student is required to carry out a project on an issue of interest to him / her under the guidance and supervision of a teacher. In order to do so s/he must have the knowledge in research methodology and of steps in planning and conducting a research. The supervisors may help the students to go on field study / study tour relevant to their work. Class may be arranged in the routine to help students understand research methodology, planning, conduction and reporting on the research. An external examiner with the supervisor as the internal examiner will evaluate the research project on the basis of scientific methodology in writing the report and presentation skill and performance in the viva.</p>		
	<p>American Psychological Association (APA) – Publication Manual 2006 to be followed for project writing</p> <p>Format</p> <ul style="list-style-type: none"> ❖ Abstract – 150 words including problem, method & results. ❖ Introduction – Theoretical consideration, review, present study, objectives and hypotheses. ❖ Method – Design, Sample, Measures, Procedure ❖ Results <ul style="list-style-type: none"> ➤ Quantitative analysis of group data→ (Raw data should not be attached in Appendix) ➤ Graphical representation of data wherever required. ➤ Qualitative analysis wherever done should indicate the method of qualitative analysis. ❖ Discussion <ul style="list-style-type: none"> ➤ Discussion of result tables, graphs as related to objectives, hypotheses, and reviewed articles. There may a conclusion chapter summarizing the findings. ❖ References (APA Style) & Appendix <ul style="list-style-type: none"> ✓ Project should be typed in Times New Roman font of size 14 in 1.5 spacing on one side of the A4 size paper. ✓ The margin should be left 1.2, right 0.8, top 0.8 and bottom 0.6 inches. ✓ Paging should be marked at the top right corner. ✓ Project should be in soft binding. ✓ Total text should be around 50 / 60 pages excluding References & Appendices. ✓ Date of submission of projects to be announced towards the end of semester. ✓ Project should be prepared in the form of research paper to be published in a scientific journal. <p>Three copies of the project should be submitted to the College.</p>		
Theory	Research: Design, Technique, Report Writing, Knowledge of using Citation/ References/ Bibliography		

LIBRARY & INFORMATION SCIENCE

GENERIC ELECTIVE -SEMESTER- I

FUNDAMENTALS OF LIBRARIANSHIP (THEORY& PRACTICE)

Paper- I	Generic Elective	Full Marks-100	Credit Points-06
UNIT-I	INTRODUCTION Library & Information Centers: Types, Characteristics Functions (i) Types of Libraries and Information Centers, Features and Functions (ii) Five Laws of Library Science and Their Implications (iii) Scope of Library & Information Science, National Information Policy (iv) Information Literacy		
UNIT- II	INFORMATION & COMMUNICATION (i) Data, Information and Knowledge :Characteristics (ii) Communication theories, models (iii) Barriers to Communication (iii) Emergence of Information Society		
UNIT -III	LIBRARY LEGISLATION (i) Salient features of Library Legislation (ii) Brief study of Library Acts in different states of India (iii) Library Acts of Odisha (iv) Intellectual Property Rights, Copy Right Act, Right to Information Act		
UNIT -IV	LIBRARY ASSOCIATION & INSTITUTIONS (i) Library Association: Objectives & functions (ii) Role of National & International Association & Institutions (iii) Role of UNESCO & RRRLF for development of Libraries (iv) Library Education in India		
UNIT -V	LIBRARY & INFORMATION USERS (i) Categories of Library & Information Users (ii) Information Needs: Definition & Models (iii) Information Seeking Behaviors (iv) Techniques of Assessing Information Needs		
Practical	25 Marks (Information Literacy / Information Seeking Behavior)		

GENERIC ELECTIVE-SEMESTER- II

LIBRARY CATALOGUING(BIBLIOGRAPHIC DESCRIPTION OF PRINT MATERIALS) (THEORY& PRACTICE)

Paper -II	Generic Elective	Full Marks- 100	Credit Points-06
UNIT-I	BASICS OF CATALOGUING (i) Library catalogue-Definition, Purpose & Function (ii) Relationship between Library Catalogue & Bibliography (iii) Types of catalogue- Dictionary & Classified		
UNIT- II	BIBLIOGRAPHIC DESCRIPTION (i) Physical forms of Library Catalogue (ii) Kinds of entries- Main & Added Entries (iii) Overview of Document Description- Sources of Bibliographic Data		
UNIT -III	CATALOGUE CODES (i) Historical Development of Cataloguing Codes (ii) AACR- 2 (iii) Classified Catalogue Codes(CCC)		
UNIT-IV	CANONS OF CATALOGUING (i) Normative Principles & Cannons (ii) Rules of Choice of Headings of Personal Authors in AACR-2 (iii) Rules of Choice of Heading in Monographic Publications		
UNIT-V	LIST'SOF SUBJECT HEADINGS (i) List of Subject Headings – SLSH (ii) LCSH (iii) Subject Cataloguing		
Practical	Cataloguing of Book Materials According to AACR-2(Personal Authors & Simple Periodicals)		

GENERIC ELECTIVE-SEMESTER- III

COMPUTER BASICS & APPLICATION (THEORY& PRACTICE)

Paper-III	Generic Elective	Full Marks- 100	Credit Points-06
UNIT-I	COMPUTER BASICS (i) Computer hardware: Components (ii) Input/ Output devices (iii) Software Packages: Programming languages		
UNIT- II	OPERATING SYSTEMS (i)Meaning types and functions (ii)Overview of the Operating System (iii)features of MS Windows		
UNIT -III	DATABASE AND COMPUTER SOFTWARE PACKAGES (i)Software packages: Meaning, types and functions (ii) Database structure, Organization and searching (iii)Database Management Systems		
UNIT -IV	LIBRARY AUTOMATION (i)Definition, Need & Purposes of Library Automation (ii)Retrospective Conversion (iii)Library House Keeping Operations(Acquisition, Serial Control, Cataloguing, Circulation Control)		
UNIT -V	LIBRARY SOFTWARE PACKAGES (i)Library Software Packages (ii)Evaluation Library Software Packages (iii)Features of CDS/ISIS		
Practical	Working with MS office		

GENERIC ELECTIVE-SEMESTER- IV

FUNDAMENTALS OF INFORMATION TECHNOLOGY (THEORY& PRACTICE)

Paper-IV	Generic Elective	Full Marks- 100	Credit Points-06
UNIT-I	INTRODUCTION TO INFORMATION TECHNOLOGY (i)Basic concepts of IT, DataProcessing: Data and Information. (ii)Introduction to Computers: Classification, History, Types of Computers. (iii)Hardware: CPU, Memory, Auxiliary storage devices.		
UNIT- II	INTRODUCTION TO INFORMATION TECHNOLOGY TOOLS (i)Operating System, Programming Languages, Features and trends (ii)Introduction to MS-DOS/WINDOWS/LINUX/UNIX (iii) Working with PC Packages. Translators: Assembler, Compiler and Interpreter.		
UNIT -III	TYPES OF COMPUTER FILES (i)Business Files: Concept of Character, Field, Record and File. (ii)Types of Data Files: Master File, Transaction File, Archival File. (iii) File Organization: Sequential file, Indexed Sequential file, Randomfiles.		
UNIT -IV	COMPUTERS & COMMUNICATION (i)Introduction to Computer Networks, Internet and World Wide Web, FTP, Electronic Mail. (ii)Web Development Tools: FrontPage, HTML. (iii)Information Security and Integrity: Basic Concepts, Perverse Software, Preventive Measures and treatments.		
UNIT -V	COMPUTER OUTPUT FORMATS (i)Output Design: Objective of output, types of Output, Formats of Output, (ii)Designing printed Outputs, Guidelines for designing printed outputs. (iii) Multimedia Applications, Online Examination		
Practical	Creation of Email id print screen shot in ppts/Searching of online databases with the help of internet		

PASS PAPERS

LIBRARY & INFORMATION SCIENCE

SEMESTER- I

FUNDAMENTALS OF LIBRARIANSHIP (THEORY& PRACTICE)

Paper- I	Pass-I	Full Marks-100	Credit Points-06
UNIT-I	INTRODUCTION Library & Information Centers: Types, Characteristics Functions (i) Types of Libraries and Information Centers, Features and Functions (ii) Five Laws of Library Science and Their Implications (iii) Scope of Library & Information Science, National Information Policy (iv) Information Literacy		
UNIT- II	INFORMATION & COMMUNICATION (i) Data, Information and Knowledge :Characteristics (ii) Communication theories, models (iii) Barriers to Communication (iii) Emergence of Information Society		
UNIT -III	LIBRARY LEGISLATION (i) Salient features of Library Legislation (ii) Brief study of Library Acts in different states of India (iii) Library Acts of Odisha (iv) Intellectual Property Rights, Copy Right Act, Right to Information Act		
UNIT -IV	LIBRARY ASSOCIATION & INSTITUTIONS (i) Library Association: Objectives & functions (ii) Role of National & International Association & Institutions (iii) Role of UNESCO & RRRLF for development of Libraries (iv) Library Education in India		
UNIT -V	LIBRARY & INFORMATION USERS (i) Categories of Library & Information Users (ii) Information Needs: Definition & Models (iii) Information Seeking Behaviors (iv) Techniques of Assessing Information Needs		
Practical	25 Marks (Information Literacy / Information Seeking Behavior)		

SEMESTER- II

LIBRARY CATALOGUING(BIBLIOGRAPHIC DESCRIPTION OF PRINT MATERIALS) (THEORY& PRACTICE)

Paper -II	Pass-II	Full Marks- 100	Credit Points-06
UNIT-I	BASICS OF CATALOGUING (i) Library catalogue-Definition, Purpose & Function (ii) Relationship between Library Catalogue & Bibliography (iii) Types of catalogue- Dictionary & Classified		
UNIT- II	BIBLIOGRAPHIC DESCRIPTION (i) Physical forms of Library Catalogue (ii) Kinds of entries- Main & Added Entries (iii) Overview of Document Description- Sources of Bibliographic Data		
UNIT -III	CATALOGUE CODES (i) Historical Development of Cataloguing Codes (ii) AACR- 2 (iii) Classified Catalogue Codes(CCC)		
UNIT-IV	CANONS OF CATALOGUING (i) Normative Principles & Cannons (ii) Rules of Choice of Headings of Personal Authors in AACR-2 (iii) Rules of Choice of Heading in Monographic Publications		
UNIT-V	LIST'SOF SUBJECT HEADINGS (i) List of Subject Headings – SLSH (ii) LCSH (iii) Subject Cataloguing		
Practical	Cataloguing of Book Materials According to AACR-2(Personal Authors & Simple Periodicals)		

SEMESTER- III**COMPUTER BASICS & APPLICATION (THEORY& PRACTICE)**

Paper-III	Pass-III	Full Marks- 100	Credit Points-06
UNIT-I	COMPUTER BASICS (i) Computer hardware: Components (ii) Input/ Output devices (iii) Software Packages: Programming languages		
UNIT- II	OPERATING SYSTEMS (i)Meaning types and functions (ii)Overview of the Operating System (iii)features of MS Windows		
UNIT -III	DATABASE AND COMPUTER SOFTWARE PACKAGES (i)Software packages: Meaning, types and functions (ii) Database structure, Organization and searching (iii)Database Management Systems		
UNIT -IV	LIBRARY AUTOMATION (i)Definition, Need & Purposes of Library Automation (ii)Retrospective Conversion (iii)Library House Keeping Operations(Acquisition, Serial Control, Cataloguing, Circulation Control)		
UNIT -V	LIBRARY SOFTWARE PACKAGES (i)Library Software Packages (ii)Evaluation Library Software Packages (iii)Features of CDS/ISIS		
Practical	Working with MS office		

SEMESTER- IV**FUNDAMENTALS OF INFORMATION TECHNOLOGY (THEORY& PRACTICE)**

Paper-IV	Pass-IV	Full Marks- 100	Credit Points-06
UNIT-I	INTRODUCTION TO INFORMATION TECHNOLOGY (i)Basic concepts of IT, DataProcessing: Data and Information. (ii)Introduction to Computers: Classification, History, Types of Computers. (iii)Hardware: CPU, Memory, Auxiliary storage devices.		
UNIT- II	INTRODUCTION TO INFORMATION TECHNOLOGY TOOLS (i)Operating System, Programming Languages, Features and trends (ii)Introduction to MS-DOS/WINDOWS/LINUX/UNIX (iii) Working with PC Packages. Translators: Assembler, Compiler and Interpreter.		
UNIT -III	TYPES OF COMPUTER FILES (i)Business Files: Concept of Character, Field, Record and File. (ii)Types of Data Files: Master File, Transaction File, Archival File. (iii) File Organization: Sequential file, Indexed Sequential file, Randomfiles.		
UNIT -IV	COMPUTERS & COMMUNICATION (i)Introduction to Computer Networks, Internet and World Wide Web, FTP, Electronic Mail. (ii)Web Development Tools: FrontPage, HTML. (iii)Information Security and Integrity: Basic Concepts, Perverse Software, Preventive Measures and treatments.		
UNIT -V	COMPUTER OUTPUT FORMATS (i)Output Design: Objective of output, types of Output, Formats of Output, (ii)Designing printed Outputs, Guidelines for designing printed outputs. (iii) Multimedia Applications, Online Examination		
Practical	Creation of Email id print screen shot in ppts/Searching of online databases with the help of internet		

SEMESTER- V

INFORMATION PROCESSING & RETRIEVAL (THEORY & PRACTICE)

Paper-V		Pass-V	Full Marks- 100	Credit Points-06
UNIT-I	BASIC CONCEPTS & THEORIES (i) Definition, needs and characteristics of information (ii) Generation and growth of information (iii) Theories of information			
UNIT- II	INDEXING TECHNIQUES (i) Definition and types of indexing systems (ii) Pre coordinate and post coordinate index system (iii) PRECIS, POPSI, CHAIN, UNITERM			
UNIT -III	SUBJECT ANALYSIS & REPRESENTATION (i) Problems of Subject Analysis representation, Contributions of Cutter, Kaiser, Ranganathan, Farradane & Coats (ii) Indexing Language & Controlled Vocabulary; Characteristics of Indexing Languages (iii) Thesaurus: Structure & Construction of Thesaurofacet			
UNIT -IV	ABSTRACT & ABSTRACTING SERVICES (i) Definition, needs and types of abstracts (ii) Methodology of compilation of abstract (iii) Abstracting and its services			
UNIT -V	INFORMATION SEARCHING & RETRIEVAL (i) Search Techniques; Boolean Searches (ii) On-line Searching Techniques & Retrieval (iii) Relevance of Judgments in Retrieval			
Practical	Preparing Keyword Indexing of ten titles			

SEMESTER- VI

INFORMATION SYSTEMS, PROGRAMMES (THEORY & PRACTICE)

Paper-VI		Pass-VI	Full Marks- 100	Credit Points-06
UNIT-I	INFORMATION SYSTEMS (i) Characteristics and Components of Information Systems (ii) Designing of Information Systems (iii) Library as Information Systems			
UNIT- II	NATIONAL INFORMATION SYSTEMS AND NETWORKS (i) National information systems and need and functions (ii) Features and objectives of national information policy an overview (iii) ENVIS, GIS, RIS, BIS			
UNIT -III	INTERNATION INFORMATION SYSTEMS (i) UNESCO & FID (ii) IFLA, INIS & AGRIS (iii) UNISIST & MEDLARS			
UNIT -IV	INFORMATION NETWORK PROGRAMS (i) NICNET (ii) NFLIBNET (iii) METROPOLITAN LIBRARY NETWORKS			
UNIT -V	INFORMATION SYSTEM CONTROLL Management Information and Control Systems Information Systems Security Information Systems and Functional Area Applications			
Practical	Evaluation of Information Systems & their Programmes through their respective Home Page			

C.B.C.S. SYLLABUS

Philosophy

B. A. (Hons.)

Total Number of Semesters	:	06
Total Number of Core Courses	:	14
Credit Point	:	4 (each)
Marks for each Paper 100	:	(mid Semester 20 + End Semester 80)
No of Classes	:	50 each

Core Course (Philosophy)

First Year

Semester – I

Paper – I	:	General Philosophy
Paper – II	:	Logic & Scientific Method

Semester – II

Paper – III	:	Systems of Indian Philosophy (I)
Paper – IV	:	Symbolic Logic

Second Year

Semester – III

Paper – V	:	Systems of Indian Philosophy (II)
Paper – VI	:	Ethics
Paper – VII	:	History of Greek Philosophy

Semester – IV

Paper – VIII	:	Contemporary Indian Philosophy
Paper – IX	:	History of Modern European Philosophy
Paper – X	:	Philosophy of Language

Third Year

Semester – V

Paper – XI	:	Study of Western Classics : Meditations of Rene Descartes
Paper – XII	:	Indian Text: Isa Upanisad

Semester – VI

Paper – XIII	:	Social & Political Philosophy
Paper – XIV	:	Applied Ethics

Discipline Specific Elective (DSE)

Marks : 100 x 2 (To choose any two)

Semester - V

Paper I Philosophy of Bhagbad Gita

Paper II Philosophy of Religion (Compulsory)

Paper III Philosophy of Mind

Semester VI (To choose any two) 100 x 2 = 200

Paper I Project (Compulsory)

Paper II Gandhian Studies

Paper III Study of Major Religions of the World

Generic Elective (GE)

First Year

First Semester

Paper I Symbolic Logic (F. M. 100)

First Year

Second Semester

Paper II Indian Philosophy (F. M. 100)

Second Year Third Semester

Paper I History of Modern European Philosophy (F. M. 100)

Second Year Fourth Semester

Paper II Ethics : Theory & Practice (F. M. 100)

SKILL ENHANCEMENT COURSE (SE)

Paper – I Critical Thinking Marks – 50

Paper – II	Applied Reasoning	Marks - 50
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CBCS SYLLABUS

B. A. (Pass) Philosophy

Core Course: Philosophy (12 Papers)

First Year

Semester – I Paper – I General Philosophy 100 marks 4 credit

Paper – II	Logic & Scientific Method	100 marks 4 credit
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Semester – II	Paper-III	Systems of Indian	100 marks 4 credit
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Philosophy (I)

Paper-IV	Symbolic Logic	100 marks 4 credit
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Second Year

Semester – III Paper-V Systems of Indian 100 marks 4 credit

		Philosophy (II)	
	Paper-VI	Ethics	
Semester-IV	Paper-VII	Contemporary Indian Philosophy	100 marks 4 credit
	Paper-VIII	History of Greek Philosophy	100 marks 4 credit
Third Year			
Semester-V	Paper - IX	History of Modern European Philosophy	100 marks 4 credit
	Paper-X	Philosophy of Language	100 marks 4 credit
Semester-VI	Paper-XI	Social & Political Philosophy	100 marks 4 credit
	Paper-XII	Applied Ethics	100 marks 4 credit

Discipline Specific (DSE)

Elective

Semester-V	Paper-I	Philosophy of Bhagabad Gita	100 marks 4 credit
	Paper-II	Philosophy of Religion	100 marks 4 credit
Semester-VI	Paper –III	Gandhian Studies	100 marks 4 credit
	Paper-IV	Project	100 marks 4 credit

GENERIC ELECTIVE (GE)

Paper-I	Logic (Classical & Symbolic)	100 marks 4 credit
Paper-II	Ethics & Society	100 marks 4 credit

C.B.C.S. PATTERN

U. G. Arts Philosophy Core Course

First Year / Semester-I / Paper-I

F. M. : 20 + 80 = 100

Credits : 04

GENERAL PHILOSOPHY

- Unit-I** : Definition, Nature and Function of Philosophy, Philosophy in relation to other modes of thinking like science and Religion
- Unit – II** : Problems of Being : Monism and Pluralism
Realism: (a) Naive Realism (b) Representative Realism (Locke),
Idealism : Meaning, Esse est Percipi (Berkeley)
- Unit – III** : Problems of Knowledge: What is Knowledge? Sources of Knowledge
: Empiricism, Rationalism
- Unit –IV** : Problems of Ethics : (1) Theories of Goodness : The Good and the Evil (2) Theories of Conduct : Egoism and Altruism
- Unit-V** : Problems of Metaphysics:
(1) Substance and Universal
(2) Mind and Body

Basic Study Materials:

1. John Hospers - An Introduction to Philosophical Analysis
2. G. T. W. Patrick - Introduction to Philosophy
3. G. W. Cunningham - Problems of Philosophy
4. B. Russell - Problems of Philosophy
5. D. W. Hamlyn - Metaphysics
6. Richard Taylor - Metaphysics

FIRST YEAR U. G. CORE COURSE

Semester – I

Paper – II: Logic & Scientific Method

Full Marks: 20 + 80 = 100

Credit Points: 04

- Unit-I** : Definition of Logic, Deductive & Inductive Arguments, Validity & Soundness of Arguments, Laws of Thought
- Unit – II** : Classification of Propositions (from Quality & quantity stand point)
Distribution of terms, Square of Oppositions, Existential Import of Propositions, Interpretation of Categorical Propositions
- Unit-III** : Inference – Immediate Inference (Conversion & Observation)
Mediate Inference (Syllogism) : Figure & Moods, Testing Validity of Arguments by syllogistic Rules
- Unit-IV** : Inductive Reasoning & Scientific Enquiry
(a) Laws of Causation – Meaning & Definition cause and condition, Qualitative & Quantitative Marks of Causation
(b) Mills Experimental Methods
- Unit-V** : Science & Probability : (a) Scientific Explanation and Unscientific explanation (b) Hypothesis & Confirmation

Recommended Books:

1. Copi, Cohen & MacMahan – Introduction to Logic (14th Edition)
2. Cohen & Nagel – Introduction to Logic & Scientific Method
3. Alex Rosenberg – Philosophy of Science : A Cont. Introduction
4. W. Kneale – Probability & Introduction
5. John Hospers – Philosophical Analysis

SYSTEMS OF INDIAN PHILOSOPHY (I)

Full Mark: 20 + 80 = 100

Credit Points: 04

- Unit-I** : Salient Features of Indian Philosophy, Astika & Nastika systems,
Basic concepts like Rta, Rna, Purusartha, Law of Karma
- Unit – II** : Carvakas – Epistemology and Metaphysics (Lokayatamata)
- Unit-III** : Jainism – Syadvada, Anekantavada Jaina ethics (concept of Triratna)
- Unit-IV** : Buddhism – Four Noble Truths, Doctrine of Momentariness,
Dependant Origination, No Soul Theory, Nirvana
- Unit-V** : Samkhya Dualistic System : Purusa, Prakriti, Theory of Causation,
Theory of Evolution

Books Recommended:

1. G. C. Nayak (ODIA) - Bharatiya Darshana
2. B. B. Choudhury (ODIA) - Bharatiya Darshanara Ruparekha (Trans.) of M. Hiriyana's Outline of Indian Philosophy
3. Dutta & Chatterjee – An Introduction to Indian Philosophy
4. C. D. Sharma – A Critical Survey of Indian Philosophy
5. R. K. Puligandla – Fundamentals of Indian Philosophy
6. S. Radhakrishnan – Indian Philosophy, Vol. I / II
7. J. N. Sinha – Indian Philosophy

Semester-II / Paper-IV / Phil. Core

SYMBOLIC LOGIC

Full Mark: 20 + 80 = 100

Credit Points: 04

Books Prescribed: Basson & O' Corner: Introduction to Symbolic Logic

Unit-I	Chapter-I	Introduction
	Chapter-II	The Calculus of Propositions
Unit – II	Chapter-III	Calculus of Propositions (Sec 1 to 60)
Unit-III	Chapter – III	Calculation of Propositions (Sec 7 to 9)
Unit-IV	Chapter-V	The Elements of Predicate Calculus (Section 1 to 9)
Unit-V	Appendix	(Sec-1 to Sec-4)

2nd Year U. G. Philosophy (Core)

Semester-III / Paper-VI / Ethics

Full Mark: 20 + 80 = 100

Credit Points: 04

Unit-I	: Definition, Nature & Scope of Ethics. Ethics in relation to Politics, Sociology and Religion
Unit – II	: Distinction between moral and non-moral action Moral Judgement and factual judgement, subject or Moral judgement
Unit-III	: Utilitarianism, Hedonism
Unit-IV	: Rigorism, Perfectionism
Unit-V	: Theories of punishment; Retributive, Reformative and Preventive theory

Books for Reference:

1. J. N. Sinha – A Manual of Ethics
2. W. Frankena – Ethics

Semester – II

Paper – VII / Phil. (Core)

HISTORY OF GREEK PHILOSOPHY

F. M.: 20 + 80 = 100

Credits: 04

- Unit-I** : Nature of Greek Philosophy: What is Philosophy? Origin, development and salient features of early Greek Thought
- Unit – II** : Pre-Socratic Thought : The Being of Thales, Becoming of Heraclitus and Atomism of Democritus
- Unit-III** : Socrates : Problem before Socrates, Dialectical method, epistemology of Socrates and ethics
- Unit-IV** : Plato : Theory of Idea, Theory of Knowledge and Theory of Soul
- Unit-V** : Aristotle : A Critique of Plato, Theory of Form and Matter, Theory of Causation

Suggested Readings:

- (1) W. T. Stace - Greek Philosophy
- (2) Burnet - Greek Philosophy
- (3) Y. Masih - A Critical History of Philosophy
- (4) F. Thilly - A History of Philosophy
- (5) B. Russell - A History of Western Philosophy
- (6) B. A. G. Fuller - A History of Greek Philosophy

Semester – III

Paper – V / Phil. (Core)

SYSTEMS OF INDIAN PHILOSOPHY (II)

F. M.: 20 + 80 = 100

Credits: 04

- Unit-I** : Yoga system of Patanjali: Citta Vriti Nirodha and Astanga Yoga
- Unit – II** : Nyaya: Pramanas
Vaisesika: Categories (Padarthas)
- Unit-III** : Upanisadic view of Atman and Brahman Vidya & Avidya, Para Vidya & Apra Vidya
- Unit-IV** : Sankara's View on Maya, Jiva, Isvara & Brahman and Liberation (Jivanmukti & Videhamukti)
- Unit-V** : Ramanuja – Refutation of Sankara's view of Maya, Concept of Brahman, Jiva and Liberation

Books Recommended:

- (1) G. C. Nayak (ODIA) - Bharatiya Darshana
- (2) B. B. Choudhury (ODIA) (Trans.) - Bharatiya Darshanara Ruparekha
- (3) Dutta & Chatterjee – An Introduction to Indian Philosophy
- (4) J. N. Sinha – Indian Philosophy
- (5) R. K. Puligandla – Fundamentals of Indian Philosophy
- (6) S. Radhakrishnan – Indian Philosophy (Vol. I & II)
- (7) J. N. Sinha – Indian Philosophy

Semester – IV

U. G. Arts Core (Philosophy)

Paper - VII

CONTEMPORARY INDIAN PHILOSOPHY

F. M.: 20 + 80 = 100

Credits: 04

- Unit-I** : R. N. Tagore : God and Reality, Nature of Religion Man and his destiny
- Unit – II** : Swami Vivekananda : Concept of Man and his Destiny, Practical Vedanta, Universal Religion
- Unit-III** : Sri Aurovindo: Nature of World, Maya, Theory of Evolution, Satchidananda, Integral Yoga
- Unit-IV** : M. K. Gandhi: Truth, God, Non-violence, Satyagraha and Sarvodaya
- Unit-V** : S. Radhakrishnan : Concept of Man, Reality, Intellect & Institution Religion

Basic Study Materials:

- (1) B. K. Lal – Contemporary Indian Philosophy
- (2) T. M. P. Mahadevan & V. Saroja – Contemporary Indian Philosophy
- (3) H. Sahoo (ed.) – Contemporary Indian Philosophy

Semester – IV

Paper – IX

(HISTORY OF MODERN EUROPEAN PHILOSOPHY)

F. M. : 20 + 80 = 100

Credits : 04

- Unit-I** : Bacon – Theory of Idola, Inductive Method
Descartes – Universal Doubt, Cogito-ergo-sum, Existence of God, Interactionism
- Unit – II** : Spinoza – Substance, Attribute and Modes Psycho-physical parallelism
Leibnitz – Theory of Monads, pre-established Harmony
- Unit-III** : Locke : Refutation of Innate Ideas, Sources of Knowledge
Berkeley : Subjective Idealism, Esse-est-Percipi
- Unit-IV** : Hume – Impression & Ideas, Scepticism, Theory of Causality
- Unit-V** : Kant – Reconciliation between Empiricism and Rationalism, Possibility of Synthetic Apriority Judgement Space & Time

Books Prescribed

1. Y. Masih – History of Western Philosophy
2. H. Ray & G. Das – (O) Paschatya Darshanara Itihasa
3. Fran Thilly – A History of Philosophy
4. Ira Sengupta – A History of Western Philosophy
5. B. Russell – History of Western Philosophy
6. Barlingay & Kulkarni – A critical survey of Western Philosophy

Semester – IV

(Philosophy Core)

Paper – X

(PHILOSOPHY OF LANGUAGE)

F. M.: 20 + 80 = 100

Credits: 04

Textual Study	: John Hospers – An Introduction to Philosophical Analysis
Unit-I	: Word – Meaning : Meaning of the word “Meaning” Ambiguity and vagueness
Unit – II	: Definitions : Denotative, Connotative, & Ostensive Defining and Accompanying characteristics stipulate & Reparative Definition, Persuasive definition
Unit-III	: Sentence – Meaning : Proposition and sentence word-meaning and sentence – meaning, criteria of sentence – meaning/
Unit –IV	: Analytic – synthetic, a priori – a posteriori, distinction, logical possibility and impossibility.
Unit – V	: Concept ; Nature and source Truth : Correspondence, Coherence and Truth as it “Works”

Unit-I	Meditation – I	Sceptical Doubts
	Meditation – II	Cogito ergo sum, Sum res cogitans The wax Argument
Unit – II	Meditation – III	Clear and distinct perceptions Theory of Ideas, Existence of God
Unit-III	Meditation – IV	God is no Deceiver, Will, Intellect and Possibility of Error
Unit – IV	Meditation – V	Essence of Material Things, Existence of God
Unit – V	Meditation – VI	Mind-body Dualism, Primary & Secondary Quality

Book Recommended

1. Rene Descartes - Meditations on First Philosophy
2. Rae Langton - A study guide to Descartes Meditations
3. Amelie Rorty - Essays on Descartes Meditations

ISA UPANISADS WITH SANKARA’S COMMENTARY

Unit-I	What are Upanisads, place of Upanisads in Indian Philosophy and Culture – Isa Upanisad
Unit – II	Mantra 1 to 44
Unit-III	Mantra 5 to 9
Unit – IV	Mantra 10 to 14
Unit – V	Mantra 15 to 18

Basic Study Materials:

1. The Isa Upanisad with Sankara’s Commentary
2. S. Radhakrishnan - The Principal Upanisad
3. Satyavadi Mishra - Central Philosophy of the Upanisads

SOCIAL & POLITICAL PHILOSOPHY

- Unit-I** Sociality, Social Science & Social Laws Philosophy of Social Science – Relation between Individual society (Mechanical, Organic and Idealistic view)
- Unit – II** Political Ideals – Justice, Liberty, Equality, Equality
Political Doctrines – Humanism, Secularism Feminism, Philosophy Ecology
- Unit-III** Democratic Ideals: Democratic Government, Conditions for successful functioning of Democracy.
- Unit – IV** Political Ideologies (a) Anarchism (b) Marxism (C) Sarvodaya
- Unit – V** Social progress: Human Rights: Origin and development,
Declaration of Human Rights : Theory and Practice

Basic for Suggested Readings:

1. O.P. Gauba – An Introduction to Political Philosophy
2. J. Sinha – Outlines of Political Philosophy
3. D.D. Raphael – Problems of Political Philosophy
4. Krishna Ray & Chhanda Gupta – Essays in Social & Political Philosophy
5. M.K. Gandhi – Hind Swaraj

APPLIED ETHICS

- Unit – I** What is Applied Ethics : Nature & Scope of applied ethics – Ethical Theories – Deontology, Utilitarianism, Relativism and Subjectivism
- Unit – II** **Taking Life : Animals** – Animals Rights, Reverence for life, killing of animals
- Unit – III** **Taking Life : Humans** – Euthanasia : Types Abortion
- Unit – IV** Environmental Ethics : Relation between man and nature, Anthropocentrism, Non-Anthropocentrism
Western Tradition – Responsibility for Future Generation, Deep Ecology
- Unit – V** Professional Ethics : (a) Business ethics – Rights and obligations, justice & honesty in ethics.
(b) Bio-medical Ethics – Hippocratic Oath, Rights and obligations of Health – care Professionals, Doctor- Patient-Relationship

Books Recommended

1. Peter Singer – Practical Ethics
2. J. Jagadev – Biomedical Ethics
3. Tom Regan – Animal Rights
4. J.P. Thirou – Ethics : Theory & Practice

Discipline Specific Elective (DSE)

Semester – V

(Credits 4/F.M. 100)

Paper – I

THE PHILOSOPHY OF BHAGBAD GITA

- Unit – I** The Bhagabad Gita: Concept of Yoga, Concept of life and death.
- Unit – II** Karma & Karmaphala in the Bhagabad Gita, classification of Karma :
Karma, Akarma, Vikarma
- Unit- III** Concepts like Jnana & Vijnana, Ksara and Aksara, Uttama Purusa in Bhagabad Gita.
- Unit – IV** Chapter XVIII (Verse 1 to 36) with Sankara's commentary

Basic Study Materials:

1. S.Radhakrishnan (Trans. & Ed) - The Bhagabad Gita
2. S.C. Panigrahi - Concept of Yoga in the Gita
3. A.G.K. Warrior (Trans.) - Srimad Bhagabad Gita Bhasya of Sri Sankaracharya
4. K.M. Munshi & R.R. Diwakar - Bhagabad Gita & Modern Life
5. P.N. Srinivasachari - The Ethical Philosophy of the Gita

Paper – II

Philosophy of Religion (DSE-II)

Basic Text John Hick – Philosophy of Religion

- Unit – I** Introduction to Philosophy of Religion Judaism – Christian Concept of God (Chapter – 1)
- Unit – II** Grounds for belief in existence of God (Chapter – 2)
- Unit – III** Grounds for belief against existence of God (Chapter – 3)
- Unit – IV** The Problem of Evil (Chapter – 4)
- Unit- V** Conflicting Truth Claims of different Religions (Chapter – 9)
Religious Pluralism

Books for Reference

1. Y. Masih- Introduction to Religious Philosophy
2. Arvind Sharma – Philosophy of Religion

Paper – III

Philosophy of Mind (DSE-3)

Unit – I	Nature and Scope of Philosophy of Mind, Mind and Soul, Nature of Mental Phenomena Consciousness – Theories of Mental Phenomena
Unit – II	The Third Person Account: Merits and Limitations. The First Person Account, Theory of intentionality.
Unit – III	Some theories of Mind – Dualism, Materialism, Identity Theory, Double Aspect Theory.
Unit – IV	The Concept of a person and the problem of personal Identity.
Unit – V	Some theories of Mind – Interactionism, Parallelism, Epiphenomenalism, The Problem of Free will.

Basic Study Materials

1. J.A. Shaffer – Philosophy of Mind
2. S. Shoemaker – Self knowledge & self- identity
3. S. Hampshire – Philosophy of Mind
4. T.E. Wilkerson – Minds brains and people

SEMESTER – VI

PAPER - I

Project Compulsory

(Dissertation 60 + Viva 40 Marks)

The student has to prepare a project of his own selecting a topic from Philosophical perspective in consultation with a teacher. He / She has to prepare a dissertation of 60 marks which will be evaluated by an external examiner and he / she will face a viva-voice test (40 marks) by an external examiner along with his / her supervisor of the concerned project.

Paper – II

Gandhian Studies

- Unit – I Political Thought of Gandhi :** Gandhi's concept of Politics – goals and methods of action; concept and claim of spiritualizing politics, Satyagraha
- Unit – II Economic Thought of Gandhi :** Gandhi's ideas and efforts in the field of economics; Gandhi's critique of industrialization – evils and consequences; philosophy of work & employment, need and greed
- Unit – III Gandhi's Social Thought and Social Work:** Philosophy of Sarvodaya, concept of Gram Swaraj, Varnashrama Versus Caste system untouchability.
- Unit- IV Gandhi on Education:** Meaning and aims of education Basic education (Nai Talim), Duties of Students, Parents and Teachers in education and their interrelationship.
- Unit – V Gandhi's idea of Peace:** Meaning of peace and violence; peace and Disarmament; Non-violent way to world peace. Combating terrorism through non-violence; Gandhian Approach to conflict Resolution – Shanti Sena

Basic Study Materials :

1. Mahatma Gandhi - Autobiography
2. Mahatama Gandhi - Hind- Swaraj
3. Mahatama Gandhi - Towards Non-violent Socialism
4. Mahatma Gandhi - Towards New Education
5. S. Radhakrishnan (ed.) - Mahatma Gandhi: Essays & Reflect
6. R.K. Prabhu & U.R. Rao- The mind of Mahatma Gandhi
7. Sarat Mahanty (ODIA) - Gandhi Manisha

Semester – VI DSE**Study of Major Religions of the World****Paper –III**

- | | |
|-------------------|---|
| unit– I | Sanatan Dharma: Basic features of Sanatan Dharma, The Conception of Man (amritasya Putra), His Pursuits: Dharma , Artha, Kama & Moksa |
| Unit – II | Buddhism: Basic features of Buddhism, Four noble truths, Eight-fold Path, Nirvana |
| Unit – III | Jainism: Three Gems, Five Vows, Liberation |
| Unit – IV | Christianity: Basic features, God, World ,Salvation |
| Unit – V | Islam: Basic features, Man ,God & Human Destiny |

Suggested Readings:

- 1.Y. Masih - A Comparative Study of Religions
2. Lloyd Ridgeon - Major World Religions
3. K. N.Tiwary - Comparative Religion

First Year	GENERIC ELECTIVE (GE)	F.M. 100
		(20+80)

First Semester	Paper – I (Symbolic Logic)	Credits: 04
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Text - (Basson & O. Conner)
Introduction to Symbolic Logic

Unit – I	Ch- Introductory
	Ch-II The Calculus of Propositions
Unit – II	Ch-III The Calculus of Propositions (Sec 1 to 6)
Unit – III	Ch-III The Calculus of Propositions (Sec 7 to 9)
Unit – IV	Ch- V The Elements of Predicate Calculus
Unit- V	Appendix Sec 1 to Sec - 4

First Year	Paper- II	F.M. 100
		(20+80)

Second Sem.	INDIAN PHILOSOPHY	Credits 04
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Unit – I	Salient features of Indian Philosophy and key concepts Carvaka – Epistemology, Metaphysics Jainism – Syadvada & Anekantavada
Unit – II	Buddhism – Four Noble Truth, Doctrine of Dependent Origination, No Soul Theory, Nirvana
Unit – III	Samkhya – Purusa, Prakriti, Evolution Yoga – Patanjali's Citta Vritti Nirodha, Astanga Yoga
Unit – IV	Nyaya – Theory of Inference Vaisesika – Padarthas (Categories)
Unit- V	Samkara – Brahman, Atman, Maya & Liberation Ramanyan – Brahman, Atman, Maya & Liberation

Books Recommended:

1. Dutta & Chatterjee – An Introduction to Indian Philosophy
2. C. D. Sharma – A Critical Survey of Indian Philosophy
3. G. C. Nayak (O) Bharatiya Darshana
4. B. B. Choudhury (O) (Trs.) – Bharatiya Darshanara Ruparekha

Second Year	GENERIC ELECTIVE (GE)	F.M: 100
		(20+80)
Third Sem.	Paper – I	Credits 04

History of Modern European Philosophy

Unit – I	Bacon: Theory of Idola, Inductive Method. Descartes: Methods of Doubt, Cogito ergo sum, Innate Ideas.
Unit – II	Spinoza: Substance, Attributes and Modes Leibnitz: Theory of Monads, Pre-established Harmony
Unit – III	Locke: Refutation of Innate Ideas, Theory of Knowledge Berkeley: Esse est percipi, Subjective Idealism
Unit – IV	Hume: Ideas & Impressions, Idea of No Self, Theory of Causality, Scepticism
Unit- V	Kant: Reconciliation of Empiricism and Rationalism, Theory of space and Time Deduction of Categories of Understanding

Basic Study Materials

1. Ira Sengupta – A History of Western Philosophy
2. Barlingay & Kulkarni – A History of Western Philosophy
3. Ray & Das (ODIA) - Paschatya Darshanara Itihasa
4. Y. Masih A Critical History of Western Philosophy
5. R.K. Pati - A History of Modern European Philosophy
6. R. Falkenberg – A History of Philosophy

Ethics: Theory & Practice

Unit – I	Definition, Nature & Scope of Ethics, Distinction between moral & non-moral action, stages of development of voluntary Action.
Unit – II	Distinction between factual and moral judgment, objects of moral judgment.
Unit – III	Moral Standards : Hedonism, Mill’s Utilitarianism, Kant’s Rigorism & Perfectionism
Unit – IV	Environmental Ethics: Relation between Man & Nature, Anthropocentrism and Non - Anthropocentrism
Unit- V	Concept of Bio-centric, Egalitarianism, Deep Ecology – Man’s Responsibility for the future generation

Recommended Study Materials :

1. William Franken – Ethics
2. J.N. Sinha – A Manual of Ethics
3. Peter Singer – Practical Ethics

SKILL ENHANCEMENT COURSE

Paper – I

F.M 50

Critical Thinking

- Unit – I Introduction to Critical Thinking : Standards of Critical thinking, benefits and limitations
- Unit – II Arguments & Recognising arguments : Definition & Contents of argument premises, hidden premises, conclusions intermediate conclusions

Book Recommended :

1. Hurley, Patrick. J. – A concise Introduction to Logic (2015) 12th Ed.
2. Madhuchhanda Sen - An Introduction to Critical Thinking (2010)

SKILL ENHANCEMENT COURSE

Paper – II

F.M 50

Applied Reasoning

- Unit – I Fallacies: Introduction, fallacies of Relevance, fallacies of Presumption, Fallacies of Ambiguity, Illicit Transference, fallacies in Ordinary language
- Unit – II Types of Reasoning: Analogical, Legal and Moral
- Unit – III Science & Superstition: Distinction, Evidentiary Support, Objectivity Integrity

Book Recommended :

1. H. Patrick, J. – A Concise Introduction to Logic (2015) 12th Edition
2. M. Sen - An Introduction to Critical Thinking (2010)

UTKAL UNIVERSITY



SYLLABUS
FOR THE
CHOICE BASED CREDIT SYSTEM
+3 PUBLIC ADMINISTRATION
(Hons. & Pass) program
From 2016-2017 Academic Session

Approved by the Board of Studies on 20.05.2016

Total Marks: 2400

Credit points:148

SCHEME FOR CHOICE BASED CREDIT SYSTEM IN

BA (PUBLIC ADMINISTRATION) HONOURS

SEME STER	CORE COURSES	ABILITY ENHANCEMENT COMPULSORY COURSES	SKILL ENHANCEM ENT COURSES	GENERIC ELECTIVE COURSES	Discipline Specific Elective Cours
6	14	2		4	
I	Principles of Public Administration Indian Administration	English/MIL Communication/En vironmental Science		GEC-I	
II	Comparative Public Administration -I Administrative Thinkers-I	Environmental Science/ English/MIL communication		GEC-II	
III	Administrative Theory:New Concepts ----- Comparative Public Administration-II Administrative Thinkers-II		SEC-I	GEC-III	
IV	State Administration Development Administration Public Personnel Administration in India		SEC-II	GEC-IV	DSE-I DSE-II (From Group-A)
V	Organizational Behaviour Local Governance				
VI	Human Resource Management Public Policy				One from DSCE- Group B Project(Compulsory)

As per UGC guidelines the Honours course will have 140 credits. The student has to cover 140 credit courses in 3years. All Core courses, Generic Elective Courses(GEC) and Discipline Specific Elective Courses will have 6 credits each. 6 credits courses have to impart 50hrs of teaching and 10hrs of tutorial. One of the Discipline Specific Courses is project which is compulsory.

Course structure for B.A.(Hons.) Public Administration**Semester-1**

Name of the Paper	Category	Total Marks	Credit points
Principles of Public Administration	Core-1	100	6
Indian Administration	Core-2	100	6
Ability Enhancement Compulsory Course	AECC-1	50	4
Generic Elective Course	GEC-1	100	6
TOTAL		350	22

Semester-II

Name of the Paper	Category	Total Marks	Credit points
Comparative Public Administration	Core-3	100	6
Administrative Thinkers-I	Core-4	100	6
Ability Enhancement Compulsory Course	AECC-2	50	4
Generic Elective Course	GEC-2	100	6
TOTAL		350	22

Semester-III

Name of the Paper	Category	Total Marks	Credit points
Comparative Public Administration-II	Core-5	100	6
Administrative Thinkers-II	Core-6	100	6
Administrative Theory: New concepts	Core-7	100	6
Skill Enhancement Course	SEEC-1	50	4
Generic Elective Course	GEC-3	100	6
TOTAL		450	28

Semester-IV

Name of the Paper	Category	Total Marks	Credit points
State Administration	Core-8	100	6
Development Administration	Core-9	100	6
Public Personnel Administration in India	Core-10	100	6
Skill Enhancement Course	SEEC-2	50	4
Generic Elective Course	GEC-4	100	6
TOTAL		450	28

Semester-V

Name of the Paper	Category	Total Marks	Credit points
Organizational Behaviour	Core-11	100	6
Local Governance	Core-12	100	6
Discipline Specific Elective Course	DSEC-1 (From Group A)	100	6
Discipline Specific Elective Course	DSEC-2 (From Group A)	100	6
TOTAL		400	24

Semester-VI

Name of the Paper	Category	Total Marks	Credit points
Human Resource Management	Core-13	100	6
Public Policy	Core-14	100	6
Discipline Specific Elective Course	DSEC-1 (From Group B)	100	6
Discipline Specific Elective Course	Project-Compulsory	100	6
TOTAL		400	24

Discipline Specific Elective Courses for B.A.(Hons.)Public Administration

DSEC—Group-A(Any Two of the Following)	DSEC—Group-B(Any one of the Following Papers) and Project
Research Methodology	Financial Administration in India
Urban Governance in India	Welfare Administration in India
Rural Development in India	Disaster Management in India
Indian Administration:Issues and trends	Project (Compulsory)

Syllabus in detail

Core Public Administration Course-1: Principles of Public Administration

6 Credits/100 Marks

Course Description: This paper covers basic principles of public administration. The objective is to provide the students with basic knowledge regarding principles of administration.

Learning Outcome:Students can acquire a basic understanding regarding the concepts of public administration.

Unit –I

Public Administration, Meaning Nature, Scope, Role of Public Administration in Developing and Developed Countries, Methods of Study , Difference between Public And Private Administration

Unit-II

Formal and Informal Organization, Line and staff Agencies, Principles of Public Administration- Hierarchy, Span of Control, Delegation, Co-ordination

Unit- III

Decentralization, Centralization, Organizational Effectiveness

Suggested Readings

1. Avasthi and Maheswari, “Public Administration”, Agra, Laxmi Narayan Agarwal, 1988.
2. Mohit Bhattacharya “Public Administration”, World Press (Second Edition, 1991)
3. B.L. Fadia and Kuldeep Fadia, “Public Administration: Administrative Theories and Concepts”, Agra, Sahitya Bhawan, 2014.
4. Rumki Basu, “Public Administration: Concepts and Theories” New Delhi, Sterling Publishers, 2011.

Core Public Administration Course 2-Indian Administration 6 Credits/100 Marks

Course Description: The papers cover a number of provisions as to Indian Administration. The objective is to apprise the students as to structure and process of Indian Administration.

Learning outcome: Students will acquire rudimentary knowledge as to the functioning of Indian Administration.

Unit-I

Evolution of Indian Administration: Ancient Period, Medieval period, Modern Period up to 1947, Salient Features of Indian Constitution, Preamble, Federalism,

Unit-II

President, Prime Minister, Cabinet, Centre- State Relations (Administrative, Legislative and financial)

Unit-III

Core Institutional mechanisms: Niti Ayog, National Development Council, Planning process, State Planning, District Planning, Election Commission, Finance Commission, Lok Pal and Lokayukta

Suggested Readings:

1. Hoshier Singh and Pankaj Singh, "Indian Administration", Delhi, Pearson, 2011
2. B.L. Fadia and Kuldeep Fadia, "Indian Administration" Agra, Sahitya Bhawan, 2014
3. D.D. Basu, "Introduction to the constitution of India" New Delhi, Prentice Hall of India, 2014
4. S.R. Mahesswari, "Indian Administration", New Delhi, Orient Longman, 2011.
5. Pratap Bhanu Mehta & Nirja Gopal Jayal. The Oxford Companion to Politics in India, Oxford University Press, 2011
6. Bidyut Chakrabarty & Rajendra Kumar Pandey, Indian Government and Politics, Sage Publication, 2009

Core Public Administration Course 3-Comparative Public Administration-1

6

Credits/100 Marks

Course Description: The paper carries a comparative understanding of different administrative systems. The objective is to make the students aware of the structure and function of different administrative systems like the UK, USA. Students can have the knowledge of structure and functions of administrative systems like the UK, USA. Learning outcome: The students will be aware of administrative systems of major democracies.

Unit-I

Executive System in U.K., U.S.A., Civil Service in UK & USA.

Unit-II

Legislative System in U.K., U.S.A.,

Unit-III

Judicial System in U.K., U.S.A.,

Suggested Readings

1. Ramesh k. Arora, "Comparative Public Administration", 1996.

1. J. A. Chandler (ed), "Comparative Public Administration", Routledge Publications, 2010
2. Sabine Kuhalmann, "Introduction to Comparative Public Administration", Edward Elgar Publishing, 2014.
3. Nirmood Rapheli (ed), "Reading in Comparative Public Administration", 1970

Core Public Administration Course 4-Administrative Thinkers-1

6 Credits/100 Marks

Course Description: The paper contains administrative thinking of a group of Thinkers.

The objective is to make the students apprise of the administrative ideas of a group of Indian and other thinkers. Students can acquire basic idea as to administrative thinking of Kautilya, Taylor, Max Weber, Elton Mayo etc.

Learning outcome: This will enrich students' understating of administrative theories.

Unit-I

Kautilya, F W Taylor, Woodrow Wilson

Unit –II

Henri Fayol, Gullick, Urwick, Max Weber

Unit – III

Mary Parker Follett, Elton Mayo.

Suggested Readings

1. D.Ravindra Prasad, V.S. Prasad, P. Satyanarayan, Y. Pardhasarathi, "Administrative Thinkers", New Delhi, Sterling Publishers, 2014.
2. Shriram Maheswari, "Administrative Thinkers", Delhi, Macmillan, 2003.
3. R.K. Sapru, "Administrative Theories and Management Thought", New Delhi, PHI Learning Private Limited, 2013.
4. Bidyut Chakravorty, "Public Administration", New Delhi, Sage, 2013.

Core Public Administration Course 5: Comparative Public Administration-II

6

Credits/100 Marks

Course Description: The paper covers the theories and models of comparative Public Administration. The objective is to make the students aware of theories and models of Comparative Public Administration.

Learning outcome: Students will acquire fair knowledge as to comparative Public Administration on reading this paper.

Unit-I

The Concept, Nature, Scope and Approaches to the Study of Comparative Public Administration, Emerging Trends in Comparative Public Administration.

Unit-II

Theories and Models of Comparative Public Administration: Fred Riggs and Ferrel Heady.

Unit-III

Grievance Mechanisms in Administration: U.K. & U.S.A.

Suggested Readings:

1. K.K. Ghai, "Major Governments, Political System of U.K., USA, Switzerland, France and China", New Delhi, Kalyani Publishers, 2013.
2. J. A. Chandler (ed), "Comparative Public Administration", Routledge Publications, 2010

3. Sabir Kuhalmann, Introduction to Comparative Public Administration, Edward Elgar Publishing, 2014.

4. Nirmod Rapheli (ed), Reading in Comparative Public Administration, 1970.

Core Public Administration Course6: Administrative Thinkers-II

6 Credits/100 Marks

Course Description: The paper contains administrative thinkers of a group of Thinkers. The objective is to make the students apprise of the administrative ideas of a different modern thinkers. Students can acquire basic ideas concerning administrative thinking of , Chris Argyris, Chester I Barnard, Abraham Maslow, Herzberg, McGregor, Herbert Simon etc.

Learning outcome: This will enrich students' understating of different administrative theories.

Unit I

Chris Argyris, Chester I Barnard,

Unit –II

Abraham Maslow, Hebert Simon,

Unit III

Herzberg, McGregor,

Suggested Readings

1. D.Ravindra Prasad, V.S. Prasad, P. Satyanarayan, Y. Pardhasarathi, "Administrative Thinkers", New Delhi, Sterling Publishers, 2014.
2. Shriram Maheswari, "Administrative Thinkers", Delhi, Macmillan, 2003.
3. R.K. Sapro, "Administrative Theories and Management Thought", New Delhi, P HI Learning Private Limited, 2013.
4. Bidyut Chakravorty, "Public Administration", New Delhi, Sage, 2013.

Core Public Administration Course 7:Administrative Theory: New Concepts

6

Credits/100 Marks

Course Description: The course covers emerging concepts in Public Administration. The objective is to apprise the students emerging trends and new concepts of Public Administration.

Learning outcome: Students can acquire knowledge regarding updated concepts of Public Administration.

Unit-I

New Public Administration, New Public Management, Minnow-brook Conference –III

Unit-II

New Trends & Issues: Public Choice Approach, Public Private Partnership, Corporate Social Responsibility, Civil Society,

Unit-III

Good governance, E-governance, Regulatory Governance, Citizen Charter,

Suggested Readings:

1. Alaka Dhameja (Ed), “Contemporary Debates in Public Administration”, New Delhi, 2003.
2. Arun Kumar Behera, “Public Administration: Theory and Practice”, Delhi, Pearson, 2012.
3. Bidyut Chakravarty, “Public Administration: in a Globalized world”, New Delhi, Sage, 2014

Core Public Administration Course 8-State Administration 6 Credits/100 Marks

Course Description: The paper covers different dimensions of State Administration. As a matter of fact students can know the structure and functions of State Administration. To help the students to gain knowledge regarding state administration.

Learning outcome: Students will have the knowledge of State Administrative System.

Unit-I

State Government: Governor, Council of Ministers, Chief Minister.

Unit-II

State Legislature, High Court, Board of Revenue, Revenue Divisional Commissioner.

Unit-III

Secretariat Administration: Chief Secretary, Department of General Administration, Finance, Planning and Co-ordination.

Suggested Readings:

1. Administrative Reforms Commission Report on State Administration, November, 1969.
2. S.S. Khera, “District Administration”, New Delhi, National Publishing House, 1979.
3. Shriram Maheswari, “State Government in India”, New Delhi, 1979.
4. J.C. Johari, Indian Government and Politics, New Delhi, 2011

Core Public Administration Course 9-Development Administration

6 Credits/100 Marks

Course Description: The paper will provide ideas regarding the development administration, goals of development and role of United Nations in international development. The objective is to aware the students regarding mixed economy model, decentralized, planning and international aid programme.

Learning outcome: The students will gain knowledge regarding development administration, mixed economy model, world trade organization, IMF and World Bank.

Unit-I

Development Administration: Conceptual analysis, Scope, Growth and Significance Development Administration and Administrative development,

Unit-II

Goals of Development, Mixed Economy Model, Planning System in India: National, state District Planning

Unit-III

Role of United Nations in global development, International Aid and Financial Assistance- IMF & World Bank, World Trade Organisation

Suggested Readings:

1. R.K. Sapru, "Development Administration", New Delhi, Sterling Publishers, 2014.
2. Mohit Bhattacharya, "Development Administration", Kolkata, World Press, 1979.
3. V.A. Pai Panandikar (ed) "Development Administration in India", New Delhi, Macmillan, 1974.
4. S.A. Palekar, "Development Administration".

Core Public Administration Course10-Public Personnel Administration in India **6 Credits/100 Marks**

Course Description: The paper covers basic ideas concerning Public Personnel Administration in India. On reading this students can know as to structure and function of Central Personnel Recruiting Agency as well as State Counter parts. Also students can have a fair knowledge as to the recruitment, ethics, morale and other related ideas.

Learning outcome: Students will acquire knowledge regarding Public Personnel Administration in India.

Unit-I

Public Personnel Administration: Concept, Scope, Significance and Objectives, Problems of Public Personnel Administration

Unit-II

Civil Service in India: Recruitment, Union Public Service Commission, State Public Service Commission Training, Promotion,.

Unit-III

Ethics in Civil Service in India: Code of Conduct, Discipline, Service Conditions, Morale, Civil Service Neutrality

Suggested Readings:

1. Rajesh K. Jha (ed), "Public Personnel Administration", New Delhi, 2012
2. Bidyut Chakraborty and Mohit Bhattacharya (ed), "Public Administration – A Reader", New Delhi, Oxford, 2003.
3. K. Bata Dey, "Personnel Administration in India: Retrospective Issues, Prospective Thought", New Delhi, Uppal, 1991.
4. S.L. Goel, Public Personnel Administration, New Delhi, Sterling, 1984.

Core Public Administration Course 11:Organizational Behavior

6 Credits/100 Marks

Course Description: The paper covers concepts relating to organizational behavior and management process. The objective is to know organizational behavior, Organizational Culture, Organizational Development, Organizational Change and few management concepts like motivation, leadership and communication.

Learning outcome: Students will acquire basic qualities of a manager and a leader.

Unit-I

1. Organizational Behavior- Meaning, Nature and Challenges,

Unit-II

Organizational Culture, Organizational Development, Organizational Change

Unit-III

Management- Meaning, Functions and Challenges for Managers, Motivation, Leadership, Communication.

Suggested Reading

1. Niranjan Pani, "Management Concepts: Organizational Behaviour, Human Resource Management" New Delhi, Kunal Books, 2009.
2. S.S. Khanka "Organisation Behaviour", New Delhi, S. Chand and Company Ltd., 2011.

3. Fred Luthans, "Organisational Behaviour", New York, M.C. Graw- Hill, 2000.
4. David J Cherrington, "Organisational Behaviour", Allyn and Bacon, Boston, 1989.

Core Public Administration Course 12 :Local Governance 6 Credits/100 Marks

Course Description: This paper will make the students aware of problems in Rural and Urban India and give them knowledge regarding policies ,programmes for and approaches to local self governance in India. It will also give knowledge regarding local bodies in India.

Unit-I

Rationale and Necessity of Local Government, Democratic Decentralization, Practice of local governance in U.K. & U.S.A

Unit- II

Growth of Rural Local Government in India: Balwant Rai Mehta Committee, 73rd Constitutional Amendment Act, PESA Act

Unit –III

Urban Local Governance in India: Local Government: Corporation, Municipality, NAC, 74th Constitutional Amendment Act, State Government's Control over Local Bodies, New Localism

Suggested Readings:

1. Bijoyini Mohanty, "Glimpses of Local Governance", New Delhi, Kunal Books, 2012.
2. Anirban Kashyap, "Panchayati Raj, Views of Founding Fathers and Recommendations of different committees, Lancer Books, 1989.
3. M. Venkatragaya and M. Pattabhiram, "Local Government in India", New Delhi, Allied Publishers, 1969.
4. S.R. Maheswari, "Local Government in India", Agra, Lakshmi Narain Agarwal, 1984.

Core Public Administration Course13 -Human Resource Management 6 Credits/100 Marks

Course Description: This paper covers concepts concerning human resource management and human resource development. Students can know human resource planning , job analysis, recruitment, promotion, training, and other important concepts concerning human resource management.

Learning outcome: This paper will make the students conscious of how Human Resource Managers should function.

Unit-1

Human Resource Management- Meaning, Nature and Evolution, Functions of HRM

Unit-II

Human Resource Planning, Job Analysis, Work Design, Recruitment, Promotion and Transfer.

Unit-III

Concept of HRD, Distinction between HRM & HRD, Training and Development, Career Planning and Career Development.

Suggested Readings

1. Niranjani Pani, "Management Concepts, Organisational Behaviour, Human Resource Management", New Delhi, Kunal Books, 2009.
2. T.N. Chhabra, "Human Resource Management; Concepts and Issues", Delhi, Dhanpatirao and Co. 2012.
3. P. Subba Rao, "Essentials of Human Resource Management and Industrial Relations", Himalaya Publishers, Mumbai, 2010.
4. K.B. Aswathappa, "Personnel and Human Resource Management," Tata Mc. Graw Publishing House, 2003.

Core Public Administration Course 14-Public Policy**6 Credits/100 Marks**

Course Description: The paper covers seminal ideas concerning Public Policy formulation and its implementation. The students will gain the knowledge with regard to the process of Policy- making and policy-implementation.

Learning outcome: Students will become conscious of various aspects of public policy making and policy analysis.

Unit-I

Public Policy- Meaning, Types and Significance, Approaches to Public Policy.

Unit –II

Institutional Arrangement for Policy Making: Cabinet Secretariat, Prime Minister's Office, Central Secretariat

Unit –III

Policy Implementation, Policy Monitoring and Evaluation, Policy Analysis

Suggested Readings:

1. R.K. Saprú, "Public Policy: Foundation, Implementation and evaluation", New Delhi, Sterling, 2012.
2. R.K. Saprú, "Public Policy: Art and Craft of Policy Analysis", Delhi, PHI Learning, 2013.
3. Y. Dror, "Public Policy Making Re-examined", New Jersey, Transaction Publishers, 1989.
4. Aaron Wildavsky, "The Art and craft of Policy Analysis", London, Macmillan, 1980.

Discipline Specific Elective Papers:Public Administration

Group-A

(1)Research Methodology

6 Credits/100 Marks

Course Description: This paper covers basic ideas relating to research methods in Social Science. The objective is students can gain knowledge as to different dimensions of Social Science Research including Data Collection, Data Analysis and Report Writing.

Learning outcome: On reading the paper, a student will acquire techniques of scientific methods of research and report writing.

Unit-I

Meaning of Research, Objectives, Features, Importance of Research in Social Science

Unit-II

Research Problem, Hypotheses, Research Design

Unit – III

Data Collection, Questionnaire, Observation and Sampling Method , Report Writing

Suggested Readings:

- 1.C.R. Kothari, Research Methodology, New Age International Publisher
- 2.Wilkinson and Bhandarkar, Methodology and Techniques of Social research, Himalaya Publishing House

(2)Urban Governance in India

6 Credits/100 Marks

Course Description: This paper will make the students aware of problems in Urban India and give them knowledge regarding policies ,programmes for and approaches to Urban development in India.

Unit-I

Rural- Urban Migration, Urban Congestion, Pollution, Urban Crimes.

Unit-II

Urban Planning, Problems and Prospects of Urban Planning, City Management, Urban Housing, Sewage, Water Supply, Traffic Jam, Transport System, Urban Finance, Development of sub-urban areas

Unit-III

Urban Poverty & its reduction, Urban Development Programmes- JNNURM, Slum Management, Urban Public Health, Institutions of Urban Development – Local Bodies.

Suggested Readings:

1. S.A. Baud, New Forms of Urban Governance, Sage Publications, 2009
2. M.M. Hust Evelin, Urbanization and Governance in India, Manohar CHS, 2005
3. Bijoyini Mohanty, “Glimpses of Local Governance”, New Delhi, Kunal Books, 2012.

(3)Rural Development in India

6 Credits/100 Marks

Course Description: This paper will make the students aware of problems in Rural India and give them knowledge regarding policies ,programmes for and approaches to rural development in India.

Unit-I

Need of Rural Development, Impact of Globalization, Sector of Rural Development –Agriculture, Diary, Fishery, Animal Resource Development

Unit-II

Development Strategies for Rural Development: PURA, Role of NGO in Rural Development, Water Resource Management (Pani Panchayat), Self- Help Groups, Institutions for Rural Development, Rural Local Bodies.

Unit-III

Rural-Cooperatives, Rural Banking, Role of Bureaucracy in Rural Development, ORMAS.

Rural Development Programme: MGNREGS, National Rural Livelihood Mission, Nation Rural Health Mission, SGSY Sarva Sikhya Aviyan (SSA)

Suggested Readings:

1. Bijoyini Mohanty, “Glimpses of Local Governance”, New Delhi, Kunal Books, 2012.
2. Katar Singh, Rural Development: Principles, Policies and Management, Sage Publication, 2009
- 3 . A.R. Desai, Rural Sociology in India, Popular Prakashan, 1994

(4)Indian Administration: Issues and Trends

6 Credits/100 Marks

Course Description: The course will give the students knowledge regarding recent developments in Indian administration.

Unit-I

Administrative Reforms in India since independence, Administrative Culture and Ethics.

Unit-II

Citizen- Administration Interface, Corruptions in India Administration; Lokpal and Lokayukta, Women Reservations in Legislatures.

Unit-III

Digital Governance and its Problems, Privatization and Disinvestment.

Environmental Issues: Disaster and its Management in India-preparedness and Mitigation

Suggested Readings:

1. Hoshiar Singh and Pankaj Singh, "Indian Administration", Delhi, Pearson, 2011
2. B.L. Fadia and Kuldeep Fadia, "Indian Administration" Agra, Sahitya Bhawan, 2014
3. D.D. Basu, "Introduction to the constitution of India" New Delhi, Prentice Hall of India, 2014
4. Pratap Bhanu Mehta & Nirja Gopal Jayal. The Oxford Companion to Politics in India, Oxford University Press, 2011
5. Bidyut Chakrabarty & Rajendra Kumar Pandey, Indian Government and Politics, Sage Publication, 2009
6. S.R. Mahesswari, "Indian Administration", New Delhi, Orient Longman, 2011

Group-B

(1)Financial Administration in India 6 Credits/100 Marks

Course Description: The paper covers basic ideas relating to Financial Administration in India.

The main aim is to apprise the students as to monetary and fiscal policy of the country along with the budgetary process.

Learning outcome: Students will have a fair knowledge of money control in India.

Unit –I

Financial Administration: meaning and its dimensions, Concept of Budget, Types and Forms,

Unit-II

Monetary and Fiscal Policies, Role of Finance Ministry, Parliamentary control over Public expenditure,

Unit –III

Budgetary Process in India; Preparation, Enactment and Implementation

Suggested Readings:

1. Rudar Dutta & Sundaram, Indian Economy, S Chand Publication
2. Sanjeev Kumar Mahajan, Financial Administration in India, PHI Learning
3. Gurdev Singh Lal, Financial administration in India.
4. B.J. Reed, Public Finance Administration, Sage Publications, 1997

(2)Welfare Administration in India

6 Credits/100 Marks

Course Description: This paper imparts knowledge on the areas of Social Welfare and Welfare Programmes. The objective is to make the students aware of the public policies in social sector development.

Learning outcome: The students will gain knowledge regarding welfare programmes concerning for women, children and marginalized communities.

Unit-1

Concepts of Social Welfare, Welfare Administration in India; Central Social Welfare Board, State Social Welfare Board.

Unit-II

Welfare Programmes for Women and Children, Scheduled Caste, Scheduled Tribes

Unit-III

Social Justice and Social Change
Major Social Sectors: Health and Education, NHM, Right to Education Act

Suggested Readings

1. V.A. Pai Panandikar (ed) "Development Administration in India", New Delhi, Macmillan, 1974.
2. Dr. D.R. Sachdeva, Social welfare Administration in India, Kitab Mahal, 2013

3. Sanjay Bhattacharya, Social Work Administration and Development, Rawat Publication, 2006

3) Disaster Management in India

6 Credits/100 Marks

Course Description: The paper will impart knowledge on disasters and their management in India. It will create awareness in students as to how to cope with disasters and help the community in disaster preparedness.

Unit-1

Understanding natural and man-made disasters

Unit-II

Disaster preparedness, institutional mechanism for disaster management in India

Unit-III

Rehabilitation, reconstruction and recovery in disasters, gender sensitive disaster management approach

Suggested Readings:

1. Ayaz Ahmad, Disaster Management: Through the New Millennium, Anmol Publications
2. B. Narayan, Disaster Management, A.P.H. Publishing Corporation
3. Arvind Kumar, *Disaster Management - Recent Approaches* Anmol Publications

SCHEME FOR CHOICE BASED CREDIT SYSTEM IN BA (PUBLIC ADMINISTRATION) PASS

Semester-I	Semester-II
Core Public Administration I: Elements of Public Administration	Core Public Administration II: Indian Administration
Semester-III	Semester-IV
Core Public Administration III: Comparative Public Administration	Core Public Administration IV: Local Governance
Semester-V	Semester-VI
Discipline Specific Elective I Any One of the Following	Discipline Specific Elective II Any One of the Following
i. DSE 1: Development Administration	i. DSE1: Public Personnel Administration in India
ii. DSE 2: Public Policy	ii. DSE2: Welfare Administration in India

As per UGC guidelines the Pass course will have 120 credits. The student has to cover 120 credit courses in 3 years. All Core courses, Generic Elective Courses (GEC) and Discipline Specific Elective Courses (DSEC) will have 6 credits each. In case of 6 credit courses the concerned Department has to impart 50 hrs of teaching and 10 hrs of tutorial. One of the Discipline Specific Courses is project which is compulsory.

Course structure for B.A.(Pass) Public Administration

The student opting for Public Administration as a Pass subject has to cover 4 core papers and 24 credits in 4 semesters and 4 Discipline Specific Courses in 5th and 6th Semester.

Core course Public Administration 1-Elements of Public Administration

6 Credits/100 Marks

Course Description: This paper covers basic principles of public administration. The objective is to provide the students with basic knowledge regarding principles of administration. Students can acquire a basic understanding regarding the concepts of public administration.

Unit –I

Public Administration: Meaning Nature, Scope, Public Administration in a Globalized world, Methods of Study, Difference between Public And Private Administration

Unit-II

Concepts : Formal and Informal Organization, Line and staff Agencies, Head Quarter and Field Relations.

Principles of Public Administration - Hierarchy, Unity of Command, Span of Control, Delegation, Co-ordination, Delegated Legislation, Administrative adjudication

Unit- III

Theories: Approaches to Public Administration: New Public Administration, New Public Management, Good Governance, Third Minnowbrook Perspective

Suggested Readings

1. Avasthi and Maheswari, "Public Administration", Agra, Laxmi Narayan Agarwal, 1988.
2. Mohit Bhattacharya "Public Administration", World Press (Second Edition, 1991)
3. B.L. Fadia and Kuldeep Fadia, "Public Administration: Administrative Theories and Concepts", Agra, Sahitya Bhawan, 2014.
5. Rumki Basu, "Public Administration: Concepts and Theories" New Delhi, Sterling Publishers, 2011.

Core Public Administration Course 2-Indian Administration 6 Credits/100 Marks

Course Description: The papers cover a number of provisions as to Indian Administration. The objective is to apprise the students as to structure and process of Indian Administration. Students can acquire rudimentary knowledge as to the functioning of Indian Administration.

Unit-I

Evolution of Indian Administration: Ancient Period, Medieval period, Modern Period up to 1947, Constituent Assembly, Salient Features of Indian Constitution, Preamble, Federalism,

Unit-II

Central Administration: President, Prime Minister, Cabinet, Centre- State Relations (Administrative, Legislative and financial)

Core Institutional mechanisms: NITI Ayog, National Development Council, Planning process, State Planning, District Planning, Election Commission, Finance Commission, Lok Pal and Lokayukta

Unit-III

State Administration: Governor, Chief Minister, Chief Secretary, District Collector, Revenue Divisional Commissioner, Block Administration

Suggested Readings:

1. Hoshiar Singh and Pankaj Singh, "Indian Administration", Delhi, Pearson, 2011
2. B.L. Fadia and Kuldeep Fadia, "Indian Administration" Agra, Sahitya Bhawan, 2014
3. D.D. Basu, "Introduction to the constitution of India" New Delhi, Prentice Hall of India, 2014
4. S.R. Mahesswari, "Indian Administration", New Delhi, Orient Longman, 2011.
5. Pratap Bhanu Mehta & Nirja Gopal Jayal, The Oxford Companion to Politics in India, Oxford University Press, 2011
6. Bidyut Chakrabarty & Rajendra Kumar Pandey, Indian Government and Politics, Sage Publication, 2009

Core Public Administration Course 3-Comparative Public Administration

6

Credits/100 Marks

Course Description: The paper carries a comparative understanding of different administrative systems. The objective is to make the students aware of the structure and function of different administrative systems like the UK, USA. Students can have the knowledge of structure and functions of administrative systems like the UK, USA.

Unit-I

Comparative Public Administration: Meaning and Scope, Evolution of Comparative Public Administration
Executive System in U.K., U.S.A.,

Unit-II

Legislative System in U.K., U.S.A.,

Unit-III

Judicial System in U.K., U.S.A., Civil Service in UK & USA.

Suggested Readings

1. Ramesh k. Arora, "Comparative Public Administration", 1996.
2. J. A. Chandler (ed), "Comparative Public Administration", Routledge Publications, 2010
3. Sabine Kuhalmann, "Introduction to Comparative Public Administration", Edward Elgar Publishing, 2014.
4. Nirmood Rapheli (ed), "Reading in Comparative Public Administration", 1970

Core Public Administration Course 4 - Local Governance 6 Credits/100 Marks

Course Description: This paper will make the students aware of problems in Rural and Urban India and give them knowledge regarding policies, programmes for and approaches to local self governance in India. It will also give knowledge regarding local bodies in India.

Unit-I

Rationale and Necessity of Local Government, Democratic Decentralization, Practice of local governance in U.K. & U.S.A

Unit- II

Growth of Rural Local Government in India: Balwant Rai Mehta Committee, 73rd Constitutional Amendment Act, PESA Act

Unit –III

Urban Local Governance in India: Local Government: Corporation, Municipality, NAC, 74th Constitutional Amendment Act, State Government's Control over Local Bodies, New Localism

Suggested Readings:

1. Bijoyini Mohanty, "Glimpses of Local Governance", New Delhi, Kunal Books, 2012.
2. Anirban Kashyap, "Panchayati Raj, Views of Founding Fathers and Recommendations of different committees, Lancer Books, 1989.
3. M. Venkatrangaya and M. Pattabhiram, "Local Government in India", New Delhi, Allied Publishers, 1969.
4. S.R. Maheswari, "Local Government in India", Agra, Lakshmi Narain Agarwal, 1984

Discipline Specific Elective Course-I**1) Development Administration****6 Credits/100 Marks**

Course Description: The paper will provide ideas regarding the development administration, goals of development and role of United Nations in international development. The objective is to aware the students regarding mixed economy model, decentralized, planning and international aid programme. The students will gain knowledge regarding development administration, mixed economy model, World Trade Organization, IMF and World Bank.

Unit-I

Development Administration: Conceptual analysis, Scope, Growth and Significance Development Administration and Administrative development,

Unit-II

Goals of Development, Mixed Economy Model, Planning System in India: National, state District Planning

Unit-III

Role of United Nations in global development, International Aid and Financial Assistance- IMF & World Bank, World Trade Organisation

Suggested Readings:

1. R.K. Sapru, "Development Administration", New Delhi, Sterling Publishers, 2014.
2. Mohit Bhattacharya, "Development Administration", Kolkata, World Press, 1979.
3. V.A. Pai Panandikar (ed) "Development Administration in India", New Delhi, Macmillan, 1974.
4. S.A. Palekar, "Development Administration".

(2)Public Policy

6 Credits/100 Marks

Course Description: The paper covers seminal ideas concerning Public Policy formulation and its implementation. The students will gain the knowledge with regard to the process of Policy- making and policy-implementation. Students will become conscious of the various aspects of public policy making and policy analysis.

Unit-I

Public Policy- Meaning, Types and Significance, Approaches to Public Policy.

Unit –II

Institutional Arrangement for Policy Making: Cabinet Secretariat, Prime Minister's Office, Central Secretariat

Unit –III

Policy Implementation, Policy Monitoring and Evaluation, Policy Analysis

Suggested Readings:

1. R.K. Saprú, "Public Policy: Foundation, Implementation and evaluation", New Delhi, Sterling, 2012.
2. R.K. Saprú, "Public Policy: Art and Craft of Policy Analysis", Delhi, PHI Learning, 2013.
3. Y. Dror, "Public Policy Making Re-examined", New Jersey, Transaction Publishers, 1989.
4. Aaron Wildavsky, "The Art and craft of Policy Analysis", London, Macmillan, 1980.

Discipline Specific Elective Course-II

(1)Public Personnel Administration in India

6 Credits/100 Marks

Course Description: The paper covers basic ideas concerning Public Personnel Administration in India. On reading this students can know as to structure and function of Central Personnel Recruiting Agency as well as State Counter parts. Also students can have a fair knowledge as to the recruitment, ethics, morale and other related ideas. Students can acquire knowledge regarding Public Personnel Administration in India.

Unit-I

Public Personnel Administration: Concept, Scope, Significance and Objectives, Problems of Public Personnel Administration

Unit-II

Civil Service in India: Recruitment, Union Public Service Commission, State Public Service Commission Training, Promotion,.

Unit-III

Ethics in Civil Service in India: Code of Conduct, Discipline, Service Conditions, Morale, Civil Service Neutrality

Suggested Readings:

1. Rajesh K. Jha (ed), "Public Personnel Administration", New Delhi, 2012
2. Bidyut Chakraborty and Mohit Bhattacharya (ed), "Public Administration – A Reader", New Delhi, Oxford, 2003.
3. K. Bata Dey, "Personnel Administration in India: Retrospective Issues, Prospective Thought", New Delhi, Uppal, 1991.
4. S.L. Goel, Public Personnel Administration, New Delhi, Sterling, 1984.

(2)Welfare Administration in India

6 Credits/100 Marks

Course Description: This paper imparts knowledge on the areas of Social Welfare and Welfare Programmes. The objective is to make the students aware of the public policies in social sector development. The students will gain knowledge regarding welfare programmes concerning for women, children and marginalized communities.

Unit-1

Concepts of Social Welfare, Welfare Administration in India; Central Social Welfare Board, State Social Welfare Board.

Unit-II

Welfare Programmes for Women and Children, Scheduled Caste, Scheduled Tribes

Unit-III

Social Justice and Social Change
Major Social Sectors: Health and Education, NHM, Right to Education Act

Suggested Readings

- 1.V.A. Pai Panandikar (ed) "Development Administration in India", New Delhi, Macmillan, 1974.
2. Dr. D.R. Sachdeva, Social welfare Administration in India, Kitab Mahal, 2013
3. Sanjay Bhattacharya, Social Work Administration and Development, Rawat Publication, 2000

Sociology undergraduate Syllabus

(For Honours)

Nature of Paper	Total No. of Papers	Total Marks	Total Credits
Core	14	100x14=1400	6x14=84
Discipline Specific Elective	04	100x4=400	6x4=24
Generic Elective	04	100x4=400	6x4=24

CORE PAPERS

(SOC-1) Introduction to Sociology

This introductory paper intends to acquaint the students with Sociology as a social science and the basic concepts used in the discipline. It also focuses on the social processes and the social institutions that man encounters as a member of the society.

Objectives: After studying these two papers, the student can

- Can get to know the convergence and divergence of Sociology with other social science disciplines in terms of the subject matter, nature and scope of the discipline and its approach.
- Develop knowledge about its historicity.
- Can get acquainted with the basic concepts used in the subject.
- Can generate ideas about the social processes and social institutions man encounters as a member of the society.

Learning Outcomes: This paper is expected to clarify and broaden the student's notion about the subject, the basic concepts used and some universal societal processes. This will provide a wholesome picture about what the subject is all about.

Unit-1: Sociology: Definition and Subject matter, Nature and Scope, Emergence of Sociology, Sociology and its relationship with Anthropology, Political Science, Economics, and History

Unit-2: Basic Concepts: Society, Culture, Community, Institutions, Association, Social Structure, Status and Role, Norms and Values, Folkways and Mores, Associative and Dissociative processes – Cooperation, Assimilation, Accommodation, Competition, and conflict

Unit-3 : Individual and Society : Individual and society, Socialization, Stages and Agencies of Socialization, Development of Self – Contributions of George Herbert Mead, C.H. Cooley's Looking Glass Self The Concept of Group : Types of Groups – Primary and Secondary groups, In-Group and Out-group, Reference Group

Unit-4: Social Stratification: Meaning and definition, Dimensions of Stratification, Theories of Stratification – Functionalist, Marxist, Weberian. Social mobility and its determinants.

Unit-5: Social Control: Meaning and types, Formal and Informal social control, Agencies of Social control

Essential readings:

1. Bottomore, T.B. 1972, Sociology: A guide to problems and literature. Bombay :George Allen and Unwin (India)
2. Haralambos, M. 1998. Sociology: Themes and perspectives. New Delhi Oxford University Press
3. Inkeles, Alex, 1987. What is Sociology? New Delhi: Prentice-Hall of India
4. Jaikumar, No. 1988 . What is Sociology .Madras:Macmillan, India :
5. Johnson, Harry M. 1995. Sociology: A Systematic Introduction. New Delhi , Allied Publishers
6. Schaefer, Richard T. and Robert P. Lamm. 1999 Sociology. New Delhi Tata-Mac Graw Hill.

(SOC-2) Indian Society

Every society has its own peculiar structure and there are some institutions universal to every society, but with their unique manifestations in each society. There are some change agents and initiatives that enable the society to change with the passage of time. This paper focuses on the structure of the Indian society and the changing aspects with the processes operating, change agents and initiatives.

Objectives: After studying these two papers on Indian society, the student can

- Get an impression about the basic composition of Indian society, its historical moorings, basic philosophical foundations of the society and the institutions.
- Learn about the changing institutions, the processes, the agents and the interventions that bring about change in the Indian society.

Learning Outcomes: This paper is expected to bring familiarity in a student about Indian society. It will present a comprehensive, integrated and empirically –based profile of Indian society. It is hoped that the structure and processes operative in the society, the change agents operating in Indian society presented in this course will also enable students to gain a better understanding of their own situation and region.

Unit-1 : Composition of Indian Society : Caste, Tribe, Religion, Language. Unity in Diversities, Threats to national integration

Unit-2 Hindu Social Organisation: Bases of Hindu Social Organization, Varna, Ashrama and Purushartha. Doctrine of Karma.

Unit-3 : Marriage and Family in India: Hindu marriage as Sacrament, Forms of Hindu Marriage. The Hindu joint family: Patriarchal and Matriarchal systems. Marriage and family among the Muslims. Changes in the institutions of Marriage and Family.

Unit-4 : The Caste system in India: Origin, Features and Functions. Caste and Class, The Dominant Caste, Changes in Caste system, Caste and Politics in India Constitutional and legal provisions for the Scheduled Castes, Scheduled Tribes.

Unit-5 : Social Change in Modern India : Sanskritization, Westernization, Secularization, and Modernization

Essential readings:

1. Bose, N.K. 1967, Culture and Society in India. Bombay : Asia Publishing House

2. Bose, N.K. 1975, Structure of Hindu Society. New Delhi
3. Dube, S.C. 1990, Society in India.(New Delhi: National Book Trust.)
4. Dube, S.C. 1995, Indian Village (London : Routledge)
5. Dube, S.C. 1958: India's changing Villages (London: Routledge and Kegan Paul).
6. Karve, Irawati, 1961 : Hindu Society : An Interpretation(Poona : Deccan-College) :: Lannoy,
7. Mandelbaum, D.G. 1970 : Society in India (Bombay: Popular Prakashan)
8. Srinivas, M.N. 1980 : India: Social Structure (New Delhi: Hindustan - Publishing Corporation)
9. Srinivas, M.N. 1963: Social Change in Modern India (California, Berkeley: University of California Press).
10. Singh, Yogendra, 1973: Modernization of Indian Tradition (Delhi: Thomson Press).

(SOC-3) Sociological Thought

Sociology originated as an intellectual response to the crisis confronting the mid nineteenth century European society. Its development over two centuries has been influenced by a variety of socio-economic and political conditions. It is now established as a multi-paradigmatic academic discipline, with its body of theoretical knowledge enriched and its methodological techniques and procedures systemized. This paper is intended to familiarize the students with the social, political, economic and intellectual contexts in which sociology emerged as a distinctive discipline. It deals with the contributions of the forerunners of the discipline and with the contributions of the founders who gave a systematic shape to the subject.

Objectives: After going through these two papers, the student can

- Gain an understanding of some of the classical contributions in Sociology, and their contemporary relevance.
- Learn about the methodological shift in the discipline over the years.

Learning Outcomes: This paper is expected to clarify and broaden the student's knowledge about the theoretical and methodological contributions of the classical contributors to the subject and the contemporary relevance of these theories.

Unit-1 : Auguste Comte : Law of the Three Stages, Hierarchy of Sciences, Positivism

Unit-2 : Herbert Spencer : Organismic Analogy, Theory of Social Evolution

Unit-3 : Karl Marx : Dialectical Materialism, Class struggle, Alienation, Sociology of Capitalism

Unit-4 : Emile Durkheim : Division of Labour in Society, Rules of Sociological Method, Theory of Suicide.

Unit-5 : Max Weber : Social Action, Protestant ethic and the spirit of capitalism, Ideal type, Bureaucracy, Authority

Essential readings:

1. Aron, Ramond. 1967(1982 reprint) Main currents in sociological thoughts (2 volumes). Harmondsworth, Middlesex: Penguin Books
2. Barnes, H.E. 1959. Introduction to the history to the sociology The University of Chicago press
3. Coser, Lewis A. 1979. Masters of Sociological Thought. New York : Harcourt Brance Jovanovich
4. Fletcher, Ronald. 1994.The Making of Sociology (2 volumes) Jaipur-Rawat
5. Morrison, Ken.1995 Marx, Durkheim, Weber: Formation of Modern Social Thought. London; sage
6. Ritzer, George. 1996. Sociological Theory New Delhi. Tata-McGraw Hill
7. Singh, Yogendra. 1986 Indian Sociology: social conditioning and emerging Trends. New Delhi: Vistaar
8. Zeitlin, Irving.1998 (Indian Edition). Rethinking Sociology: A critique of Contemporary Theory. Jaipur: Rawat.

(SOC-4) Social Change and Development

Change is the law of nature and every society is subject to change. Social change has always been a central concern of Sociological study. Change takes different forms. Change has its pattern which is spelt out by various theories. Change is often propelled by various factors. This paper is designed to provide some ideas to the student about such process, theories and factors.

Objectives: After going through this paper, the student can

- Derive knowledge about the meaning, nature, forms and patterns of change.
- Get an idea about the theories that explain change and their adequacy in explaining so.
- Get an impression about the factors that propel change in the society.

Learning Outcomes: This paper is expected to provide a wholesome idea to the students about the process of social change. They can relate their experience with the theoretical explanations.

Unit-1 : Social Change : Meaning and nature. Social Progress, Evolution and Development.

Unit-2 : Theories of Social Change : Evolutionary theory, Cyclical theory, Conflict Theory, Functionalist theory.

Unit-3 : Factors of Social Change: Cultural, Economic, Technological, Ideological, Demographic

Unit-4 : Economic Growth and Social Development : Indicators of Social Development, Human Development Index, Gender Development Index

Unit-5 : Models of Development : Capitalist, Socialist, and Gandhian.

Essential readings:

1. Moore, W.E. 1965 Social Change, Prentice-Hall of India. New Delhi
2. Gandhi M.K., Hind Swaraj
3. Schumacher, E.F., Small is Beautiful
4. Narain, Shreeman, Principles of Gandhian Planning
5. Mishra, B., Capitalism, Socialism and Planning.
6. UNDP, Human Development Report

(SOC-5) Research Methodology

Since the days of August Comte, a debate and a deliberate attempt has been initiated to provide a scientific character to social sciences. In this attempt empirical research has been introduced as an integral part of observing social reality and generalising it objectively without any subjective predisposition. Gradually, research methods have been developed and introduced in social sciences to bring it in par with scientific observations. The essence of this paper lies in introducing the students with these methods of research to ensure objectivity as far as practicable in social research.

Objectives: By going through this paper, the student can

- Get an understanding of the nature of scientific methods, nature of social Phenomena and the way of attaining value neutrality.
- Have a grip over the basic steps involved in social research and the types of social research with their applicability
- Develop an insight into the need and types of research design and the use of sampling method for attaining objectivity and scientific study.

Learning Outcomes: This paper is designed and incorporated to acquaint the students with the scientific ways of studying social phenomena. This provides them with a research insight that will enable them to capture the most relevant data in an objective manner. The market demand of this paper will be very high as the students well versed with this paper will be highly demanded in academics, fundamental research, and policy research undertaken both by Government and Non- Government agencies.

Unit-1 : Meaning and Significance of Social Research, Nature of scientific Method, Applicability of scientific method to the study of social phenomena, Major steps in social research.

Unit-2 : Research Design, Types of Research Design: Exploratory, Diagnostic, Descriptive, and Experimental research Design.

Unit-3 : Hypothesis: Meaning, Characteristics, Types and sources of Hypothesis, Role of Hypothesis in Social Research

Sampling: Meaning, and characteristics, Types: Probability and Non-Probability Sampling. Role of Sampling in Social Research

Unit-4 : Qualitative social Research : Observation, Case Study, Content Analysis

Unit-5 : Quantitative methods in Social Research: Survey research, Questionnaires, Interview. Measures of Central Tendency: Mean, Median, Mode.

Recommended Readings:

1. Bajaj and Gupta 1972 Elements of Statistics. New Delhi: R.Chand and Co., New Delhi
2. Beteille, A. and T.N. Madan 1975 Encounter and experience: Personal Accounts of Fieldwork. Vikas Publishing House, New Delhi
3. Bryman, Alan 1988 Quality and Quantity in Social Research Unwin Hyman, London
4. Jayram, N. 1989. Sociology: Methods and Theory. Madras: MacMillan, Madras
5. Kothari, C.R. Research Methodology : Methods and Techniques, Bangalore, Wiley Eastern.
6. Punch, Keith. 1996. Introduction to Social Research, Sage, London
7. Shipmen, Martin, 1988 The Limitations of Social Research Sage, London
8. Young, P.V. 1988 Scientific Social Survey and Research Prentice Hall, New Delhi

(SOC-6) Gender and Society

The biological basis to the differences between the sexes does not explain the inequalities faced by the sex groups in the society. In the society variations are marked in the roles, responsibilities, rights of and relations between sex groups depending on the social prescriptions relating to sex affiliations. The differences, inequalities and the division of labour between men and women are often simply treated as consequences of 'natural' differences between male and female humans. But, in reality the social norms, institutions, societal expectations play a significant role in deciding and dictating the behaviour of each sex group. This is the fundamental of the study of Gender and Society.

Objectives: After studying this paper, the student can

- Conceptualize what is "Gender" and what is "Sex" and draw a line of distinction between the two.
- Note the difference in gender roles, responsibilities, rights and relations.
- Trace out the evolution and institutionalization of the institution of "Patriarchy".
- Get to know the theories of Feminism that brought women issues and demands to the forefront.
- Assess the initiatives undertaken for gender development with the paradigm shift from time to time.

Learning Outcomes: This paper is expected to generate ideas and sensitivity about gender in a student which he/she can put into practice in daily life. This will lead to change the prevalent biases and gender practices and create a gender neutral social world where both men and women can enjoy their basic rights and cherish to achieve their dreams.

Unit-1 : Social Construction of Gender : Sex and Gender, Gender stereotyping and socialization, Gender Role and Identity. Gender stratification and Inequality, Gender discrimination and Patriarchy.

Unit-2 : Feminism: Meaning, origin and growth of Feminist Theories. Theories of Feminism : Liberal, Radical, Socialist, and Eco-Feminism.

Unit-3 : Gender and Development: History and Approaches, WID,WAD and GAD. Women Empowerment: Meaning and Dimensions. World Conference of Women, Mexico, Copenhagen, Nairobi and Beijing. Gender- Related Development Index (GDI) and Gender Empowerment Index (GEM).

Unit-4: Status of Women in India : Ancient and Medieval period, women in pre-independence India, Social Reform movements, The Nationalist movement, Women in Independent India.

Unit-5 : Major Challenges and Issues Affecting Women in India: Women and Education, Women and Health, Women and Work. Policy provisions for women.

Recommended Readings:

1. Bhasin, Kamla, 2003 Understanding Gender, Kali for Women
2. Bhasin, Kamala , 1986 Khanv, Said Nighat Some Questions on Feminism and Its Relevance in South Asia, Kali for Women, New Delhi
3. Chaudhuri, Maitrayee 2004 Feminism in India: Issues in Contemporary Indian Feminism Kali for Women, New Delhi
4. Kabeer, Naila 1994 Reversed Realities: Gender Hierarchies in Development Thought: Gender Hierarchies in Development
5. Srivastava Gouri, 2005 Women Education in India Issues and Dimensions, Academic Excellence Publishers & Distributors
6. Agarwal, S.P 2001 Women's Education in India, Concept Publishing Company
7. **Satia, J, Misra, M, Arora, R, Neogi, S**, ed. Innovations in Maternal Health - Case studies from India. New Delhi, India: SAGE Publications Pvt. Ltd.
8. Dube, Leela 1990 Structures and Strategies –Women, Work and Family, SAGE Publications, New Delhi
9. Kalia, Anil 1998 “Women Workers: Invisible and Unprotected”, Social Welfare, Vol.45, No.1, April
10. Cahwala, Monioca 2006 Gender Justice: Women and Law in India, Deep and Deep Publications

(SOC-7) Rural Sociology

Rural Sociology is a specialized branch of Sociology describing the society of villages and rural areas. As the rural areas or the villages mark the beginning of human civilization, this paper is designed to bring out the distinct features of the rural society with their typologies and typicalities. In the present paper an attempt is made to introduce the student with the development of this branch overtime with its focus on the typicality of Indian villages, their structures, changing features and social problems faced by the rural people.

Objectives: After studying this paper, the student can

- Get an impression about the emergence of the sub discipline Rural Sociology and the forces contributing for its origin.

- Learn about the nature of this branch of knowledge, its subject matter and significance.
- Collect information and knowledge about the mooring of the sub discipline in the Indian context.
- Generate an idea about the typicalities of the rural society and the institutions operating therein and their dynamics.
- Derive ideas about rural social problems of the country.

LearningOutcomes: India thrives in her villages. By going through this paper, the student can have a grip on the grass roots of Indian society. This will enable the student to understand the society in a better manner, to note the heterogeneities in culture, institutions and their functions, changes, the contrasts found between the rural urban societies and the problems faced by the people.

Unit-1 : Origin and Scope of Rural Sociology., Nature and Importance of Rural Sociology.

Unit-2 : Rural social Structure: Village Community, Agrarian Economy, Caste System, Mobility and Migration. Rural-Urban Contrast and Continuum

Unit-3: Rural Social problems: Poverty, Unemployment, , Food Security, Landlessness, Indebtedness, Health care and Sanitation

Unit-4 : History and Evolution: Community Development Programme, Land Reforms, Green Revolution. Cooperative Movement, Panchayati Raj Institutions- Constitutional provisions and Structure. Role of Panchayats in Rural Development

Unit-5 Rural Development Programmes: MGNREGA, SGSY, Indira Awas Yojana, Livelihood Mission, Health Mission

Recommended Books:

1. Doshi S.L. & P.C. Jain 2002 Rural Sociology, Jaipur, Rawat
2. Desai A.R. Rural Sociology in India 1997 Bombay Popular Prakashan
3. Dhanagare D.N. 1988 Peasant movements in India, New Delhi, Oxford
4. Gupta D.N. 2001 Rural development System New Delhi Books India International
5. Dube, S.C. 1988 India's changing Village: Human Factor in Community Development Himalayan Publishing House, Bombay
6. Maheshwari, S.R. 1985 Rural Development In India, Sage Publication, New Delhi
7. Vivek, R. & Bhattacharya 1985 The New Strategies of Development in Village India, Metropolitan
8. Jain, Gopal Lal 1985 Rural development Mangaldeep Publication, Jaipur
9. Joshi R P., and S. Narawam 1985 Panchayat Raj in India : Emerging Trends across the States Rawat, Jaipur
10. Singh, Katar 1995 Rural development: Principle policies and Management Sage, New Delhi

(SOC-8) Globalization and Society

Globalisation is the dominant process of social change in the contemporary world. It has resulted in the sinking of time and space and collapse of borders. It is a new coinage for an old process. It has its own dimensions, distinct features and impacts on society. It has given birth to new role players. All these are the focal points of discussion of this paper.

Objectives: Bygoing through this paper, the student can

- Collect information about the meaning and nature of this process, its historical mooring.
- Amass knowledge about its dimensions and impacts, both positive and negative.
- Get introduced to the agencies that manage the process.

Expected Outcomes: This paper is expected to acquaint the student with an ongoing social process bringing tremendous changes in the nations.

Unit-1 : Meaning and characteristics of Globalization. Historical context, Liberalization, Privatization and Globalization.

Unit-2: Dimensions of Contemporary Globalization: Economic, Technological, Political and Cultural.

Unit-3: Consequences of Globalization: Rising Inequality, Environmental impact, Consumerism, Health and Security. Emergence of Anti-Globalization movements.

Unit-4 Globalisation and Indian Society: Understanding the concepts of liberalization, privatization and globalization in the Indian context; Growth of information technology and communication and its impact manifested in everyday life

Unit-5 Impact of globalisation on Religion, Culture, Education, Family, Marriage, Women, Tribes

Essential Readings:

- 1.Appadurai, Arjun 1996, Modernity at Large, University of Minnesota Press
2. Applebaum, R. and Robinson, W., 2005, Critical Global Studies, Routledge, New York.
- 3.Bremen, Yan, 1993, Footlose Labour, Cambridge University Press, Cambridge
4. Browning, Halcli, Webster(ed), 1996, Understanding contemporary society: Theories of the present, SAGE Publications, London
5. Cohen Robin and Shirin M.(ed), Global Social Movements, The Athlone Press, London
6. Dubhashi P.R., 2002, Peoples Movement against Global Capitalism : EPW Feb.9
7. Giddens, Anthony, 2000, Runaway World : How globalization is reshaping our lives, Routledge, New York.

8. Jha, Avinash, 2000, Background to Globalization, Centre for Education and Documentation, Mumbai
9. Chander Sekhran Bal krishnana - Impact of Globalization on developing countries and India.
10. C, Rangarajan, 2002 Globalization and its impact

(SOC-9) Marriage, Family and Kinship

This course provides a brief account of the classical approaches to the study of family and kinship. It exposes the students to the distinct aspects of these three interrelated institutions in the Indian context. Finally, it discusses some contemporary issues that pose a challenge to the normative model of these institutions.

Objectives: By going through this paper, the student can

- Understand the three institutions that are the foundations of the society.
- Comprehend the theoretical perspectives on these institutions.
- Get to know the rules governing these institutions.
- Estimate the changes coming over these institutions with the process of social change.

Expected Outcomes: This paper is expected to instill knowledge about the foundational institutions, their governing principles and the continuity and change features of these institutions.

Unit-1: Theoretical Perspectives: Overview of theoretical developments Descent theory, Alliance theory, Recent theorizations and their implications

Unit-2: Marriage: Marriage as social Institutions, Functions of Marriage. Rules of Marriage: Endogamy, Exogamy; Monogamy and Polygamy; Levirate and Sororate; Hypogamy and Hypergamy. Dowry and Bride Price.

Unit-3: The Family: Types of Family on the basis of Rules of Authority, Descent and Residence. Functions of Family. Contemporary changes and problems: Divorce and Family Disintegration.

Unit-4: Contemporary Issues: Changing demographic patterns Migration, Diasporas and Impact on Family Implications of new reproductive technologies Domestic violence Challenges to the normative model of family

Unit-5 : The Kinship and Clan System: Meaning and Definition of Kinship and Clan. Types. Clan, Family, Lineage and Totemism and Taboos.

Essential Readings:

1. Fox Robin 1967 Kinship and Marriage: An Anthropological Perspective, Pelican.
2. Parkin, Robert 1997 Kinship: An Introduction to Basic Concepts, Blackwell, Oxford.
3. Parkin, Robert and Linda Stone (ed.) (2004) Kinship and Family : An Anthropological Reader, Blackwell Publishing, USA.
4. Patel, Tulsi (ed.) (2005) The Family in India : Structure and Practice, Sage Publications, New Delhi.
5. Uberoi, Patricia (ed.) (1993) Family, Kinship and Marriage in India, Oxford University Press, Delhi

(SOC-10) Social Disorganization and Deviance

No society is fully organized in character. Disorganization is apt to occur from time to time. Disorganization is a manifestation of the deviant behavior found among some individuals. This deviance occurs when the individuals feel that the normative order of the society and its institutions are not need fulfilling in character. This present paper makes an attempt to provide an impression about the scenario of disorganization, its forms, causes and consequences with the theories explaining the situation.

Objectives: After going through this paper, the student can

- Understand the meaning, causes, consequences and forms of social disorganization.
- Learn about the theories explaining the disorganization situations.
- Comprehend the concept of crime and the existing theories of punishment.

Learning Outcomes: This paper is designed with an expectation to impress upon a student the concept of deviant behavior leading to social disorganization, forms, theoretical foundations and criminal activities which he encounters in real life situations.

Unit-1 : Social Disorganization: Meaning and Nature. Family Disorganization and Personality Disorganization Causes and Consequences.

Unit- 2: Theories of Deviant Behaviour : Contributions of Durkheim and Merton. Ecological theory, Delinquent Sub-Culture theory, Differential Association theory, Differential Opportunity theory.

Unit- 3 : Crime and Punishment : Concepts of Crime and Delinquency. Causes and consequences. Theories of Punishment: Retributive, Deterrant,Reformative.

Unit-4: Social Problems: Poverty, Unemployment, Alcholism, Indebtedness,Terrorism

Unit-5 Atrocities against women, Domestic violence, Dowry, Divorce

Essential Readings:

1. Mamoria, C.B.,1981 Social Problems and Social Disorganization in India
2. Carrabine;Eamonn,Iganski,Paul,Lee ,Maggy,Plummer
Ken,South,Nigel(2004)[Criminology: A Sociological Introduction](#)
3. [Sutherland](#), Edwin Hardin Sutherland(1949) White Collar Crime, Dryden Press
4. Ahuja, Ram(2012) Social problems in India,Rawat
5. Chakraborty, Dipangshu(1999) Atrocities on Indian Women, APH

(SOC-11) Political Sociology

Polity constitutes a vital part of every society. It helps in the system of governance. But the social variables to a great extent determine the course of polity. They decide and detect the system of governance, distribution of power, political institutions like parties and pressure groups, nature of political participation, political socialization. In the same vein, the political institutions, political processes, political culture influence the

society and the course of its progress. The present paper highlights the close nexus between society and polity and how dynamism in one brings dynamism in the other.

Objectives: After going through this paper, the student can

- Comprehend the existing forms of states and their relative merits and demerits.
- Differentiate between power, authority and influence which guide and govern the political processes.
- Get to know about the political processes, participation types and determinants and the political institutions.

Learning Outcomes: The very aim of this paper is to generate an insight in the student about the political institutions, political processes, political culture he/she encounters in his/her daily life as a member of the society.

Unit-1 State: Characteristics, Aristotle's classification of types of state: Theological, Monarchical, Aristocratic, Democratic and Totalitarian forms.

Unit-2 Influence, Power and Authority: Meaning and types of influence, characteristics of Power, distribution of power: the Constant sum and the Variable sum approach to power, theories of political elites, authority: Weberian classification of authority, different ways of acquiring legitimacy.

Unit-3 Political culture and political socialization: Meaning and dimensions of political culture, meaning and types of political socialization agencies of political socialization and their role.

Unit-4 Political participation: meaning and types of political participation, political apathy – reasons for political apathy, Determinants of political participation – psychological, social and political.

Unit-5 Political parties and pressure groups: Political parties – features and functions, structures of political parties; meaning of pressure groups and their relationship with political parties, types of pressure groups and their role.

Reference:

- 1.A.K.Mukhopadhyay1980 Political Sociology, K.P.Begchi & Company. Calcutta, 1980
- 2.Ali Ashaf and Sharma B.N. 2001Political Sociology, University Press, Hyderabad
3. Bhattacharya, D.C. Political Sociology
- 4.Baral, J.K. Political Sociology
5. T.Bottomore, Political Sociology, Blackie & Sons, Bombay, 1975
6. Lipset S.M.Modern Political Analysis, Printice Hall, New Delhi 1983
7. Dhal, Robert A, Who Governs

(SOC-12)Environment and Society

Environment and society are in constant interaction with each other. It is the environment which sustains life in society and it is the society that is responsible for the preservation and the degradation of the environment. In the recent years environmental challenges have posed a threat to the lives on the planet. Keeping this in view, the present paper tries to create awareness among the students about the major environmental issues and the efforts geared to tackle them.

Objectives: After going through this paper, the student can

- Derive knowledge about the close interaction between society and environment.
- Gain substantial idea about the environmental issues and their repercussions on humanity.
- Accumulate ideas about the ideological currents, issues that drive environment movements.
- Get aware about the global and national efforts to conserve environment.

Learning Outcomes: The very aim of this paper is to disseminate knowledge about the significance of environment for society, to change the practices that can protect and preserve the environment and to make the students participate in the mission to preserve, protect and promote the cause of environment.

UNIT – I Environment and its Concepts: Ecology, Eco-system, Environment and Society – their inter-relations; Eco-Feminism

UNIT – 2 Environmental Issues: Sustainable Development, Industrialization and Development, Urbanization and Development, Environmental Degradation

UNIT – 3 Environmental Movements: Chipko Movement, Narmada Bachao Andolan, Ganga Bachao Abhiyan; The Silent valley movement, Forest Rights.

UNIT – 4 Contemporary Environmental Problems: Problems of Water, Deforestation, Urban Wastes, Slums, Global-Warming and Climate Change.

Unit-5 Environment protection efforts at the global level and the national level in India.

Essential Readings:

1. Albrow, Martin & Elizabeth King (Ed.)1990, Globalisation, Knowledge and Society, Sage: London
2. Baviskar. Amita 1995, In the Valley of the River: Tribal Conflict over Development in the Narmada Valley, Delhi: OUP.
3. Bhatt, Anil 1989 Development and Social Justice: Micro Action by Weaker Section, Sage: New Delhi.
4. Chauhan, I.S 1998, Environmental Degradation, Delhi: Rawat Publications.

5. Desh Bandhu and Garg, R.K.(eds) 1986 Social Forestry and Tribal Development, Dehradun: Natraj Publishers.
6. Dubey, S.M. and Murdia, Ratno(ed)1980 Land Alienation and Restoration in Tribal Communities in India, Bombay: Himalaya Publishing House.
7. Gadgil, Madhav & Ram Chandra. Guha 1996 Ecology and Equity: The use and Abuse of Nature in contemporary India:: New Delhi: OUP.
8. Ghai, Dharam (ed) 1994 Development and Environment: Sustaining People and Nature. UNRISD: Blackwell Publication.
9. Giddens, Anthony 1996 “Global Problems and Ecological Crisis”, 2nd edition New York:W.W.Norton and Co.
10. Guha, Ramechandra 1995 The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya, OUP: Delhi.
11. Mehta S.R. (ed) 1997 Poverty, Population and Sustainable Development, New Delhi: Rawat Publications.
12. Plumwood, Val 1992 Gender and Ecology: Feminism and Making of Nature, London: Routledge.

(SOC-13)Urban Sociology

Urbanisation is an important social process that changed the face of human civilization. It was initiated with the process of modernization, transport revolution, coming up of river valley civilizations, establishment of trade links and industrial revolution. Urbanisation has brought both prosperity and problems. It is one of the earnest tasks of Sociology to trace out the evolution of the process, social; problems associated with it and policy planning and measures undertaken to overcome these challenges. This paper Urban Sociology concentrates upon these tasks.

Objectives: After going through this paper, the student can

- Understand the specific traits of urban areas, its historical patterns of growth.
- Develop knowledge about urban social institutions and problems
- Gain insight into urban development plans, programmes and efforts.

Learning Outcomes: The very aim of this paper is to acquaint the students with the process of urbanization, to give an impression about the pattern of evolution of cities, urban institutions, their contrasts with rural institutions, urban problems and the responses developed to arrest them.

Unit-1 Meaning, Nature, Scope and importance of Urban Sociology, Rural Urban Differences: Specific traits of rural world vs. urban world- Socio-cultural differences ,urbanization, Urbanism as a way of life.

Unit-2 Theories of patterns of city growth: Concentric zone theory- Sector model- Multiple nuclei theory.

Unit-3 Social institutions of Indian urban communities: Family, marriage and kinships in urban India – Caste in urban India – Urban politics and urban economy

Unit-4 Urban social problems: Crime and Juvenile delinquency, Slums, Beggary , Prostitution

Unit-5 Urban development in Indian plans, Urban development programmes, Slum development programmes, Urban Basic Services

Essential readings:

1. Lin, Jan and Mele Christopher (ed.)2012The Urban Sociology Reader, Routledge
2. Flanagan, W.,1993 *Contemporary Urban Sociology* Cambridge: University of Cambridge
3. Patel Sujata and Deb, Kushal(ed.) Urban Studies
4. Rao,M.S.A.1992Urban Sociology in India
5. Ramachandran,R 1997 Oxford University Press
6. Jayapalan, N 2002 Urban Sociology,Atlantic Publishers
7. Wilson, Robert,A Schultz,David, A1978 Urban Sociology, prentice Hall

(SOC-14)

Practical: Field Work and Dissertation

(Dissertation: 80 marks and Viva-voce: 20 marks)

- Dissertation may be written on any social institution, problem or may be an evaluative study.
- It should be based on empirical study.
- Size of the dissertation should be around 5000 words.
- Dissertation paper will be examined jointly by one Internal and one External Examiner to be appointed by the University. Marks will be awarded jointly by the Internal and External Examiners on the basis of the written Dissertation and Viva-voce.

(SOC-DSE-1)

Sociology of Movements

Movements reflect the voices raised against the prevailing practices of a society. Every society witnesses social movement in some form or the other. Movements bring social change and transformation. It is a collective effort that is driven by particular issues and brings forth changes. The present paper tries to provide a rudimentary impression to the students about the concept, nature and types of movements with a thrust on the movements witnessed by Indian society.

Objectives:

- To introduce to the students with the concept of social movements and their dynamics.
- To introduce the students to the role of social movements in social transformation .
- To help them understand the various approaches to the study of social movements.

Learning Outcomes:The very aim of this paper is to disseminate knowledge about the concept of social movements and its process and change making role in the society.

Unit:1Social Movements:Nature, Definitions, Characteristics of social movement , types: Revolutionary, Reform, Revival, Counter movements

Basis of social movements: Leadership, ideology, resource

Unit-2 Religious movements in India: The SNDP Movements in Kerala
The Brahmo Samaj and The Arya Samaj

Unit-3Peasants Movements in India: The Champaran Satyagraha (1917), The Kheda Peasant Struggle, The Bardoli Movement in Gujarat. The Peasant Revolt in Telangana ,TheTebhaga Movement in Bengal.

Unit-4Backward Class Movements in India:Mahar Movement in Maharastra, Dalit Movement in Tamil Nadu, The Non Brahmin Movement in Tamil Nadu

Unit-5Women's Movements in India: In the Pre independence era and the post independence period

Essential readings:

1. Foweraker Joe,1995 Theorising Social Movements, Pluto Press, London,
2. Buechler, S. 1997'New Social Movement Theories' in Buechler, S. and Cylke, F.K., Jr. (eds.) Social Movements: Perspectives and Issues. Mountain View: Mayfield Publishing Company
3. Rao, M.S.A. ed.1979Social Movements in India Vol. I and II, Manohar, New Delhi
4. Dhanagare,D.N.1983 Peasant Movements in India1920-1950,OUP, Delhi,1983
5. Kaur, Manmohan, 1968 "Role of Women in the Freedom Movement 1857-1947", Sterling, New Delhi
6. Basu, Aparna, 1976 "Role of Women in the Freedom Movement", in B.R.Nanda, ed, Indian Women From Purdah to Modernity, Vikas, Delhi.
7. Chattopadhyaya, Kamaladevi, 1983 "Indian Women's Battle for Freedom", Abhinav Publications, New Delhi

(SOC-DSE-2)

Industrial Sociology

Industrialisation as a social process has changed the face of humanity over the years. Industrialisation in its wake has brought several social problems and changes in social institutions, practices.The aim of this paper is to analyse the structure and process of

industrial organisations from the sociological perspective. It also deals with the social effects of industrialization on Indian Social Systems and institutions.

Objectives: After going through this paper, the student can

- Understand the nature and scope of industrial sociology as branch of Sociology.
- The developmental stages of industry.
- The organizational structure of industries and employee and employer relations in the industry.

Learning Outcomes: The very aim of this paper is to impress upon the students of sociology the role they can play in creating effective industrial relations with their knowledge of sociology.

Unit-I Introduction:

Meaning and definition of Industrial sociology. Nature and scope of Industrial Sociology. Significance of Industrial Sociology in India.

Unit-2 Social – industrial Thought:

- A. Classical Theories: Adam Smith, Karl Marx, Max Weber, Durkheim and Mayo
- B. Sociological Theories: Likert, Herzberg, Maslow, McClelland.

Unit-3 The Development of Industry:

The Manorial system, the Guild system, Domestic system, the Factory system. Industrial evolution in India.

Unit-4 Industrial Organisation:

Formal Organisation: Its nature and features, problems built-in in the formal organization. Informal Organisation: Origin and function of informal organization. Informal Organisation of Management.

Unit-5 Industrial and Labour Relations:

Industrial Relations, International Labour Organisation, Labour Legislation, Industrial Relations in India. Industrial Disputes/conflicts.

Workers' participation in Management (WPM): Industrial Democracy: Levels of participation of WPM: Objectives, WPM Models in India.

Reference:

1. Gisbert, Pascal, 1972 Fundamentals of Industrial Sociology, New Delhi, Tata McGraw Hill
2. Davis, Keith, 1984 Human Behaviour at work, New Delhi, McGraw Hill
3. Ramaswamy, E.A. 1978 Industrial Relations in India, Delhi, MacMillan
4. Schneider, Eugene 1971 Industrial Sociology, McGraw Hill- London

(SOC-DSE-3)

Population Studies

Demography is both an index and instrument of development and change. India as a country is plagued by population explosion which retards, the economy and blocks social progress. Irrespective of several positive attempts undertaken by the government, India has failed to control its population problem. This paper is designed to provide an idea to the students about population dynamics and its impact on society.

Objectives: After going through this paper, the student can

- Understand the various facets of population studies and the theories that depict population change.
- Develop specific idea on Indian population structure, policies adopted and programmes launched in the country to check population.
- Assess the role of various agencies in population control.

Learning Outcomes: The very aim of this paper is to acquaint the students with a perennial problem of the Indian society that is population growth and the measures introduced to control it.

UNIT – I Population Studies: Meaning, Scope and Significance; Demographic Processes: Fertility, Mortality and Migration

UNIT – 2 Population Theories: Malthusian, Demographic Transition and Optimum Population Theory

UNIT – 3 Population Compositions in India: Age Structure, Sex-Ratio, Rural-Urban Composition, Literacy in India

UNIT – 4 Population Planning and Policies: Needs and Objectives; Population Policy of India, National Rural Health Mission

Unit-5 Population Control: Role of technology, women's empowerment, voluntary organisations

Essential Readings:

1. Agarwal, S.N. 1989 Population Studies with Special Reference to India, New Delhi: Lok Surjeet Publication.
2. Bose, Ashish 1991 Demographic Diversity in India, Delhi: B.R.Publishing Corporation.
3. Banarjee, D. 1985 Health and Family Planning Services in India, New Delhi: Lok Parkshan.
4. Chandrasekhar, S. (ed.) 1974 Infant Mortality, Population Growth and Family Planning in India, London: George Alen and Unwin Ltd.
5. Dubey, Surendra Nath 2001 Population of India, Delhi: Authors Press.
6. Kohli, S. 1977 Family Planning in India, New Delhi.
7. Malthus, T.R. 1986 An Essay on the Principle of Population, London: William Pickering.
8. Premi, M.K. 2004 Social Demography, Delhi: Jawahar Publishers and Distributors.
9. Sharma, Rajendra 1997 Demography and Population Problems, New Delhi: Atlantic Publishers.
10. Srivastava, O.S. 1998 Demography and Population Studies, New Delhi: Vikas Publishing House.
11. National Rural Health Mission 2006 Govt. of India, New Delhi.

(SOC-DSE-4)

Sociology of Social Institutions

Social institutions play a significant role in the functioning of a society by regulating the activities of the individuals and fulfilling their needs. Though they are universal to every society, they are not uniform in their characteristics and in terms of the norms they prescribe. They vary from society to society and across cultures. The present

paper is designed to introduce to the students the basic social institutions which are fundamental to the lives of the people and significant to the functioning of the society.

Objectives: After going through this paper, the student can

- Understand the basic institutions which are vital to the functioning of the society.
- Learn the variations in the structure and functioning of these institutions across time and societies.
- Get an idea about the emerging features of these institutions.

Learning Outcomes: The very aim of this paper is to impress upon the students the vital role played by the institutions in social life, their typologies and changing features and functions.

Unit-1 Community, Groups, Institutions and Organizations.

Unit-2 Family, Marriage and Kinship: Key concepts; Different forms of family and marriage; Changes in family pattern worldwide; Importance of Kinship.

Unit-3 Religion : Defining religion; Varieties of religion; Theories of religion.

Unit-4 Education : The development of literacy and schooling; Gender and the education system; Education and ethnicity; Theories of schooling; Education and cultural reproduction; Education and inequality

Unit-5 Economy : Importance of work; Organisation of work; Work and technology; Formal Economy and Informal Economy; Market and Society.

Polity: Modern State; Concepts of Power and Authority; Forms of social distribution of power : Marxist, Elitist, Pluralist

Essential readings:

1. Ken Browne : An Introduction to Sociology ,Polity, 3rd ed.
2. Anthony Giddens : Sociology (4th ed) : Human Societies
3. Bilton and others : Introductory Sociology ,Macmillan
4. G. Rocher : A General Introduction to Sociology
5. P. Worsely : New Introducing Sociology
6. Smelser, Neil.J Sociology
7. S.K.Pramanik & R.Ganguly(eds) : Globalization in India ,PHI Learning

(SOC-GE-1)

Introduction to Sociology

This introductory paper intends to acquaint the students with Sociology as a social science and the basic concepts used in the discipline. It also focuses on the social processes and the social institutions that man encounters as a member of the society.

Objectives: After studying these two papers, the student can

- Can get to know the convergence and divergence of Sociology with other social science disciplines in terms of the subject matter, nature and scope of the discipline and its approach.
- Develop knowledge about its historicity.
- Can get acquainted with the basic concepts used in the subject.
- Can generate ideas about the social processes and social institutions man encounters as a member of the society.

Learning Outcomes: This paper is expected to clarify and broaden the student's notion about the subject, the basic concepts used and some universal societal processes. This will provide a wholesome picture about what the subject is all about.

Unit-1: Sociology: Definition and Subject matter, Nature and Scope, Emergence of Sociology, Sociology and its relationship with Anthropology, Political Science, Economics, and History

Unit-2: Basic Concepts: Society, Culture, Community, Institutions, Association, Social Structure, Status and Role, Norms and Values, Folkways and Mores, Associative and Dissociative processes – Cooperation, Assimilation, Accommodation, Competition, and conflict

Unit-3 : Individual and Society : Individual and society, Socialization, Stages and Agencies of Socialization, Development of Self – Contributions of George Herbert Mead, C.H. Cooley's Looking Glass Self The Concept of Group : Types of Groups – Primary and Secondary groups, In-Group and Out-group, Reference Group

Unit-4: Social Stratification: Meaning and definition, Dimensions of Stratification, Theories of Stratification – Functionalist, Marxist, Weberian. Social mobility and its determinants.

Unit-5: Social Control: Meaning and types, Formal and Informal social control, Agencies of Social control

Essential readings:

1. Bottomore, T.B. 1972, Sociology: A guide to problems and literature. Bombay : George Allen and Unwin (India)
2. Haralambos, M. 1998. Sociology: Themes and perspectives. New Delhi Oxford University Press
3. Inkeles, Alex, 1987. What is Sociology? New Delhi: Prentice-Hall of India
4. Jaikumar, No. 1988 . What is Sociology . Madras: Macmillan, India :
5. Johnson, Harry M. 1995. Sociology: A Systematic Introduction. New Delhi , Allied Publishers
6. Schaefer, Richard T. and Robert P. Lamm. 1999 Sociology. New Delhi Tata-Mac Graw Hill.

(SOC-GE-2)

Indian Society

Every society has its own peculiar structure and there are some institutions universal to every society, but with their unique manifestations in each society. There are some change agents and initiatives that enable the society to change with the passage of time. This paper focuses on the structure of the Indian society and the changing aspects with the processes operating, change agents and initiatives.

Objectives: After studying these two papers on Indian society, the student can

- Get an impression about the basic composition of Indian society, its historical moorings, basic philosophical foundations of the society and the institutions.
- Learn about the changing institutions, the processes, the agents and the interventions that bring about change in the Indian society.

Learning Outcomes: This paper is expected to bring familiarity in a student about Indian society. It will present a comprehensive, integrated and empirically –based profile of Indian society. It is hoped that the structure and processes operative in the society, the change agents operating in Indian society presented in this course will also enable students to gain a better understanding of their own situation and region.

Unit-1 : Composition of Indian Society : Caste, Tribe, Religion, Language. Unity in Diversities, Threats to national integration

Unit-2 Hindu Social Organisation: Bases of Hindu Social Organization, Varna, Ashrama and Purushartha. Doctrine of Karma.

Unit-3 : Marriage and Family in India: Hindu marriage as Sacrament, Forms of Hindu Marriage. The Hindu joint family:Patriarchal and Matriarchal systems. Marriage and family among the Muslims. Changes in the institutions of Marriage and Family.

Unit-4 : The Caste system in India: Origin, Features and Functions. Caste and Class, The Dominant Caste,Changes in Caste system, Caste and Politics in India
Constitutional and legal provisions for the Scheduled Castes, Scheduled Tribes.

Unit-5 : Social Change in Modern India : Sanskritization, Westernization, Secularization, and Modernization

Essential readings:

11. Bose, N.K. 1967, Culture and Society in India. Bombay : Asia Publishing House
12. Bose, N.K. 1975, Structure of Hindu Society. New Delhi
13. Dube, S.C. 1990, Society in India.(New Delhi: National Book Trust.)
14. Dube, S.C. 1995, Indian Village (London : Routledge)
15. Dube, S.C. 1958: India's changing Villages (London: Routledge and Kegan Paul).
16. Karve, Irawati, 1961 : Hindu Society : An Interpretation(Poona : Deccan-College) :: Lannoy,
17. Mandelbaum, D.G. 1970 : Society in India (Bombay: Popular Prakashan)
18. Srinivas, M.N. 1980 : India: Social Structure (New Delhi: Hindustan - Publishing Corporation)
19. Srinivas, M.N. 1963: Social Change in Modern India (California, Berkeley: University of California Press).
20. Singh, Yogendra, 1973: Modernization of Indian Tradition (Delhi: Thomson Press).

(SOC-GE-3)

Sociological Thought

Sociology originated as an intellectual response to the crisis confronting the mid nineteenth century European society. Its development over two centuries has been influenced by a variety of socio-economic and political conditions. It is now established as a multi-paradigmatic academic discipline, with its body of theoretical knowledge enriched and its methodological techniques and procedures systemized. This paper is intended to familiarize the students with the social, political, economic and intellectual contexts in which sociology emerged as a distinctive discipline. It deals with the contributions of the forerunners of the discipline and with the contributions of the founders who gave a systematic shape to the subject.

Objectives: After going through these two papers, the student can

- Gain an understanding of some of the classical contributions in Sociology, and their contemporary relevance.
- Learn about the methodological shift in the discipline over the years.

Learning Outcomes: This paper is expected to clarify and broaden the student's knowledge about the theoretical and methodological contributions of the classical contributors to the subject and the contemporary relevance of these theories.

Unit-1 : Auguste Comte : Law of the Three Stages, Hierarchy of Sciences, Positivism

Unit-2 : Herbert Spencer : Organismic Analogy, Theory of Social Evolution

Unit-3 : Karl Marx : Dialectical Materialism, Class struggle, Alienation, Sociology of Capitalism

Unit-4 : Emile Durkheim : Division of Labour in Society, Rules of Sociological Method, Theory of Suicide.

Unit-5 : Max Weber : Social Action, Protestant ethic and the spirit of capitalism, Ideal type, Bureaucracy, Authority

Essential readings:

1. Aron, Ramond. 1967(1982 reprint) Main currents in sociological thoughts (2 volumes). Harmondsworth, Middlesex: Penguin Books
2. Barnes, H.E. 1959. Introduction to the history to the sociology The University of Chicago press
3. Coser, Lewis A. 1979. Masters of Sociological Thought. New York : Harcourt Brance Jovanovich
4. Fletcher, Ronald. 1994. The Making of Sociology (2 volumes) Jaipur-Rawat
5. Morrison, Ken. 1995 Marx, Durkheim, Weber: Formation of Modern Social Thought. London; sage
6. Ritzer, George. 1996. Sociological Theory New Delhi. Tata-McGraw Hill
7. Singh, Yogendra. 1986 Indian Sociology: social conditioning and emerging Trends. New Delhi: Vistaar
8. Zeitlin, Irving. 1998 (Indian Edition). Rethinking Sociology: A critique of Contemporary Theory. Jaipur: Rawat.

(SOC-GE-4)

Social Change and Development

Change is the law of nature and every society is subject to change. Social change has always been a central concern of Sociological study. Change takes different forms. Change has its pattern which is spelt out by various theories. Change is often propelled by various factors. This paper is designed to provide some ideas to the student about such process, theories and factors.

Objectives: After going through this paper, the student can

- Derive knowledge about the meaning, nature, forms and patterns of change.
- Get an idea about the theories that explain change and their adequacy in explaining so.

- Get an impression about the factors that propel change in the society.

Learning Outcomes: This paper is expected to provide a wholesome idea to the students about the process of social change. They can relate their experience with the theoretical explanations.

Unit-1 : Social Change : Meaning and nature. Social Progress, Evolution and Development.

Unit-2 : Theories of Social Change : Evolutionary theory, Cyclical theory, Conflict Theory, Functionalist theory.

Unit-3 : Factors of Social Change: Cultural, Economic, Technological, Ideological, Demographic

Unit-4 : Economic Growth and Social Development : Indicators of Social Development, Human Development Index, Gender Development Index

Unit-5 : Models of Development : Capitalist, Socialist, and Gandhian.

Essential readings:

1. Moore, W.E. 1965 Social Change, Prentice-Hall of India. New Delhi
2. Gandhi M.K., Hind Swaraj
3. Schumacher, E.F., Small is Beautiful
4. Narain, Shreeman, Principles of Gandhian Planning
5. Mishra, B., Capitalism, Socialism and Planning.
6. UNDP, Human Development Report

Sociology undergraduate Syllabus

(For Pass)

Nature of Paper	Total No. of Papers	Total Marks	Total Credits
Core	04	100x4=400	6x4=24
Discipline Specific Elective	02	100x2=200	6x2=12
Generic Elective	02	100x2=200	6x2=12

CORE PAPERS

(SOC-1) Introduction to Sociology

This introductory paper intends to acquaint the students with Sociology as a social science and the basic concepts used in the discipline. It also focuses on the social processes and the social institutions that man encounters as a member of the society.

Objectives: After studying these two papers, the student can

- Can get to know the convergence and divergence of Sociology with other social science disciplines in terms of the subject matter, nature and scope of the discipline and its approach.
- Develop knowledge about its historicity.
- Can get acquainted with the basic concepts used in the subject.
- Can generate ideas about the social processes and social institutions man encounters as a member of the society.

Learning Outcomes: This paper is expected to clarify and broaden the student's notion about the subject, the basic concepts used and some universal societal processes. This will provide a wholesome picture about what the subject is all about.

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Unit-5: Social Control: Meaning and types, Formal and Informal social control, Agencies of Social control

Essential readings:

1. Bottomore, T.B. 1972, Sociology: A guide to problems and literature. Bombay : George Allen and Unwin (India)
2. Harlambos, M. 1998. Sociology: Themes and perspectives. New Delhi Oxford University Press
3. Inkeles, Alex, 1987. What is Sociology? New Delhi: Prentice-Hall of India
4. Jaipur, No. 1988 . What is Sociology . Madras: Macmillan, India :
5. Johnson, Harry M. 1995. Sociology: A Systematic Introduction. New Delhi , Allied Publishers
6. Schaefer, Richard T. and Robert P. Lamm. 1999 Sociology. New Delhi Tata-Mac Graw Hill.

(SOC-2) Indian Society

Every society has its own peculiar structure and there are some institutions universal to every society, but with their unique manifestations in each society. There are some change agents and initiatives that enable the society to change with the passage of time. This paper focuses on the structure of the Indian society and the changing aspects with the processes operating, change agents and initiatives.

Objectives: After studying these two papers on Indian society, the student can

- Get an impression about the basic composition of Indian society, its historical moorings, basic philosophical foundations of the society and the institutions.
- Learn about the changing institutions, the processes, the agents and the interventions that bring about change in the Indian society.

Learning Outcomes: This paper is expected to bring familiarity in a student about Indian society. It will present a comprehensive, integrated and empirically –based profile of Indian society. It is hoped that the structure and processes operative in the society, the change agents operating in Indian society presented in this course will also enable students to gain a better understanding of their own situation and region.

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Unit-2 Hindu Social Organisation: Bases of Hindu Social Organization, Varna, Ashrama and Purushartha. Doctrine of Karma.

Unit-3 : Marriage and Family in India: Hindu marriage as Sacrament, Forms of Hindu Marriage. The Hindu joint family: Patriarchal and Matriarchal systems. Marriage and family among the Muslims. Changes in the institutions of Marriage and Family.

Unit-4 : The Caste system in India: Origin, Features and Functions. Caste and Class, The Dominant Caste, Changes in Caste system, Caste and Politics in India
Constitutional and legal provisions for the Scheduled Castes, Scheduled Tribes.

Unit-5 : Social Change in Modern India : Sanskritization, Westernization, Secularization, and Modernization

Essential readings:

1. Bose, N.K. 1967, Culture and Society in India. Bombay : Asia Publishing House
2. Bose, N.K. 1975, Structure of Hindu Society. New Delhi
3. Dube, S.C. 1990, Society in India. (New Delhi: National Book Trust.)
4. Dube, S.C. 1995, Indian Village (London : Routledge)
5. Dube, S.C. 1958: India's changing Villages (London: Routledge and Kegan Paul).
6. Karve, Irawati, 1961 : Hindu Society : An Interpretation (Poona : Deccan-College) :: Lannoy,
7. Mandelbaum, D.G. 1970 : Society in India (Bombay: Popular Prakashan)
8. Srinivas, M.N. 1980 : India: Social Structure (New Delhi: Hindustan - Publishing Corporation)
9. Srinivas, M.N. 1963: Social Change in Modern India (California, Berkeley: University of California Press).
10. Singh, Yogendra, 1973: Modernization of Indian Tradition (Delhi: Thomson Press).

(SOC-3) Rural Sociology

Rural Sociology is a specialized branch of Sociology describing the society of villages and rural areas. As the rural areas or the villages mark the beginning of human

civilization, this paper is designed to bring out the distinct features of the rural society with their typologies and typicalities. In the present paper an attempt is made to introduce the student with the development of this branch overtime with its focus on the typicality of Indian villages, their structures, changing features and social problems faced by the rural people.

Objectives: After studying this paper, the student can

- Get an impression about the emergence of the sub discipline Rural Sociology and the forces contributing for its origin.
- Learn about the nature of this branch of knowledge, its subject matter and significance.
- Collect information and knowledge about the mooring of the sub discipline in the Indian context.
- Generate an idea about the typicalities of the rural society and the institutions operating therein and their dynamics.
- Derive ideas about rural social problems of the country.

LearningOutcomes: India thrives in her villages. By going through this paper, the student can have a grip on the grass roots of Indian society. This will enable the student to understand the society in a better manner, to note the heterogeneities in culture, institutions and their functions, changes, the contrasts found between the rural urban societies and the problems faced by the people.

Unit-1 : Origin and Scope of Rural Sociology., Nature and Importance of Rural Sociology.

Unit-2 : Rural social Structure: Village Community, Agrarian Economy, Caste System, Mobility and Migration. Rural-Urban Contrast and Continuum

Unit-3: Rural Social problems: Poverty, Unemployment, , Food Security, Landlessness, Indebtedness, Health care and Sanitation

Unit-4 : History and Evolution: Community Development Programme, Land Reforms, Green Revolution. Cooperative Movement, Panchayati Raj Institutions- Constitutional provisions and Structure. Role of Panchayats in Rural Development

Unit-5 Rural Development Programmes: MGNREGA, SGSY, Indira Awas Yojana, Livelihood Mission, Health Mission

Recommended Books:

1. Doshi S.L. & P.C. Jain 2002 Rural Sociology, Jaipur, Rawat
2. Desai A.R. Rural Sociology in India 1997 Bombay Popular Prakasan
3. Dhanagare D.N. 1988 Peasant movements in India, New Delhi, Oxford
4. Gupta D.N. 2001 Rural development System New Delhi Books India International
5. Dube, S.C. 1988 India's changing Village: Human Factor in Community Development Himalayan Publishing House, Bombay
6. Maheshwari, S.R. 1985 Rural Development In India, Sage Publication, New Delhi
7. Vivek, R. & Bhattacharya 1985 The New Strategies of Development in Village India, Metropolitan
8. Jain, Gopal Lal 1985 Rural development Mangaldeep Publication, Jaipur

9. Joshi R P., and S. Narawam 1985 Panchayat Raj in India : Emerging Trends across the States Rawat, Jaipur

10. Singh, Katar1995 Rural development: Principle policies and Management Sage, New Delhi

(SOC-4) Social Change and Development

Change is the law of nature and every society is subject to change. Social change has always been a central concern of Sociological study. Change takes different forms. Change has its pattern which is spelt out by various theories. Change is often propelled by various factors. This paper is designed to provide some ideas to the student about such process, theories and factors.

Objectives: After going through this paper, the student can

- Derive knowledge about the meaning, nature, forms and patterns of change.
- Get an idea about the theories that explain change and their adequacy in explaining so.
- Get an impression about the factors that propel change in the society.

Learning Outcomes: This paper is expected to provide a wholesome idea to the students about the process of social change. They can relate their experience with the theoretical explanations.

Unit-1 : Social Change : Meaning and nature. Social Progress, Evolution and Development.

Unit-2 : Theories of Social Change : Evolutionary theory, Cyclical theory, Conflict Theory, Functionalist theory.

Unit-3 : Factors of Social Change: Cultural, Economic, Technological, Ideological, Demographic

Unit-4 : Economic Growth and Social Development : Indicators of Social Development, Human Development Index, Gender Development Index

Unit-5 : Models of Development : Capitalist, Socialist, and Gandhian.

Essential readings:

1. Moore, W.E. 1965 Social Change, Prentice-Hall of India. New Delhi
2. Gandhi M.K., Hind Swaraj
3. Schumacher, E.F., Small is Beautiful
4. Narain, Shreeman, Principles of Gandhian Planning
5. Mishra, B., Capitalism, Socialism and Planning.
6. UNDP, Human Development Report

(SOC-DSE-1)

Research Methodology

Since the days of August Comte, a debate and a deliberate attempt has been initiated to provide a scientific character to social sciences. In this attempt empirical research has

been introduced as an integral part of observing social reality and generalising it objectively without any subjective predisposition. Gradually, research methods have been developed and introduced in social sciences to bring it in par with scientific observations. The essence of this paper lies in introducing the students with these methods of research to ensure objectivity as far as practicable in social research.

Objectives: Bygoing through this paper, the student can

- Get an understanding of the nature of scientific methods, nature of social Phenomena and the way of attaining value neutrality.
- Have a grip over the basic steps involved in social research and the types of social research with their applicability
- Develop an insight into the need and types of research design and the use of sampling method for attending objectivity and scientific study.

Learning Outcomes: This paper is designed and incorporated to acquaint the students with the scientific ways of studying social phenomena. This provides them with a research insight that will enable them to capture the most relevant data in an objective manner. The market demand of this paper will be very high as the students well versed with this paper will be highly demanded in academics, fundamental research, and policy research undertaken both by Government and Non- Government agencies.

Unit-1 : Meaning and Significance of Social Research, Nature of scientific Method, Applicability of scientific method to the study of social phenomena, Major steps in social research.

Unit-2 : Research Design, Types of Research Design: Exploratory, Diagnostic, Descriptive, and Experimental research Design.

Unit-3 : Hypothesis: Meaning, Characteristics, Types and sources of Hypothesis, Role of Hypothesis in Social Research

Sampling: Meaning, and characteristics, Types: Probability and Non-Probability Sampling. Role of Sampling in Social Research

Unit-4 : Qualitative social Research : Observation, Case Study, Content Analysis

Unit-5 : Quantitative methods in Social Research: Survey research, Questionnaires, Interview. Measures of Central Tendency: Mean, Median, Mode.

Recommended Readings:

1.Bajaj and Gupta1972 Elements of Statistics. New Delhi: R.Chand and Co., New Delhi

2. Beteille, A. and T.N. Madan1975 Encounter and experience: Personal Accounts of Fieldwork. Vikas Publishing House, New Delhi

3.Bryman, Alan 1988 Quality and Quantity in Social Research Unwin Hyman, London

4.Jayram, N.1989. Sociology: Methods and Theory. Madras: MacMillan, Madras

5.Kothari,C.R. Research Methodology : Methods and Techniques, Bangalore, Wiley Eastern.

6. Punch, Keith. 1996. Introduction to Social Research, Sage,London

7. Shipmen, Martin, 1988 The Limitations of Social Research Sage, London
8. Young, P.V. 1988 Scientific Social Survey and Research Prentice Hall, New Delhi

(SOC-DSE-2)

Gender and Society

The biological basis to the differences between the sexes does not explain the inequalities faced by the sex groups in the society. In the society variations are marked in the roles, responsibilities, rights of and relations between sex groups depending on the social prescriptions relating to sex affiliations. The differences, inequalities and the division of labour between men and women are often simply treated as consequences of 'natural' differences between male and female humans. But, in reality the social norms, institutions, societal expectations play a significant role in deciding and dictating the behaviour of each sex group. This is the fundamental of the study of Gender and Society.

Objectives: After studying this paper, the student can

- Conceptualize what is "Gender" and what is "Sex" and draw a line of distinction between the two.
- Note the difference in gender roles, responsibilities, rights and relations.
- Trace out the evolution and institutionalization of the institution of "Patriarchy".
- Get to know the theories of Feminism that brought women issues and demands to the forefront.
- Assess the initiatives undertaken for gender development with the paradigm shift from time to time.

Learning Outcomes: This paper is expected to generate ideas and sensitivity about gender in a student which he/she can put into practice in daily life. This will lead to change the prevalent biases and gender practices and create a gender neutral social world where both men and women can enjoy their basic rights and cherish to achieve their dreams.

Unit-1 : Social Construction of Gender : Sex and Gender, Gender stereotyping and socialization, Gender Role and Identity. Gender stratification and Inequality, Gender discrimination and Patriarchy.

Unit-2 : Feminism: Meaning, origin and growth of Feminist Theories. Theories of Feminism : Liberal, Radical, Socialist, and Eco-Feminism.

Unit-3 : Gender and Development: History and Approaches, WID, WAD and GAD. Women Empowerment: Meaning and Dimensions. World Conference of Women, Mexico, Copenhagen, Nairobi and Beijing. Gender- Related Development Index (GDI) and Gender Empowerment Index (GEM).

Unit-4: Status of Women in India : Ancient and Medieval period, women in pre-independence India, Social Reform movements, The Nationalist movement, Women in Independent India.

Unit-5 : Major Challenges and Issues Affecting Women in India: Women and Education, Women and Health, Women and Work. Policy provisions for women.

Recommended Readings:

6. Bhasin, Kamla, 2003 Understanding Gender, Kali for Women
7. Bhasin, Kamala , 1986 Khanv, Said Nighat Some Questions on Feminism and Its Relevance in South Asia, Kali for Women, New Delhi
8. Chaudhuri, Maitrayee 2004 Feminism in India: Issues in Contemporary Indian Feminism Kali for Women, New Delhi
9. Kabeer, Naila 1994 Reversed Realities: Gender Hierarchies in Development Thought: Gender Hierarchies in Development
10. Srivastava Gouri, 2005 Women Education in India Issues and Dimensions, Academic Excellence Publishers & Distributors
6. Agarwal, S.P 2001 Women's Education in India, Concept Publishing Company
7. **Satia, J, Misra, M, Arora, R, Neogi, S**, ed. Innovations in Maternal Health - Case studies from India. New Delhi, India: SAGE Publications Pvt. Ltd.
8. Dube, Leela 1990 Structures and Strategies –Women, Work and Family, SAGE Publications, New Delhi
9. Kalia, Anil 1998 “Women Workers: Invisible and Unprotected”, Social Welfare, Vol.45, No.1, April
10. Cahwala, Monioca 2006 Gender Justice: Women and Law in India, Deep and Deep Publications

(SOC-GE-1) Social Disorganization and Deviance

No society is fully organized in character. Disorganization is apt to occur from time to time. Disorganization is a manifestation of the deviant behavior found among some individuals. This deviance occurs when the individuals feel that the normative order of the society and its institutions are not need fulfilling in character. This present paper makes an attempt to provide an impression about the scenario of disorganization, its forms, causes and consequences with the theories explaining the situation.

Objectives: After going through this paper, the student can

- Understand the meaning, causes, consequences and forms of social disorganization.
- Learn about the theories explaining the disorganization situations.
- Comprehend the concept of crime and the existing theories of punishment.

Learning Outcomes: This paper is designed with an expectation to impress upon a student the concept of deviant behavior leading to social disorganization, forms, theoretical foundations and criminal activities which he encounters in real life situations.

Unit-1 : Social Disorganization: Meaning and Nature. Family Disorganization and Personality Disorganization Causes and Consequences.

Unit- 2: Theories of Deviant Behaviour : Contributions of Durkheim and Merton. Ecological theory, Delinquent Sub-Culture theory, Differential Association theory, Differential Opportunity theory.

Unit- 3 : Crime and Punishment : Concepts of Crime and Delinquency. Causes and consequences. Theories of Punishment: Retributive, Deterrent, Reformatory.

Unit-4: Social Problems: Poverty, Unemployment, Alcoholism, Indebtedness, Terrorism

Unit-5 Atrocities against women, Domestic violence, Dowry, Divorce

Essential Readings:

1. Mamoria, C.B., 1981 Social Problems and Social Disorganization in India
2. Carrabine; Eamonn, Iganski, Paul, Lee, Maggy, Plummer Ken, South, Nigel (2004) [Criminology: A Sociological Introduction](#)
3. [Sutherland](#), Edwin Hardin Sutherland (1949) White Collar Crime, Dryden Press
4. Ahuja, Ram (2012) Social problems in India, Rawat
5. Chakraborty, Dipangshu (1999) Atrocities on Indian Women, APH

(SOC-GE-2)

Sociology of Movements

Movements reflect the voices raised against the prevailing practices of a society. Every society witnesses social movement in some form or the other. Movements bring social change and transformation. It is a collective effort that is driven by particular issues and brings forth changes. The present paper tries to provide a rudimentary impression to the students about the concept, nature and types of movements with a thrust on the movements witnessed by Indian society.

Objectives:

- To introduce to the students with the concept of social movements and their dynamics.
- To introduce the students to the role of social movements in social transformation .
- To help them understand the various approaches to the study of social movements.

Learning Outcomes: The very aim of this paper is to disseminate knowledge about the concept of social movements and its process and change making role in the society.

Unit: 1 Social Movements: Nature, Definitions, Characteristics of social movement , types: Revolutionary, Reform, Revival, Counter movements

Basis of social movements: Leadership, ideology, resource

Unit-2 Religious movements in India: The SNDP Movements in Kerala
The Brahmo Samaj and The Arya Samaj

Unit-3 Peasants Movements in India: The Champaran Satyagraha (1917), The Kheda Peasant Struggle, The Bardoli Movement in Gujarat. The Peasant Revolt in Telangana, The Tebhaga Movement in Bengal.

Unit-4 Backward Class Movements in India: Mahar Movement in Maharashtra, Dalit Movement in Tamil Nadu, The Non Brahmin Movement in Tamil Nadu

Unit-5 Women's Movements in India: In the Pre independence era and the post independence period

Essential readings:

1. Foweraker Joe, 1995 Theorising Social Movements, Pluto Press, London,
2. Buechler, S. 1997 'New Social Movement Theories' in Buechler, S. and Cylke, F.K., Jr. (eds.) Social Movements: Perspectives and Issues. Mountain View: Mayfield Publishing Company
3. Rao, M.S.A. ed. 1979 Social Movements in India Vol. I and II, Manohar, New Delhi
4. Dhanagare, D.N. 1983 Peasant Movements in India 1920-1950, OUP, Delhi, 1983
5. Kaur, Manmohan, 1968 "Role of Women in the Freedom Movement 1857-1947", Sterling, New Delhi
6. Basu, Aparna, 1976 "Role of Women in the Freedom Movement", in B.R. Nanda, ed., Indian Women From Purdah to Modernity, Vikas, Delhi.
7. Chattopadhyaya, Kamaladevi, 1983 "Indian Women's Battle for Freedom", Abhinav Publications, New Delhi .

**COURSES OF STUDIES
FOR
+ 3 DEGREE COURSE (ARTS)**

SANSKRIT

Under

(Choice-based Credit System)

From the sessions 2016-17 onwards



**UTKAL UNIVERSITY
BHUBANESWAR – 751004
ODISHA**

UTKAL UNIVERSITY
SCHEME FOR CHOICE BASED CREDIT
SYSTEM IN B.A. Honours (SANSKRIT)

	CORE COURSE(14)	Ability Enhancement Compulsory course (AECC) (2)	Skill Enhancement Course (SEC) (2)	Elective: Discipline Specific DSE (4)	Elective: Generic (GE) (4)
I	C 1	(English/ MIL Communication)			GE- 1
	C 2	Environmental Science			
II	C 3	Environmental Science/ English			GE- 2
	C 4	MIL Communication			
III	C 5		SEC - 1		GE- 3
	C 6				
	C 7				
IV	C 8		SEC - 2		GE- 4
	C 9				
	C 10				
V	C 11			DSE- 1	
	C 12			DSE- 2	
VI	C 13			DSE- 3	
	C 14			DSE- 4	

Total Papers - 26

Total Marks - 2400 (350 + 350 + 450 + 450 + 400 + 400)

Total Credits - 140 (20 + 20 + 26 + 26 + 24 + 24)

COURSE STRUCTURE FOR B.A.(HONS.) SANSKRIT& GENERIC ELECTIVE

1st Year (08 Papers: 700 Marks)			
S1.	SEMESTER-I Marks- Credits	S1.	SEMESTER-II Marks- Credits
1.	Core Course (SKT.)-1 (100 -6)	5.	Core Course (SKT.)-3 (100 -6)
2.	Core Course (SKT.)-2 (100 -6)	6.	Core Course (SKT.)-4 (100 -6)
3.	AECC-1 Env. Studies (50 -2)	7.	AECC-2 M.I.L (50 -2)
4.	Generic Elective- 1(If SKT.)(100 -6)	8.	Generic Elective - 2(If SKT.) (100 -6)
	(6+6+2+6 = 20 Credits) Total: 350 Marks		(6+6+2+6 = 20 Credits) Total: 350Marks
2nd Year (10 Papers: 900 Marks)			
S1.	SEMESTER-III Marks- Credits	S1.	SEMESTER-IV Marks- Credits
9.	Core Course (SKT.)-5 (100 -6)	14.	Core Course (SKT.)-8 (100 -6)
10.	Core Course (SKT.)-6 (100 -6)	15.	Core Course (SKT.)-9 (100 -6)
11.	Core Course (SKT.)-7 (100 -6)	16.	Core Course (SKT.)-10 (100 -6)
12.	SEC - 1 (50 -2)	17.	SEC -II (50 -2)
13.	Generic Elective (If SKT.)-3 (100 -6)	18.	Generic Elective (If SKT.)-4(100 -6)
	(6+6+6+2+6 = 26 Credits)Total: 450 Marks		(6+6+6+2+6 = 26 Credits)Total: 450Marks
3rd Year (8 Papers: 800 Marks)			
S1.	SEMESTER-V Marks- Credits	S1.	SEMESTER-VI Marks- Credits
19	Core Course (SKT.)-11 (100 -6)	23	Core Course (SKT.)-13 (100 -6)
20	Core Course (SKT.)-12 (100 -6)	24	Core Course (SKT.)-14 (100 -6)
21	DSE(SK T)- 1 (Discipline Specific Elective) (100 -6)	25	DSE(SK T)- 3 (Discipline Specific Elective) (100 -6)
22	DSE(SK T)- 2 (Discipline Specific Elective) (100 -6)	26	DSE(SK T)- 4 (Discipline Specific Elective) (100 -6) Project Report and Presentation.
	(6+6+6+6 = 24 Credits) Total: 400 Marks		(6+6+6+6 = 24 Credits) Total: 400 Marks
<p>Grand Total: 26Papers</p> <p>Grand Total Marks: 2400 (350+350+450+450+400+400)</p> <p>Grand Total Credits:140 (20+20+26+26+24+24)</p> <p>CC= Core Course-1400</p> <p>DSE= Discipline Specific Elective- 400</p> <p>GE= Generic Elective- 400</p> <p>SEC= Skill Enhancement Course- 100</p> <p>AECC= Ability Enhancement Compulsory Course- 100</p> <p>ABBREVIATION: 1. CC= Core Course, 2. DSE= Discipline Specific Elective, 3. GE= Generic Elective, 4. SEC= Skill Enhancement Course, 5. AECC= Ability Enhancement Compulsory Course</p>			

CORE COURSES
(14 Papers - 100 × 14 = 1400 Marks)
1st YEAR

SEMESTER-I

CC- 1 MORAL TEACHINGS AND BASICS OF SANSKRIT [Term end: 80 + Midterm 20]

- | | |
|---|----|
| 1. <i>Hitopadesa</i> | 30 |
| 2. <i>Yaksaprasna of Mahabharata(Aranyakaparva, ch.313)</i> | 30 |
| 3. <i>Sabdarupa&Dhaturupa</i> | 20 |

CC-2 DRAMA-I& HISTORY OF SANSKRIT LITERATURE -I [Termend : 80 + Midterm20]

- | | |
|--|----|
| 1. <i>Abhijnanasakuntalam</i> (Act I-IV) | 50 |
| 2. <i>History of Sanskrit Literature-I</i>
(<i>Ramayana, Mahabharata, General out lines of Puranas, Sanskrit Drama</i>) | 30 |

SEMESTER-II

CC-3 DRAMA -II & DRAMATURGY [Term end: 80 + Midterm 20]

- | | |
|---|----|
| 1. <i>Abhijnanasakuntalam</i> (Act V-VII) | 50 |
| 2. <i>Dramaturgy</i> | 30 |

CC-4 AN INTRODUCTION TO THE TECHNIQUE OF PANINIAN GRAMMAR& PROSODY [Term end: 80 + Midterm 20]

- | | |
|---|----|
| 1. <i>Vocabulary Relevant to Sanskrit Grammar and Arrangement of Paninian Grammar</i> | 15 |
| 2. <i>Samjnaprakaranam</i> | 45 |
| 3. <i>Chandas</i> | 20 |

2nd YEAR

SEMESTER-III

CC-5 POETRY & HISTORY OF SANSKRIT LITERATURE- II [Term end: 80 + Midterm 20]

- | | |
|---|----|
| 1. <i>Meghadutam- (Purvamegha)</i> | 50 |
| 2. <i>History of Sanskrit Literature-II</i>
(<i>Gitikavyas, Khandakavyas, Gadyakavyas, Kathasahitya</i>) | 30 |

CC-6 META-RULES OF PANINIAN GRAMMAR, POETICS AND FIGURES OF SPEECH [Term end: 80 + Midterm 20]

- | | |
|---|----|
| 1. <i>Paribhasaprakaranam</i> | 30 |
| 2. <i>Sahityadarpanah(Ch. I & II)</i> | 30 |
| 3. <i>Sahityadarpanah (Alamkaras)</i> | 20 |

CC-7 CASES AND CASE ENDINGS IN PANINIAN GRAMMAR & TRANSLATION-I [Term end: 80 + Midterm 20]

- | | |
|---|----|
| 1. <i>Siddhantakaumudi(Karaka- Vibhakti I-IV)</i> | 50 |
| 2. <i>Translation from Sanskrit- Odia/ Eng</i> | 30 |

SEMESTER-IV**CC-8 INSCRIPTIONS,UPANISAD&BHAGAVADGITA[Term end: 80 + Midterm 20]**

1. *Inscriptions* 30
(Girnar Inscription of Rudradaman, Allahabad Pillar Inscription of Samudragupta and Mandasore inscription of Yasovarman)
2. *Kathopanisad(Adhyaya-I, Vallis-I,II&III)* 30
3. *Bhagavatagita(Ch.XV)* 20

CC-9 CASE AND CASE ENDINGS OF PANINIAN GRAMMAR, TRANSLATION- II & LEXICON [Term end: 80 + Midterm 20]

1. *Siddhantakaumudi(Karaka- Vibhakti V-VII)* 40
2. *Translation from Odia/ Eng passage-Sanskrit* 30
3. *Amarakosa* 10

CC-10 ORNATE PROSE & PROSE WRITING [Term end: 80 + Midterm 20]

1. *Dasakumaracharitam (PurvapithikaDvitiya Ucchvasa)* 25
2. *Sukanasopadesa* 25
3. *Essay in Sanskrit* 20
4. *Expansion of Idea in Sanskrit* 10

3rd YEAR**SEMESTER-V****CC-11 ORNATE POETRY IN SANSKRIT & HISTORY OF SANSKRIT LITERATURE –III [Term end: 80 + Midterm 20]**

1. *Sisupalabadham(Canto-I Verses 01-48)* 30
2. *Kiratarjuniyam (Canto-I)* 30
3. *History of skt.literature - III (Mahakavyas and Champu)* 20

CC-12 VEDA,VEDIC GRAMMAR &HISTORY OF VEDIC LITERATURE [Term end: 80 + Midterm 20]

1. *Vedic Suktas* 30
2. *Vedic Grammar* 20
3. *History of Vedic Literature* 30

SEMESTER-VI**CC-13 ARTHASASTRA , DHARMASASTRA AND AYURVEDA [Term end: 80 + Midterm 20]**

1. *Arthasastra (Adhikarana I, II–VIII)* 30
2. *Manusmṛti (2nd Ch. Verses from 1 to 52)* 30
3. *Ayurveda (Carakasamhita- Dirghamjivitiyadhyaya verses 53-103)* 20

CC-14 TECHNICAL LITERATURE IN SANSKRIT [Term end: 80 + Midterm 20] (JYOYISHA & VASTU)

1. *Jyotisha (Jyotihsara-ratnavali Chap- I)* 40
(Grahanaaksatraparicayaprakaranam)
2. *Vastu (Vasturatnakara Chap-I)* 40
(Bhuparigrahaprakaranam)

ABILITY ENHANCEMENT COMPULSORY COURSE(AECC)

50 Marks /02 Credits each

SEMESTER - I

AECC - 1 ENVIRONMENTAL STUDIES

SEMESTER - II M.I.L. (ALTERNATIVE SANSKRIT) (If SANSKRIT) AECC

- II 40+10Marks 02 Credits

SKILL ENHANCEMENT COURSES (SEC)

SKILL ENHANCEMENT COURSES (SEC-I) 50 Marks /02 Credits each

SKILL ENHANCEMENT COURSES (SEC-II) 50 Marks /02 Credits each

(A Students has to choose any two Papers out of these four groups namely P, Q, R & S) Group-
P YOGA

Group- Q KARMAKANDA

Group- R VASTU

Group- S TRANSLATION AND EDITING SKILL

DISCIPLINE SPECIFIC ELECTIVE (DSE)

SEMESTER-V (A Student has to opt two DSE papers out of Groups- A, B, C & D)

Group- A SCIENCE OF VASTU AND VRKSA

Group- B SOCIO POLITICAL THOUGHTS IN ANCIENT INDIA Group- C

YOGA: THEORY AND PRACTICE

Group- D TRENDS OF INDIAN PHILOSOPHY

SEMESTER-VI (A Student has to opt one DSE paper out of Groups- E, F, G and one project work of 100 marks)

Group- E ETHICAL LITERATURE IN SANSKRIT

Group- F SCIENTIFIC LITERATURE IN SANSKRIT

Group- G GENERAL LINGUISTICS AND PHILOLOGY

GENERIC ELECTIVE (GE)

SEMESTER-I GE-I (A Student has to opt one from Groups H & I)

Group- H GRAMMAR, HISTORY OF SKT LIT., DRAMA & PROSE

Group- I MASTERING SANSKRIT LANGUAGE

SEMESTER-II GE-II (A Student has to opt one from Groups J & K)

Group- J FUNCTIONAL SANSKRIT

Group- K HISTORY OF LITERATURE, POETRY, PHILOSOPHY & POETICS

SEMESTER-III GE-III (A Student has to opt one from Groups L & M)

Group- L POETRY, GRAMMAR & COMPOSITION

Group- M DARSANA, PROSODY & POETICS

SEMESTER - IV GE - IV (A Student has to opt one from Groups N & O)

Group- N SOCIO POLITICAL THOUGHTS IN ANCIENT INDIA

Group- O ETHICAL LITERATURE IN SANSKRIT

SYLLABUS IN DETAIL

1st YEAR

SEMESTER-I

CC- 1 MORAL TEACHINGS AND BASICS OF SANSKRIT

1. *Hitopodeśa Mitralabha* (From *Kathāmukha* to *Gṛdhravidalakatha*) 30Marks
2. *Yaksaprasna of Mahabharata*(*Aranyakaparva, ch.313*
from Verses no. 41 to 133) 30Marks
3. *Śabdarupa&Dhaturupa* 20 Marks

(‘a’ karanta, ‘i’ karanta, ‘ī’karanta, ‘u’karanta, ‘ū’ karanta, ‘in’ bhaganta, *Mātr*, *Pitr*, *Asmad*, *Yusmad*, *Tad*(*sabdarupas*).*Lat*, *Lañ*, *Vidhiliñ*, *Lṛt*, *Lot* and *Litlaktaras* of *Path*,*Ni*, *Kṛ*, *Sev*, *Han*, *Pā*, *Dā*, *Śru*, *Śī* and *Kṛīṇ* in the form of *Ātmanepada*, *Parasmaipada* or *Ubhayapada* whichever is applicable. (*Dhaturupas*)

Unit-I & II *HitopodeśaMitralabha* (From *Kathamukha* to *Gṛdhravidalakatha*) 30 Marks

Long Questions -1 15 Marks

Short Questions -3 5×3=15 Marks

Unit-III & IV *Yaksaprasna of Mahabharata* 30 Marks

Long Questions-1 15 Marks

Explanation - 1 8 Marks

Translation of a textual Verse 7 Marks

Unit-V *Śabdarupa&Dhaturupa* 20 Marks

Śabdarupa - 5 2×5= 10 Marks

Dhaturupa - 5 2×5= 10 Marks

Books for Reference:

3. *Hitopadesah*(*Mitralabhah*) (Ed.) Kapildev Giri, Chaukhamba Publications, Varanasi.
4. *Hitopadesah* (*Mitralabhah*) (Ed.) N.P. Dash and N.S. Mishra, Kalyani Publishers, New Delhi
5. *Vyakaranadarpana*, The Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar, 2013
6. Critical edition of the *Mahabharata*, (Ed.) V.S. Sukthankar, BORI, Pune
7. *Mahabharata*, Gitapress, Gorakhpur (Prescribed Text)
8. *Yaksaprasna*, T. K. Ramaayiyar, R. S. Vadhyar & Sons. Palkad, Kerala

CC-2 . DRAMA-I & HISTORY OF SANSKRIT LITERATURE - I

1. *Abhijnanasakuntalam* (Act I-IV) 50 Marks

2. History of Sanskrit Literature-I 30 Marks

(*Ramayana*, *Mahabharata*, General out lines of *Puranas* and Sanskrit Drama)

1. Abhijnanasakuntalam (Act I-IV)

Unit-I	Long Questions -1	14 Marks
Unit- II	Short Questions -2	7×2=14 Marks
	Explanation of Verse- 1	8 Marks
Unit-III	Textual Grammar	14 Marks
	i) <i>Sandhi</i>	1×2= 2 Marks
	ii) <i>Prakṛti- Pratyaya</i>	2×2= 4 Marks
	iii) <i>Karaka&Vibhakti</i>	2×2= 4 Marks
	iv) <i>Samasa</i>	2×2= 4 Marks

2. History of Sanskrit Literature-I

30 Marks

Unit- IV *Ramayana & Mahabharata*

Long Questions -1

10 Marks

Short Questions -1

05 Marks

3. General Outlines of Puranas and Sanskrit DramaUnit- V General Outlines of *Puranas* and Sanskrit Drama

(Defination and Classification of Puranas, Bhasa, Kalidasa, Sudraka, Visakhadatta, Bhavabhuti, Bhattanarayana)

Long Questions -1

10 Marks

Short Questions -1

05 Marks

Books for Reference:

1. *Abhijnanasakuntalam* (Ed.) R.M. Bose, Modern Book Agency Pvt. Ltd., 10 BankimChatterjee Street, Calcutta
2. *Abhijnanasakuntalam* (Ed.) M.R. Kale, Motilal Banarsidass Publishers Pvt. Ltd., NewDelhi-11007, 8th Reprint-2010
3. *Abhijnanasakuntalam* (Ed.) R.M Mohapatra, Books & Books, Cuttack
4. *Abhijnanasakuntalam* (Ed.) H.K. Satapathy, Students Store, Cuttack
4. *History of Sanskrit literature*, Baladev Upadhyay, Chaukhamba Publications, Varanasi.
5. *Sanskrit Drama*, A.B. Keith, Oxford University Press, London
6. *Samskrta Sahityata Itihasa*, (Odia) H.K. Satapathy, Kitab Mahal, Cuttack- 753003.

SEMESTER-II**CC - 3 DRAMA - II & DRAMATURGY**1. *Abhijnanasakuntalam* (Acts V-VII) 50 Marks2. *Dramaturgy* 30 Marks(*Nandi, Prastavana, Purvaranga, Pancha-arthaprakṛti, Panchasandhi, Pancha-arthopaksepaka, Nataka, Prakarana.*)**1. Abhijnanasakuntalam (Acts V-VII)**

Unit-I	Long Questions - 1	14 Marks
Unit- II	Short Questions - 2	8×2= 16 Marks
Unit-III	i) Explanation of Verse- 1	8 Marks
	ii) Verse/ Dialogue Translation-1	7 Marks
	iii) Translation from Prakṛit to Sanskrit	5 Marks

2. *Dramaturgy (Sahityadarpana, Chapter- VI)*

30 Marks

Unit-IV

Nandi, Prastavana, Purvaranga, Nataka, Prakarana, Pancasandhi

Short Notes on any three

5×3= 15 Marks

Unit-V

Panca - arthaprakṛti and Panca- arthopaksepaka

(Short Notes on any three))

5×3= 15Marks

Books for Reference:

4. *Abhijnanasakuntalam* (Ed.) R.M. Bose, Modern Book Agency Pvt. Ltd., 10 BankimChatterjee Street, Calcutta
5. *Abhijnanasakuntalam* (Ed.) M.R. Kale, Motilal Banarsidass Publishers Pvt. Ltd., NewDelhi-11007, 8th Reprint-2010
6. *Abhijnanasakuntalam* (Ed.) R.M.Mohapatra, Books &Books , Cuttack
4. *Abhijnanasakuntalam* (Ed.) H.K. Satapathy, Students Store, Cuttack
4. For *Dramaturgy- Sahitya Darpana* (Ed.) P.V.Kane, Motilal Banarsidass Publishers Pvt. Ltd., New Delhi
5. *Odia Translation of Sahityadarpana* by Narayana Mohapatra, Odisha Sahitya Academy, Bhubaneswar.
6. *Sahitya Darpana* with Laksmi Tika (Sanskrit) and Vimala Tika, (Hindi) (Ed.) K.M.Sastri, Chaukhamba Publications, Varanasi.
7. *Sahityadarpana* evam Chanda (Ed.) Dr. Braja Sundar Mishra, Satyanarayan Book Store, Cuttack
9. *Sahityadarpanao Chanda* (Ed.) Niranjan Pati, Vidyapuri, Cuttack

CC- 4 AN INTRODUCTION TO THE TECHNIQUE OF PANINIAN GRAMMAR & PROSODY

1. Vocabulary relevant to Sanskrit Grammar and Arrangement of Paninian Grammar

15 Marks

2. *Samjna-prakaranam*

45 Marks

3. *Chanda*

20 Marks

1. Vocabulary relevant to Sanskrit Grammar and Arrangement of Paninian Grammar

Unit- I

15 Marks

(*Astadhyayi, Siddhantakaumudi, Ganapatha, Dhatupatha, Dhatu, Antaranga, Bahiranga, Apavada, Agama, Adesa, Nadi, Nistha, Krdanta, Taddhita, Tinanta, Nijanta, Sananta, Yananta, Namadhatu, Vikarana, Luk, Lopa, Sarvadhātuka, Ardhadhātuka, ti & Upadha* = 26)

Short Notes on any - 5

3×5= 15Marks

2. *Samjnaprakaranam*

45Marks

Unit- II

Two Sutras / Vrttis out of 1st 10 Sutras (Upto *tulyasyaprayatnam savarnam*) to be explained.

7½ ×2=15 Marks

Unit- III

Two Sutras / Vrttis out of 2nd 10Sutras (From *a a* upto *cadayo 'sattve*) to be explained.

7½ ×2= 15 Marks

Unit- IV

Two Sutras / Vrttis out of rest Sutras (From *pradayah* upto *dirgham ca*) to be explained.

7½ ×2= 15 Marks

3. Chanda (Prosody)-Srutabodhah

20Marks

Unit- V Definition and Examples of 4 Chandas - out of 7

5×4=20 marks

(Chandas such as -: Arya, Anustubh, Indravajra, Upendravajra, Upajati, Vamsastha, Vasantatilaka, Mandakranta, Malini, Shikharini, Shardula-vikridita, Sragdhara.)

Books for Reference:

1. *Siddhanta-kaumudi* with *Balamanorama* and *Tattvabodhini*, Vol.I (Ed.) Giridhara Sharma Chaturveda, Motilal Banarsidass
2. *Siddhanta-kaumudi* with *Mitabhasini* Com., (Ed.) S.R. Ray, Sanskrit Pustak Bhandar, 38 Cornwallis St., Calcutta
3. *Siddhanta-kaumudi* with Eng Tr. (Ed.), S.C. Basu, Motilal Banarsidass, New Delhi-110007, Rpt-1995
4. *Vaiyakarana Siddhanta Kaumudi* (Ed.) M.V. Mahashabde, Dadar Book depot, Bombay.
5. *Siddhanta-kaumudi* (Ed.) Prof. G.K. Dash & Dr(Mrs) K.Dash with Navanita tika, A.K.Mishra Publishers Pvt. Ltd, Cuttack.
6. *Siddhanta-kaumudi* (Ed.) Minati Mishra, Vidyapuri, Cuttack
7. *Siddhanta-kaumudi* (Ed.) Dr. Niranjana Pati, Kalyani Publishers, New Delhi
8. *Siddhanta-kaumudi* (Ed.) P.R.Ray, Sailabala Womens College, (Skt.Deptt.) Cuttack.
9. *Vyakaranadarpana*, The Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar- 2013
10. *Shrutabodha*, Hari Prasad Sharma, Nirnaya Sagar Press
11. *Sahityadarpana* Evam Chhanda (Ed.) Dr. Brajasundar Mishra, Satyanarayana Book Store, Cuttack.

2nd YEAR

SEMESTER-III

CC-5 POETRY & HISTORY OF SANSKRIT LITERATURE- II

1. *Meghadutam-* (Purvamegha) 50 Marks
2. *History of Sanskrit Literature-II* 30 Marks
(*Gitikavyas*, *Khandakavyas*, *Gadyakavyas* and *Kathasahitya*)

1. Meghadutam- (Purvamegha)

50 Marks

- | | | |
|----------|------------------------------|--------------------|
| Unit-I | Long Questions - 1 | 15 Marks |
| Unit- II | Short Questions - 2 | 7 ½ × 2 = 15 Marks |
| Unit-III | i) Explanation of One Verse | 12 Marks |
| | ii) Translation of One Verse | 8 Marks |

2. History of Sanskrit Literature-II

30 Marks

- | | | |
|---------|--|----------|
| Unit-IV | (<i>Gitikavyas</i> & <i>Khandakavyas</i>) | |
| | Long Questions -1 | 10 Marks |
| | Short Questions -1 | 05 Marks |
| Unit- V | (<i>Gadyakavyas</i> , <i>Kathasahitya</i>) | |
| | Long Questions -1 | 10 Marks |
| | Short Questions -1 | 05 Marks |

Books for Reference:

1. *Meghadutam* (Ed.) S.R. Ray, Sanskrit Pustak Bhandar, 38 Cornwallis St., Calcutta
2. *Meghadutam* (Ed.) M.R. Kale, Motilal Banarsidass, Delhi
3. *Meghadutam* (Ed.) Radhamohan Mahapatra, Books and Books, Vinodvihari, Cuttack, 1984
4. *Meghadutam* (Ed.) Dr. Braja Sundar Mishra, Vidyapuri, Cuttack, 1st Edn-1999
5. *Samskrta Sahitya ka Itihasa*, Baladeva Upadhyaya, Choukhamba, Varanasi.
6. *Samskrta Sahitya ka Ruparekha*, Vacaspati Goreilla, Choukhamba Vidyabhavan, Varanasi.
4. *Samskrta Sahitya Itihasa*, H.K. Satapathy, Kitab Mahal, Cuttack
5. *Samskrta Sahitya Itihasa*, Text Book Bureau, Govt. of Odisha, Bhubaneswar

CC-6 META - RULES OF PANINIAN GRAMMAR, POETICS & FIGURES OF SPEECH

- | | |
|---|----------|
| 1. <i>Paribhasaprakaranam</i> of <i>Siddhantakaumudi</i> | 30 Marks |
| 2. <i>Sahityadarpanah</i> (Ch.I & II) | 30 Marks |
| 3. <i>Sahityadarpanah</i> (Selected <i>Alamkaras</i> from Ch.X) | 20 Marks |

1. Paribhasaprakaranam**30 Marks**Unit- I Four *Sutras* to be explained.

5×4= 20 Marks

Unit- II Two *Vrttis/ Vartikas* to be explained.

5×2= 10 Marks

2. PoeticsUnit- III *Sahityadarpana Ch. I*

Long Questions -1

10 Marks

Short Questions -1

05 Marks

Unit- IV *Sahityadarpana Ch. II (Vakya, Pada, Abhidha, Laksana, Vyanjana)*

Long Questions -1

10 Marks

Short Questions -1

05 Marks

3. Figures of speech (without Sub-division)Unit- V *Sahityadarpana* (Ch.X)

5×4= 20 Marks

(Alamkarassuch

as *Anuprasa, Yamaka, Slesa, Upama, Rupaka, Utpreksa, Bhrantiman,**Nidarsana, Arthantaranyasa, Aprastuta-prasamsa, Apahnuti, Vyatireka,**Vibhavana, Visesukti, Samasukti, Svabhavukti)*Definition and Examples of **Four Alamkaras** (figures of speech) out of **seven**.**Books for Reference:**

1. *Siddhanta-kaumudi* with *Balamanorama* and *Tattvabodhini*, Vol.I (Ed.) Giridhara Sharma Chaturveda, Motilal Banarsidass
2. *Siddhanta-kaumudi* with *Mitabhasini Com.*, (Ed.) S.R. Ray, Sanskrit Pustak Bhandar, 38 Cornwallis St., Calcutta
3. *Siddhanta-kaumudi* with Eng Tr. (Ed.), S.C. Basu, Motilal Banarsidass, New Delhi-110007, Rpt-1995
4. *Vaiyakarana Siddhanta Kaumudi* (Ed.) M.V. Mahashabde, Dadar Book depot, Bombay.
5. *Siddhanta-kaumudi* (Ed.) Prof. G.K. Dash & Dr(Mrs) K.Dash with *Navanita tika*, A.K. Mishra Publishers Pvt. Ltd, Cuttack.

4. Siddhanta-kaumudi (Ed.) Minati Mishra, Vidyapuri, Cuttack
5. Siddhanta-kaumudi (Ed.) Dr. Niranjana Pati, Kalyani Publishers, New Delhi
6. Siddhanta-kaumudi (Ed.) P.R.Ray, Sailabala Womens College,(Skt.Deptt.) Cuttack.
7. Sahitya Darpana (Ed.) P.V. Kane, Motilal Banarsidass Publishers Pvt. Ltd., New Delhi
8. Odia Translation of Sahityadarpana by Narayana Mohapatra, Odisha Sahitya Academy, Bhubaneswar.
9. Sahitya Darpana with Lakshmi Tika (Sanskrit) and Vimala Tika, (Hindi) (Ed.) K.M. Sastri, Chaukhamba Publications, Varanasi.
10. Sahityadarpana evam Chhanda (Ed.) Braja Sundar Mishra, Satyanarayan Book Store, Cuttack
11. Sahityadarpana o Chhanda (Ed.) Niranjana Pati, Vidyapuri, Cuttack
12. Sanskrit Kavyatattva Vicara, Ketaki Nayak, Odisha Text Book Bureau, Bhubaneswar.

CC-7 CASES AND CASE ENDINGS IN PANINIAN GRAMMAR & TRANSLATION - I

1. *Siddhantakaumudi(Karaka-Vibhakti I-IV)* 50 Marks
2. Translation from Sanskrit unseen passage to Odia/ English 30 Marks

1. *Siddhantakaumudi(Karaka-Vibhakti I-IV)* 50 Marks

- Unit- I & II (*Prathama&Dvitiya*)
 Four *Sutras/ Vrtti/ Vartika* to be explained. 5×4= 20 Marks
- Unit- III (*Trtiya*)
 Two *Sutras/ Vrtti/ Vartika* to be explained 5×2= 10 Marks
- Unit- IV (*Caturthi*)
 Four *Sutras/ Vrtti/ Vartika* to be explained. 5×4= 20 Marks
- Unit -V *Translation from Sanskrit unseen passage into Odia/ English*
 One unseen Sanskrit Passage is to be given for Translation into Odia/ English
 (At least 10 sentences) 10×3= 30 Marks

Books for Reference:

- 1.Siddhanta-kaumudi with Balamanorama and Tattvabodhini, Vol.I (Ed.) Giridhara Sharma Chaturveda, Motilal Banarsidass
- 2.Siddhanta-kaumudi with Mitabhasini Com., (Ed.) S.R. Ray, Sanskrit Pustak Bhandar, 38 Cornwallis St., Calcutta
- 3.Siddhanta-kaumudi with Eng Tr. (Ed.), S.C. Basu, Motilal Banarsidass, New Delhi- 110007,Rpt-1995
4. Vaiyakarana Siddhanta Kaumudi (Ed.) M.V. Mahashabde, Dadar Book depot, Bombay.
5. Siddhanta-kaumudi (Ed.) Prof. G.K. Dash & Dr(Mrs) K.Dash with Navanita tika, A.K. Mishra Publishers Pvt. Ltd, Cuttack.
6. Siddhanta-kaumudi (Ed.) Minati Mishra, Vidyapuri, Cuttack
7. Siddhanta-kaumudi (Ed.) Dr. Niranjana Pati, Kalyani Publishers, New Delhi
8. Siddhanta-kaumudi (Ed.) P.R.Ray, Sailabala Womens College,(Skt.Deptt.) Cuttack.
9. *Vyakaranadarpana*, The Odisha State Bureau of Text Book Preparation and Production,Bhubaneswar- 2013
- A Guide to Sanskrit Composition and Translation*, M.R.Kale,Motilal Banarsidass, NewDelhi
11. Brhat Anuvada Candrika, Chakradhara Hamsa Nautial Shastri, Motilal Banarsidass, New Delhi

CC-8 INSCRIPTIONS , UPANISAD&BHAGAVADGITA

1. Inscriptions	30 Marks
2. Kathopanisad(Vallis-I,II&III)	30 Marks
3. Bhagavadgita (Chap.XV)	20 Marks

1. Inscriptions**30 Marks**

(Girnar inscription of Rudradaman, Allahabad Stone Pillar Inscription of Samudragupta and Mandasore Inscription of Yasodharman)

Unit- I	Long Questions -1	15 Marks
Unit- II	Short Questions -3	5×3= 15 Marks

2. Kathopanisad(Adhyaya I, Vallis-I,II&III)**30 Marks**

Unit- III	Long Questions	-1	15 Marks
Unit- IV	i) Explanation - 1 Mantra		08 Marks
	ii) Translation- 1 Mantra		07 Marks

3. Bhagavadgita(Ch.XV)**20 Marks**

Unit- V	Long Questions	-1	12 Marks
	Translation- 1 Verse		08 Marks

Books for Reference:

1. *Selected Sanskrit Inscriptions* (Ed.) D.B. Pusalkar, Classical Publishers, New Delhi
2. *Abhilekhamala* (Ed.) Sarojini Bhuyan, Cuttack
3. *Abhilekhamala* (Ed.) Sujata Dash, Cuttack
4. *Abhilekhamala* (Ed.) Jayanta Tripathy, Vidyapuri, Cuttack
5. *Isadi Nau Upanisad* with Sankarabhasya - Gita Press, Gorakhpur
6. *Kathopanisad* with *Sankarabhasya*(Ed.) V.K. Sharma, Sahitya Bhandar, SubhasBazar, Meerut
7. *The Message of the Upanisad* , Swami Ranganathananda, Bharatiya VidyaBhavan,K.M. Munsri Marg Mumbai.
8. *Shrimad-bhagavad-gita* (Ed.) S. Radhakrishnan, Bharatiya Vidya Bhavan
9. *Shrimad-bhagavad-gita* (Ed.) Gambhirananda, Ramakrishna Mission
10. *Shrimad-bhagavad-gita*, Gita Press, Gorakhpur

CC-9 CASE AND CASE ENDINGS OF PANINIAN GRAMMAR, TRANSLATION-II AND LEXICON

1. Siddhantakaumudi(Karaka-Vibhakti V-VII)	40 Marks
2. Translation of an unseen Odia/ English passage into Sanskrit	30Marks
3. Amarakosa	10 marks

1. Siddhantakaumudi(Karaka- Vibhakti V-VII)

Unit-I (CASE-V)	Answer any two Sutras/ Vrtti/ Vartika	5×2= 10 Marks
Unit-II (CASE-VI)	Answer any four Sutras/ Vrtti/ Vartika	5×4= 20 Marks
Unit-III (CASE-VII)	Answer any two Sutras/ Vrtti/ Vartika	5×2= 10 Marks

2. Translation- II**30 Marks**

Unit-IV	30 Marks
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One unseen Passage of Odia is to be translated into Sanskrit.

(At least Ten sentences)

3. *Amarakosa* (Devata, Svarga, Visnu, Laksmi, Durga, Surya, Brahma, Siva, Kartikeya, Ganesa, Sarasvati from Svargavarga)

Unit- V Answer any Two Questions s	5×2= 10 Marks
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Books for Reference:

1. Siddhanta-kaumudi with Balamanorama and Tattvabodhini, Vol.I (Ed.) Giridhara Sharma Chaturveda, Motilal Banarsidass
2. Siddhanta-kaumudi with Mitabhasini Com., (Ed.) S.R. Ray, Sanskrit Pustak Bhandar, 38 Cornwallis St., Calcutta
3. Siddhanta-kaumudi with Eng Tr. (Ed.), S.C. Basu, Motilal Banarsidass, New Delhi-110007, Rpt-1995
4. Vaiyakarana Siddhanta Kaumudi (Ed.) M.V. Mahashabde, Dadar Book depot, Bombay.
5. Siddhanta-kaumudi (Ed.) Prof. G.K. Dash & Dr(Mrs) K.Dash with Navanita tika, A.K. Mishra Publishers Pvt. Ltd, Cuttack.
6. Siddhanta-kaumudi (Ed.) Minati Mishra, Vidyapuri, Cuttack
7. Siddhanta-kaumudi (Ed.) Dr. Niranjan Pati, Kalyani Publishers, New Delhi
8. Siddhanta-kaumudi (Ed.) P.R.Ray, Sailabala Womens College, (Skt.Deptt.) Cuttack.
9. *Vyakaranadarpana*, The Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar- 2013
10. *A Guide to Sanskrit Composition and Translation*, M.R.Kale, Motilal Banarsidass, New Delhi
11. Brhat Anuvada Candrika, Chakradhara Hamsa Nautial Shastri, Motilal Banarsidass, New Delhi
12. *Namalinganuasanam (Amarakosa)*, D.G. Padhye et al. Choukhamba Sanskrit Series, New Delhi
13. *Amarakosa* with Ramasrami tika, Choukhamba Sanskrit Series office, Varanasi

CC-10 ORNATE PROSE & PROSE WRITING

- | | |
|---|-----------------|
| 1. <i>Dasakumaracaritam</i> (<i>Purvapithika, Dvitiya Ucchvasa</i>) | 25 Marks |
| 2. <i>Sukanasopadesa</i> | 25 Marks |
| 2. Essay in Sanskrit | 20 Marks |
| 3. Expansion of Idea in Sanskrit | 10 Marks |

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|--|-----------------|
| 1. <i>Dasakumaracaritam</i>(<i>Purvapithika Dvitiya Ucchvasa</i>) | 25 Marks |
| Unit-I Long Questions - 1 | 15 Marks |
| Unit-II Short Questions - 2 | 5×2=10Marks |

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|---------------------------------|-----------------|
| 2. <i>Sukanasopadesa</i> | 25 Marks |
| Unit-III One Long Question | 15 Marks |
| Unit-IV One Explanation | 10Marks |

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| 3. <i>Essay in Sanskrit</i> | 20 Marks |
| Unit-V Essay in Sanskrit (One) | 20 Marks |
| 4. <i>Expansion of Idea in Sanskrit</i> | 10 Marks |

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|------------------------------------|----------|
| Expansion of Idea in Sanskrit- One | 10 Marks |
|------------------------------------|----------|

Books for Reference:

1. *Dasakumaracarita* (Ed.) M.R. Kale, Motilal Banarsidass, Delhi
2. *Dasakumaracarita*, Chaukhamba Publications, Varanasi.
3. *Samskrta-nibandha-shatakam*, Kapila Dev Dvivedi
4. *Brhat Anuvada Shiksha*. Chakradhara Hansa Nautiyal, MLBD, Delhi
5. *Samskrta-nibandhadarshah*, Ramamurti Sharma, Sahitya Niketan, Kanpur
6. *Sukanasopadesa*, (Ed.) Ramakanta Jha, Choukhamba Vidyabhavan, Varanasi
7. *Sukanasopadesa* (Ed.) Nimal Sundar Mishra, Kalyani Publishers, New Delhi
8. *Kadambari (Purvardham)* with the Com. of Bhanuchandra Siddhanjani, MLBD, New Delhi

3rd YEAR**SEMESTER-V****CC-11 ORNATE POETRY IN SANSKRIT & HISTORY OF SANSKRIT****LITERATURE -III**

- | | |
|--|-----------------|
| 1. <i>Sisupalabadham</i> (Canto-I Verses 01-48) | 30 Marks |
| 2. <i>Kiratarjuniyam</i> (Canto-I) | 30 Marks |
| 3. History of Sanskrit literature- III (<i>Mahakavya and Campu</i>). | 20 Marks |
| 1. <i>Sisupalabadham</i> (Canto-I Verses 01-48) | 30 Marks |
| Unit-I Long Questions -1 | 15 Marks |
| Unit- II i) Explanation of One Verse | 10 Marks |
| ii) Translation of One Verse | 05 Marks |
| 2. <i>Kiratarjuniyam</i> (Canto-I) | 30 Marks |
| Unit-III Long Questions -1 | 15 Marks |
| Unit- IV i) Explanation of One Verse | 10 Marks |
| ii) Translation of One Verse | 05 Marks |
| 3. History of Sanskrit literature- III (<i>Mahakavya and Campu</i>) | 20 Marks |
| Unit- V i) Long Questions -1 | 12 Marks |
| ii) Short Notes- 2 | 4×2= 8 Marks |

Books for Reference:

1. *Sisupalabadham* (Ed.) S.R. Ray/ Vallabhatika, Bharatiya Vidya Prakashan, New Delhi.
2. *Sisupalabadham* - Canto-I (Ed.), Devanarayan Mishra, (With *Sarvankasa-tika* of Mallinatha) Sahitya Bhandar, Meerut
3. *Kiratarjuniyam* (Cantos I-III) (Ed.) M.R. Kale, Motilal Banarsidass Publishers Pvt. Ltd., Delhi, 4th Edn-1966, Rpt-1993
4. *Kiratarjuniyam* (Canto- I) (Ed.) Niranjan Pati, Vidyapuri, Cuttack.
4. *History of Sanskrit Literature*, H.R. Agarwal, Mohanlal Munsiram, Delhi
5. *History of Indian Literature* (Vol.III) M. Winternitz, Motilal Banarsidass Publishers Pvt. Ltd.

CC- 12 VEDA,VEDIC GRAMMAR & HISTORY OF VEDIC LITERATURE

- | | |
|---------------------------------------|----------|
| 1. <i>Vaidika Suktas</i> | 30 Marks |
| 2. <i>Vedic Grammar</i> | 20 Marks |
| 3. <i>History of Vedic Literature</i> | 30 Marks |

1. *Veda* **30 Marks**

Vedic Suktas from different *Samhitas*

Agni (RV- I.1), Indra (RV- II.12) , Savitr (RV- I.35), Usas (RV- I.48), Purusa-sukta (YV XXXI.1.16), Siva-samkalpa (YV-XXX.1.6), Samjnana(RV X.191), Vak(RV X.125)

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|----------|--|------------------------------|
| Unit-I | i) Long Questions -1 | 12 Marks |
| | i) Explanation - 1 Mantra | 08 Marks |
| Unit- II | i) Translation -1 Mantra | 05 Marks |
| | ii) Grammar from the text- 2 Questions | 2 ^{1/2} ×2=05 Marks |

2. *Vedic Grammar* **20 Marks**

The following Sutras are to be taught:

Chandasi pare'pi, Vyavahitasca, Caturthyarthe bahulam chandasi, Chandasi lun-lan-litah, Linarthe let,Leto'datau, Sibbahulam leti, Itasca lopah parasmaipadesu, Sa uttamasya, Ata ai, Vaito'nyatra, Hr-grahor bhaschandasi, Chandasi ubhayatha, Tumarthe se-sen-ase-asen-kse-kasen-adhyai-adhyain-kadhyai-kadhyain-shadhyai-shadhyain-tavai-taven-tavenah, Va chandasi, Ses chandasi bahulam, Prakrtya'ntapadam avyapare, Nipatasya ca, Supam suluk purva-savarnac che-ya-da-dya- ya-jalah, Idanto masi, Ajjaserasuk, Dirghadati samanapade

- | | | |
|-----------|--------------------------------|--------------|
| Unit- III | Two sutras to be explained | 5×2=10Marks |
| | Two <i>sadhanas</i> to be done | 5×2=10 Marks |

3. *History of Vedic Literature* **30Marks**

(*Samhita, Brahmana, Aranyaka, Upanisad*)

- | | | |
|---------|---------------------|------------------|
| Unit-IV | Long Questions -1 | 15 Marks |
| Unit- V | Short Questions - 2 | 7 ½ ×2= 15 Marks |

Books for Reference:

1. *New Vedic Selection* (Part-I) (Ed.) Telang and Chaubey, Bharatiya Vidya Prakashan, NewDelhi
2. *Veda O Vaidika Prakarana*,(Ed) Niranjan Pati, Vidyapuri, Cuttack.
3. *History of Indian Literature* Vol. I, M.Winternitz, MLBD, New Delhi
4. *Vaidika Sahitya aur Samskriti*, Baladeva Upadhyaya, Chaukhamba, Varanasi
5. *Vaidik sahityaki Ruparekha*, Umashankar Sharma Rsi,Chaukhamba Vidyaprakashan, Varanasi
6. *Vaidika sahitya o Samskriti* , A.C. Das, Grantha Mandira, Cuttack
7. *Vaidika Sahitya O Samskriti*, Bholanath Rout, Chitrotpala Publication, Salipur

SEMESTER-VI

CC-13 ARTHASASTRA, DHARMASASTRA AND AYURVEDA

- | | |
|--|----------|
| 1. <i>Arthasastra</i> (<i>Vinayadhikarana</i> Ch., II - VIII) | |
| from Vidyasamuddesa to Amatyotpatti. | 30Marks |
| 2. <i>Manusmṛti</i> (Chap- II. Verses from 1 to 52) | 30 Marks |
| 3. <i>Ayurveda</i> (<i>Carakasamhita, Dirghamjivitiyadhyaya</i> -Verses 53-103) | 20 Marks |
- ### 1. *Arthasastra* (*Adhikarana* I. II–VIII) **30 Marks**
- Unit I & Unit- II *Arthasastra* from the beginning up to *Vinayadhikarana, Adhikarana* I.1-4
- Short Notes-4 7½ ×4= 30 Marks

2. Manusmṛti (Chap- II. Verses from 1 to 52)	30 Marks
Unit- III & IV Manusmṛti Chap.II, Verses 1-52	
Short Notes-4	7½ ×4=30 Marks
3. Ayurveda(Carakasamhita, Dirghajivitiyadhyaya-Verses 53-103)	20 marks
Unit- V Long Questions -1	10 Marks
Short Questions -2	5 ×2= 10 Marks

Books for reference:

1. *Kautilya Arthashastra*, (Ed. & Trans.) R.P. Kangle, 3 Vols., Motilal Banarsidass, New Delhi
2. *The Arthashastra*. (Ed. & Trans.), L.N. Rangarajan, Penguin Classics, India, 1992
3. *The Arthashastra*. (Ed.) N.P. Unni, Bharatiya Vidya Prakashan, New Delhi
4. *Arthashastra* (Odia Trans.) Anantarma Kar, Odisha Sahitya Academy, Bhubaneswar
 - *Manu's Code of Law: A Critical Edition and Translation of the Mānava-Dharmaśāstra*. (Ed. Olivelle, Patrick, Oxford: Oxford University Press
 - *Kautilya Arthashastra*, (Ed.) Vachaspati Gairala, Chaukhamba publication, Varansi
7. *Manusmṛti*, (Ed.) Braja Kishor Swain, Sadgrantha Niketan, Srimandira, Puri
8. *The Charaka Samhita*, (Trans.) A.C. Kaviratna and P. Sharma, 5 Vols., Indian Medical Science Series, Sri Sadguru Publications, a division of Indian Books Centre, Delhi 81
9. *Caraka-Samhitā*: Agniveśa's Treatise Refined and annotated by Caraka and Redacted by Drdhabala (text with English translation), Sharma, P. V. , Chaukhambha Orientalia, 1981--1994.
10. *Agniveśa's Caraka Samhitā* (Text with English Translation & Critical Exposition Based on Cakrapāṇi Datta's Āyurveda Dīpikā), R.K. Sharma & Bhagwan Dash, Chowkhamba Sanskrit Series Office, 1976--2002. Another good English translation of the whole text, with paraphrases of the commentary of Cakrapāṇidatta.

CC – 14 TECHNICAL LITERATURE IN SANSKRIT (JYOYISA & VASTU)

1. <i>Jyotisa (Jyotihsara-ratnavali, Chap I)</i>	40 Marks
(<i>Graha-naksatra-paricaya-prakaranam</i>)	
2. <i>Vastu (Vasturatnakara, Chap-I)</i>	40 Marks
(<i>Bhuparigraha-prakaranam</i>)	
1. Jyotisa	40 Marks
Unit-I, II & III Four Questions	10×4= 40 Marks
2. Vastu	40 Marks
Unit-IV & V Four Questions	10 ×4= 40 Marks

Books for Reference:

1. *Jyotihsara-ratnavali* (Part-I) (Ed.) Pandit Baikoli Mahapatra, Radhakrishna Pustakalaya, Satyanarayan Temple Road, Berhampur, Ganjam, Odisha
2. *Vasturatnakar* (Ed.) Vindhyeshwari Prasad Dwivedi, Chowkhamba Krishnadas Academy, Varanasi

DETAILS OF ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)
50 Marks /02 Credits each

SEMESTER-II

AECC-2 M.I.L.(SANSKRIT) (10 Mid+40 End) 02 Credits

M.I.L. (ALTERNATIVE SANSKRIT) 40 Marks 3 Credits

UNIT- I : SANSKRIT PROSE

10 Marks

- ☐ *Shri-bhojarajasya rajyapraaptih* from the text *Bhojaprabandhah*, *Samskrita Pravesa*, Utkal University
- ☐ *Yasya bhavah tasya devah* from the text *Madhurah kathah*, *Samskritabharati*, Bangaluru
- ☐ *Ambarisha-charitam*, *Samskritapramesa*, Utkal University

2 Questions to be answered out of 4 asked

5 ×2= 10 Marks

UNIT-II: SANSKRIT POEMS (The following Poems)

10 Marks

1. *Canakyanitih* 3rd Chapter from the text *Chanakya-niti-darpanah*, Swami JagadishaParananda Saraswati, Vijaya Kumar Govindaram Ashananda, 4408, Newsadak, Delhi- 110006, 2014. (Prescribed Text)
2. *Raksa raksa bharatam* by Prof. Srinivasa Rath from the Anthology *Tadeva gaganam saiva dhara*, Rashtriya Sanskrita Samsthan, New Delhi, 1995
3. *Samyogah* by Prof. Radhavallabh Tripathi, from the Anthology *Kavyagodavari*, (Ed.)P.K. Mishra, Rashtriya Sanskrit Sansthan, New Delhi, 2011
4. *Krusakasyakatha (Verses 1-15)* by Prof. Prafulla Kumar Mishra from the anthology *Kavita bhuvanesvari*, P.G. Dept. of Sanskrit, Utkal University, Vanivihar, Bhubaneswar
5. *Jangama-dura-bhasini* by Sri Sundararaja from the anthology *Kavita bhuvanesvari*, P.G. Dept. of Sanskrit, Utkal University, Vanivihar, Bhubaneswar
6. *Dhanurbhanga* by Sri Bhubaneswar Kar, from the anthology *Kavya-vaitarani*, Vidyapuri, Cuttack
7. *Arunapranamah (Verses 10-21 of Kargil Kavyam)* by Dr. Braja Sundar Mishra, Adisaila Publications, Kendrapada, 2008.

2 Questions to be answered out of 4 asked

5×2= 10 Marks

UNIT-III : TRANSLATION

20 Marks

Translation from Odia/ English to Sanskrit

5 sentences to be translated out of 8 asked

4 × 5 =20 Marks

DETAILS OF SKILL ENHANCEMENT COURSES (50 Marks /02 Credits each) (A Students has to choose any two Papers out of these four groups namely P, Q, R & S)
Group- P YOGA (10 Mid +40 End)

(Patanjalayogasutram ch.I sutra 1-25)	
Unit-I& II (Sutra 1-15) 03 Questions	8×3= 24 Marks
Unit-III (Sutra 16-25) 02 Questions	8×2= 16 Marks

Books for References

1. *Pātañjalayogadarśanam* (Ed.) Narayana Mishra, Choukhamba Prakashan, NewDelhi
2. *Yogasūtra of Patañjali*, (Ed.) M.R. Yardi, BORI, Poona
3. *Pātañjalayogadarśana* (Odia Tr.) Priyabratya Das, Arya samaj, Bhubaneswar

Group- Q PRIESTLY TRAINING IN SANSKRIT LITERATURE (KARMAKĀṆḌA) (10 Mid +40 End)

Unit-I <i>Ācamana vidhi, Saṁkalpa, Snāna, Tarpaṇa, Aṅganyāsa</i> and <i>Karanyāsa</i>	4×2= 8 Marks
<u>Two</u> Questions s	4×2= 8 Marks
<i>Sandhyā (Gāyatrī, Prāṇāyāma), Dhyāna, mantras</i> of Gaṇeśa, Viṣṇu, Śiva, Bhāskara, Durgā, Sarasvatī and Lakṣmī	
<u>Two</u> Questions s	4×2= 8 Marks
Unit-II <i>Ṣoḍaśopacārapūjā</i>	
<u>Two</u> Questions	4×2= 8 Marks
<i>Vivāhapaddhati</i> from <i>Biharilal Karmakāṇḍa</i> –topics such as <i>Vivāha-bheda</i> (Verse 378), <i>Vivāha-lakṣaṇa</i> (416), <i>Svīkaraṇavidhi</i> (417), <i>Varunapuja</i> (419)	
<u>Two</u> Questions	4×2= 8 Marks
Unit-III <i>Vivāhapaddhati</i> from <i>Biharilal Karmakāṇḍa</i> - <i>Mahāvākya</i> (422), <i>Kanyādāṇa</i> (442) <i>Hastagranthi</i> (443), <i>Lajāhoma</i> (461) and <i>Saptapadi</i> (465) <u>Two</u> Questions	

Books for References

1. *Nityakarma-pujā-prakasa*, Sriramabhabanji Mishra and Lalbihariji Mishra, Gitapress, Gorakhpur
2. *Ṣoḍaśa-upacāra*, Gitapress, Gorakhpur
3. *Biharilal Karmakāṇḍa*, Dharmagrantha Store, Cuttack

Group- R VASTU (VASTU RATNAKAR) (10 Mid +40 End)

(<i>Vastupurusa, Vastuyantra, Subhasubhavrksanirupana, Grhacchadanavyavasta, Prakosthashtananirupana, Jalasayakhodana</i>)	
Unit-I & II(<i>Vastupurusa, Vastuyantra, Subhasubhavrksanirupana, Grhacchadanavyavasta</i>)	
03 Questions.	8×3=2 4 Marks
Unit-III (<i>Prakosthashtananirupana, Jalasayakhodana</i>)	
02 Questions.	8×2=16 Marks

Books for References

1. *Vasturatnakar* (Ed.) Vindhreshwari Prasad Dwivedi, Chowkhamba KrishnadasAcademy, Varanasi
2. *Brhatsamhita* varahmihira,(Ed.) N. Chidambaram Iyer, Divine Books, New Delhi.

Group- S TRANSLATION AND EDITING SKILL (10 Mid +40 End)

Unit-I Anuvada Kala-	10 Marks
Translation of one Odia/ English Paragraph in to Sanskrit	
Unit-II Precises Writing-	10 Marks
One Sanskrit Paragraph is to be precised in 1/3 rd words and a suitable title is to be suggested.	
Unit-III Proof Correction and Transliteration	20 Marks
i. Proof Correction-	
Two wrongly printed Sanskrit Verses from the Prescribe text are to set for necessary Proof Correction-	5*2= 10 Marks
ii. Two Sanskrit Verses from Prescribe text are to be written in Roman/ Italic script with diacritical marks.	5*2= 10 Marks

Books for References

1. Samskrta Vyakaranadarpana, Odisha Text Book Bureau, Bhubaneswar

DETAILS OF THE DSE COURSES (80 Term-end + 20 Mid-Term)

(A Student has to choose two DSE Papers in 5th Semester and two DSE Papers in 6th Semester including one Project work)

SEMESTER-V (A Student has to opt two DSE papers out of Groups- A, B, C & D)**Group- A**

THE SCIENCE OF VĀSTU AND VṚKṢA	80+20 = 100
1. Vāstuvidyā in Bṛhatsamhitā (Chap-53)	50 Marks
2. Vṛkṣāyurveda in Bṛhatsamhitā (Chap- 52)	30 Marks
Units I, II & III – (Vāstuvidyā in Bṛhatsamhitā) Five Questions s	10*5= 50 Marks
2. Vṛkṣāyurveda in Bṛhatsamhitā (Chap- 52)	30 Marks
Units IV & V - Three Questions	10*3= 30 Marks

Books for References

1. Bṛhatsamhitā of Varāhamihira, (Ed.) N. Chidambaram Iyer, Divine Books, New Delhi
2. Bṛhatsamhitā with Vattapaliya vivṛti (Ed.) Sudhakar Dwivedi and (re-edited by) Krushnachandra Dwivedi, Sampurnananda Samskrta Viswavidyalaya, Varanasi
3. Bṛhatsamhitā (Hindi Trans.), Achyutananda Jha, Choukhamba Prakashan, Varanasi
4. Vṛkṣāyurveda in Ancient India (with original text and translation), Lallanji Gopal, Sandeep Prakashan, New Delhi
5. Vṛkṣāyurveda of Bṛhatsamhitā, (Ed.), N.P. Dash, Vidyapuri, Cuttack

Group- B

SOCIO-POLITICAL THOUGHT IN ANCIENT INDIA

80+20 = 100

1. *Yājñavalkyasmṛti* (*Vyavahārādhyāya* verses 1-65) 40 marks
2. *Manusmṛti* (Chap- VII Verses 1-60) 40 marks
- Units- I &II -*Yājñavalkyasmṛti* Five Short Questions 7*5= 35 marks
- Units III & IV - *Manusmṛti* Five Short Questions 7*5=35 marks
- Unit- V Translation of Two verses from the above Units 5*2= 10 marks

Books for References

1. *Yājñavalkyasmṛti*, (Ed.) M.N. Dutta, Parimal Publications, New Delhi
2. *Yājñavalkyasmṛti* (*Vyavahārādhyāya*), (Ed.) Kishore Chandra Mahapara, Jageswarilane, Balighat, Puri
3. *Manusmṛti*, (Ed.) Braja Kishore Swain, Sadgrantha Niketana, Puri
4. *Manu's Code of Law: A Critical Edition and Translation of the Mānava Dharmaśāstra*, (Ed.) Ollivele, Patrick, Oxford University Press

Group- C

YOGA : THEORY AND PRACTICE

80+20 = 100 MARKS

1. *Pātañjalayogadarśana* (Chap-I upto Iswara) 40marks
2. *Haṭhayogapradīpikā* of Svātmārāma (Chap-II) 40marks

1. *Aṣṭāṅgayoga*

- Unit-I One Long Questions 15 marks
Unit-II Two Short Questions 7.5*2= 15 marks

2. *Haṭhayogapradīpikā*

- Unit-III One Long Questions 15 marks
Unit-IV Two Short Questions 7.5*2= 15 marks
Unit-V Demonstration of Two *Yogāsanas* 10*2= 20 marks

Books for References

1. *Pātañjalayogadarśanam* (Ed.) Narayana Mishra, Choukhamba Prakashan, New Delhi
2. *Yogasūtra of Patañjali*, (Ed.) M.R. Yardi, BORI, Poona
3. *Pātañjalayogadarśana* (Odia Tr.) Priyabratya Das, Arya samaj, Bhubaneswar.
4. *Hathayogapradipika*, with *jjyotsna Vyakhya*, chowkhamba Sanskrit series office, Varanasi.

Group- D

TRENDS OF INDIAN PHILOSOPHY

80+20 = 100 Marks

1. *Āstikas* 45 marks
2. *Nāstikas* 35 marks

1. *Āstikas*

45 marks

Unit-I *Sāṃkhya* and *Yoga*

Twenty-five elements of *Sāṃkhya* and *Aṣṭāṅgayoga* of *Yogadarśana*

Two Short Questions s

7.5*2= 15 marks

Unit-II *Nyāya-Vaiśeṣika*
Asatkāryavāda, Saptapadārthas
Two Short Questions s

7.5*2= 15 marks

Unit-III *Vedānta* and *Mīmāṃsā*
Śaktidvaya of *Māyā* in *Vedānta* and *Karma* in *Mīmāṃsā*
Two Short Questions s

7.5*2= 15 marks

2. *Nāstikas*

35 marks

Unit-IV *Nāstikas* : *Cārvāk* and *Jaina*

Yadr̥cchāvāda and *Nairātmyavāda* of *Cārvāka*, *Sapta-bhaṅga-nyāya* of *Jaina*

Two Short Questions s

7.5*2= 15 marks

Unit-V *Bauddhadarśana*

Āryasatyas and Eight Noble-paths

Four Short Questions s

5*4= 20 marks

Books for References

1. *History of Indian Philosophy*, S.N. Dasgupta, MLBD, New Delhi
2. *Indian Philosophy*, S. Radhakrishnan, George Allen and Unwin Ltd., New York
3. *A Critical Survey of Indian Philosophy*, MLBD, New Delhi
4. *Outlines of Indian Philosophy*, M. Hiriyana, MLBD, New Delhi
5. *Bharatiya Darshana* (Odia), Gouranga Charan nayak, The Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

SEMESTER-VI (A Student has to opt one DSE paper out of Groups- E, F, G and one project work of 100 marks)

Group- E

ETHICAL LITERATURE IN SANSKRIT

80+20 = 100 Marks

1. *Cāṇakyanīti* (Chaps- I, II and III from *Cāṇakyanītidarpaṇa*) 30 marks
2. *Nītiśataka* of Bhartṛhari (Verses 1-30) 30 marks
3. *Viduranīti* (Ch.I Verse 20-60) 20 marks

Units-I & II *Cāṇakyanīti* -Four Verses are to be explained -

7^{1/2}*4= 30 marks

Units -III & IV *Nītiśataka* -Four Verses are to be explained -

7^{1/2}*4= 30 marks

Unit-V *Viduranīti* Short Questions - 4

5*4= 20 marks

Books for References

1. *Cāṇakyanītidarpaṇa* (Ed.) Gunjeswar Choudhury, Choukhamba Surabharati Prakashan, Varanasi
2. *Nītiśataka* (Ed.) M.R. Kale, MLBD, New Delhi (Text)
3. *Nītiśataka* (Ed.) Naresh Jha, Choukhamba Prakashan, New Delhi
4. *Viduranīti*, Gunjeswar Choudhury, Choukhamba Surabharati Prakashan, Varanasi
5. *Viduranīti*, Gitapress, Gorakhpur, *Bhartrhari Satakatrāyam*, B. S. Mishra, Vidyapuri, Cuttack.

Group- F**SCIENTIFIC LITERATURE IN SANSKRIT****80+20 = 100 Marks**

Unit- I	(i) <i>Bhūmidevyāḥkimivayaḥ</i> by A.R. Vasudevamurty (ii) <i>Bhāratasya vaijñāniketiḥāsaḥ</i> by M.M. Joshi <u>One long Questions</u>	15 marks
Unit-II	(iii) <i>Mahābhārata vaijñānikaḥamśaḥ</i> by A.R. Vasudevamurti (iv) <i>Vaidika-saṃskṛteḥ jagadvyāpyatvam</i> by M.R. Rao <u>One long Questions</u>	15 marks
Unit-III	(v) <i>Vṛkṣāyurvedaḥ</i> -I by Aurobindo Ghose (vi) <i>Vṛkṣāyurvedaḥ</i> -I I by V. Nagraj <u>One long Questions</u>	15 marks
Unit-IV	(vii) <i>Pūrvajaiḥparigaṇitam āsīt paramāṇoḥ parimāṇam</i> by A.R. Vasudevamurti (viii) <i>Prācīnaṁ rasāyanaśāstram</i> by K. Venkatesha Murty <u>One long Questions</u>	15 marks
Unit-V	<u>Four short Questions</u> s from the above four units -	5*4= 20 marks

Books for References

1. *Bhāratasya vaijñānika-paramparā*, V. Nagraj & others, Samskratabharati, MataManira Gali, Jhandewalan, New Delhi, 110055
2. *Ancient Indian Science and its Relevance to the Modern World*, (Eds.) K.E.Govindan & Others, Rashtriya Sanskrit Vidyapitha, Tirupati- 517507
3. *Scientific Knowledge in the Vedas*, P.V. Vartak, Dharam Hinduja International Centre of Indic Research, Delhi, Nag Publishers, 11 A/UA, Jawahar Nagar, Delhi-110007
4. *Science in Sanskrit*, Samskratabharati, Mata Manira Gali, Jhandewalan, New Delhi, 110055
5. *Saṃskṛta-vijñāna-Dīpikā*, Nirmal Trikha, Eastern Book Linkers, 5825, NewChandrabala, Jawahar Nagar, Delhi- 110007

Group- G**GENERAL LINGISTICS AND PHILOLOGY****80+20 = 100 Marks**

Unit- I	Bhāṣā-lakṣaṇa, Bhāṣā-svarūpa, bhāṣā-prakārabheda, Bhaṣotpatti <u>One long Questions</u>	15 marks
Unit-II	Bhāṣā-vijñānasya mukhyāṅgāni, Gauṇāṅgāni, Dhvanivijñānam, Rūpavijñānam, Vākyavijñānam, Arthavijñānam <u>One long Questions</u>	15 marks
Unit-III	Dhvaniparivattanasya karaṇāni, Dhanivijñānasya prasiddha-niyamāḥ, Arthaparivarttanasya prakāraḥ, Arthaparivarttanasya karaṇāni <u>One Long Questions</u>	15 marks

Unit-IV Bhāṣāṇām vargīkaraṇam- Parivārika, Rūpagata, Vividha-bhāṣā-parivārāḥ
One long Questions

15 marks

Unit-V Bharopīya-bhāṣāparivārānam sāmānya-paricayaḥ, Āryabhāṣā-parivārasya
bhedadvayam- bhāratīya-īrānīyau, Vaidika-laukika-saṁskṛtam, Avesta
Four short Questions

5*4= 20 marks

Books for References

1. Elements of Science of Language, I.J.S. Taraporewalla, Samskṛta Pustaka Bhandara, Kolkata
2. An Introduction to Comparative Philology, Chapters-I, II and III, P.D. Gune,
3. Bhāṣāvijñāna o bhāṣāsastra, Kapildev Dwivedi, Vishvavidyalaya Prakashan, Varanasi, Fourth Edn 1994
4. Linguistic Introduction to Sanskrit Chaps I, II & IV, B.K. Ghosh
5. Dhvanivijñāna, G.B. Dhal, The Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

DETAILS OF THE GENERIC ELECTIVE (G E) COURSES (80 Term - End + 20

Mid-Term) SEMESTER - I GE - I (A student has to opt one paper from group H & I)

Group: H Grammar, History of Sanskrit Literature, Drama & Prose - 100 Marks

(Mid Term 20 Marks + End Term 80 Marks)

Unit I-Śabdarūpa & Dhāturūpa-10 Marks

Śabda :*Bālaka, Kavi, Bhānu, Piṭṛ, Latā, Mati, Nadī, Dhenū, Vadhū, Māṭṛ, Phala, Karman, Vāri, Madhū, Marut, Ātman, Guṇin, Vāk, Sarit, Sarva, Tad, Etad, Yad, Idam, Jagat, Asmad and Yuṣmad.*

Dhātu :*Bhū, Paṭh, pac, Kṛ, As, Ad, Han, Śī Cur, Sev, Śṛ, Kṛi, Bhī, Dṛś, Vad.*

Form of 5 Śabda

5 Marks

Form of 5 Dhātu

5 Marks

Unit II- History of Sanskrit Literature (*Rāmāyaṇa&Mahābhārata*) - 20 Marks

One Long Questions

12 Marks

Two Short Questions

08 Marks

Unit III- Hitopadeśa Mitralābha

20 Marks

Hitopadeśa Mitralābha : Kathāmukha with the following Stories :

Vṛddhavyāghra pathika kathā, Mṛga kākā śṛgāla kathā , Gṛdhra mārjāra kathā, Ati lobhi śṛgāla kathā , Hastī dhūrtta śṛgāla Kathā

One Long Questions

12 Marks

One Explanation

08 Marks

Unit IV & V - Abhijñānaśākuntalam (Act 1- 4) - 30 Marks

Unit IV - One Long Questions - 12 Marks

One Explanation - 06 Marks

Unit V - Two Short Questions 12

Marks

Books Recommended :

1. Vyākaraṇadarpaṇa, Published by Odisha State Bureau of Text Book Preparation and production, Pustak Bhavan, Bhubaneswar, 2013.
2. History of Indian Literature (Vol.III), M. Winternitz, MLBD, Delhi.
3. History of Classical Sanskrit Literature, M. Krishnamachariar, MLBD, Delhi.
4. Saṃskṛta Sāhitya kā Itihāsa, Baladev Upadhyaya, Sarada Niketan, Varanasi.
5. Saṃskṛta Sāhitya Itihāsa, Prof. Harekrushna Satapathy, Kitab Mahal, Cuttack.
6. Hitopadeśa of Nārāyaṇa, M.R. Kale, Motilal Banarsidass, Delhi.
7. Hitopadeśa Mitralābha, Kapil Dev Giri, Chowkhamba Publications, Varanasi, 1988.
8. Hitopadeśa Mitralābha, Dr. Braja Sundar Mishra, Vidyapuri, Cuttack.
9. Abhijñānaśākuntalam, M.R. Kale, MLBD, New Delhi.
10. Abhijñānaśākuntalam, R.M. Bose, Modern Book Agency Private Limited, Calcutta - 12, 1976.
11. Abhijñānaśākuntalam, Dr. Ganga Sagar Rai, Chowkhamba Sanskrit Bhawan, Varanasi, 2000.
11. Abhijñānaśākuntalam, Prof. Hare Krushna Satpathy, Kitab Mahal, Cuttack.

Group: I

Mastering Sanskrit Language - 100 Marks

(Mid Term 20 Marks + End Term 80 Marks)

Unit I : History of Sanskrit Literature (Mahākāvya & Gītikāvya)- 20 Marks

Origin and development of Sanskrit *Mahākāvyas* and *Gītikāvyas* with special reference to the following :

Mahākāvya: *Kumārasambhava, Raghuvamśa, Kirātārjunīya, Śiśupālavadha* and *Naiṣadhīyacarita*.

Gītikāvya : *Meghadūta, Ṛtusamhāra, Nitiśataka, Śṛṅgāraśataka, Vairāgyaśataka, Caṇḍīśataka, Sūryaśataka, Amaruśataka, Mohamudgara* and *Gītagovinda*.

One Long Questions from <i>Mahākāvya</i> -	12 Marks
Two short Questions from <i>Gītikāvya</i> -	08 Marks
Unit II- Śukanāśopadeśa from Kādambarī-	20 Marks
One Long Questions -	12 Marks
One Explanation	08
Marks	

Unit III & IV - Abhijñānaśākuntalam (Act5- 7) - 30 Marks

Unit III - One Long Questions	12 Marks
One Explanation	06 Marks
Unit IV - Two Short Questions	12 Marks
Unit V - Dramaturgy -	10 Marks

The following Portions to be studied from Sāhityadarpaṇa Chapter VI:

Nāṭaka , Prakaraṇa , Prastāvanā , Pūrvaraṅga, Nāndī and Pañca sandhi.

Two Short Notes - 2 X 5= 10 Marks

Books Recommended :

- History of Indian Literature (Vol.III), M. Winternitz, MLBD, Delhi.
- History of Classical Sanskrit Literature, M. Krishnamachariar, MLBD, Delhi.
- Saṁskṛta Sāhitya kā Itihāsa, Baladev Upadhyaya, Sarada Niketan, Varanasi.
- Saṁskṛta Sāhitya Itihāsa, Prof. Harekrushna Satapathy, Kitab Mahal, Cuttack.
- Śukanāśopadeśaḥ, Mohandev Panth and Harishcandra Vidyalamkara, Motilal Banarsidass, Delhi, 2010.
- Kādambarī - Śukanāśopadeśaḥ, Ramakanta Jha and Harihara Jha, Chowkhamba Vidya Bhavan, Varanasi, 2011.
- Śukanāśopadeśaḥ, Dr. Nirmal Sundar Mishra, Kalyani Publishers, New Delhi.
- Abhijñānaśākuntalam, M.R. Kale, MLBD, New Delhi.
- Abhijñānaśākuntalam, R.M. Bose, Modern Book Agency Private Limited, Calcutta - 12, 1976.
- Abhijñānaśākuntalam, Dr. Ganga Sagar Rai, Chowkhamba Sanskrit Bhawan, Varanasi, 2000.
- Abhijñānaśākuntalam, Prof. Hare Krushna Satpathy, Kitab Mahal, Cuttack.
- Sāhityadarpaṇa, Sheshraja Sharma Regmi, Chowkhamba Krishnadasa Academy, Varanasi.
- Sāhityadarpaṇa, Odisha Sahitya Akademi, Bhubaneswar.

14. Sāhityadarpaṇa evaṁ Chanda, Dr. Braja Sundar Mishra, Satyanarayan Book Store, Binod Behari, Cuttack -2.

SEMESTER – II GE - 2 (A student has to opt one paper from group J & K)

Group: J Functional Sanskrit – 100 Marks

(Mid Term 20 Marks + End Term 80 Marks)

Unit I - Sanskrit conversation - 20 Marks

A Specific incident/ Occurrence will be given in the Questions Paper (in Sanskrit) and the students will be asked to present that in Sanskrit with Conversation style.

Unit II - General idea about *Vācya*. The divisions of *Vācya* like *Kartṛvācya*, *Karma Vācya* and *Bhāvanācya*. - 20 Marks

The students will be asked to change the voice (*Vācya*) of any 10 sentences as directed. 10 x 2 = 20 Marks

Unit III - Saṁjñā Prakaraṇam from Laghu Siddhānta kaumudī- 20 Marks

Four *Sūtras*. 4 x 5 = 20 Marks

Unit IV & V - Nītiśataka of Bhartṛhari (Verses 1 - 20) - 20

Marks Four Short Questions

4 x 5 = 20 Marks

Books Recommended :

1. Functional Sanskrit: Its Communicative Aspect, Dr. Narendra, Sri Aurovindo Ashram, Pondicherry.
2. Vyākaraṇadarpaṇa, Published by Odisha State Bureau of Text Book Preparation and production, Pustak Bhavan, Bhubaneswar, 2013.
3. Laghu Siddhānta Kaumudī , Sridharananda Sashtri , MLBD , New Delhi.
4. Laghu Siddhānta Kaumudī, Isvara Chandra, Samskrta Granthagara, New Delhi, 2007.
5. Laghu Siddhānta Kaumudī , Sadasiva Shastri, Chowkhamba Sanskrit Office, Varanasi.
6. The Nīti and Vairāgya Śataka of Bhartṛhari, M.R. Kale, MLBD, New Delhi.
7. Śatakatraya , Dr. Braja Sundar Mishra, Vidya puri, Cutack , 2010.

Group: K History of Sanskrit Literature, Poetry, Philosophy and Poetics. - 100 Marks

(Mid Term 20 Marks + End Term 80 Marks)

Unit I & II - History of Sanskrit Literature - 20 Marks

(*Gadyakāvya*, Fairy Tales & Fables, *Campū*)

Unit I - One Long Questions - 12 Marks

Unit II - Two Short Notes - 08 Marks

Unit III -Meghadūta :*Pūrvamegha*(Verses 1 - 39) - 20 Marks

One Long Questions - 12 Marks

Two Short Questions s - 08 Marks

Unit IV -Śrīmad Bhagavad Gītā : (Chapter XV)- 20 Marks

One Long Questions - 12 Marks

Two Short Questions s - 08 Marks

Unit V - Alaṅkāra (From*Sāhityadarpaṇa*Ch -x) - 20 Marks

Anuprāsa, Yamaka, Śleṣa, Upamā, Rūpaka, Utprekṣā, Apahnuti, Samāsokti, Vyājastuti and Arthāntaranyāsa.

Lakṣa-lakṣaṇa-samanvaya of any four. 4x5 = 20 Marks

Books Recommended :

1. History of Indian Literature (Vol.III), M. Winternitz, MLBD, Delhi.
2. History of Classical Sanskrit Literature, M. Krishnamachariar, MLBD, Delhi.
3. Saṁskṛta Sāhitya kā Itihāsa, Baladev Upadhyaya, Sarada Niketan, Varanasi.
4. Saṁskṛta Sāhityara Itihāsa, Prof. Harekrushna Satapathy, Kitab Mahal, Cuttack.
5. Meghadūta of Kālidasa , M.R. Kale, MLBD, New Delhi.
6. Meghasandeśa, N. P. Unni, Bharatiya Vidya Prakashan, New Delhi.
7. Meghadūta, Dr. Braja Sundar Mishra, Vidyapuri, Cuttack.
8. Śrīmad Bhagavad Gītā (With Sāṅkara Bhāṣya), Gita Press, Gorakh Pur.
9. Sāhityadarpaṇa evaṁ Chanda, Dr. Braja Sundar Mishra, Satyanarayan Book Store, Binod Behari, Cuttack.
10. Sāhityadarpaṇa , P. V. Kane , MLBD , New Delhi.

SEMESTER - III GE - 3 (A student has to opt one paper from group L & M)

Group: L Poetry, Grammar and Composition - 10 Marks

(Mid Term 20 Marks + End Term 80 Marks)

Unit I -Kirātārjunīyam : Canto I- 20

Marks

One Long Questions - 12 Marks

One Explanation - 08 Marks

Unit II - Vibhaktyartha Prakaraṇa from Laghu Siddhāntakaumudī- 15Marks

Three *Sūtras*. 3 X 5 = 15 Marks

Unit III - Essay in Sanskrit - 20 Marks

Unit IV - Translation from Odia/ English to Sanskrit–15 Marks

Unit V - Retranslation from Sanskrit to Odia/ English - 10 Marks

Books Recommended :

1. Kirātārjunīyam (Canto - I- III), M.R.Kale, MLBD, Delhi.
2. Kirātārjunīyam (Canto - I) Kanta Bhatia and Amaldhari Singh, Bharatiya Vidya Prakashan, Delhi.
3. Kirātārjunīyam O Nātyatattava, Dr. Niranjana Pati, Kalyani Publishers, New Delhi.
4. Laghu Siddhānta Kaumudī , Sridharananda Sashtri , MLBD , New Delhi.
5. Laghu Siddhānta Kaumudī, Isvara Chandra, Samskrta Granthagara, New Delhi, 2007.
6. Laghu Siddhānta Kaumudī , Sadasiva Shastri, Chowkhamba Sanskrit Office, Varanasi.
7. Laghusiddhanta Kaumudi, Ghanashyama Dora, A.K.Mishra Agency, Cuttack.
8. Vyākaraṇadarpaṇa, Published by Odisha State Bureau of Text Book Preparation and production, Pustak Bhavan, Bhubaneswar, 2013.
9. Saṁskṛta nibandhaśatakam, Kapildev Dwivedi.

Group: M Darśana, Prosody and Poetics - 100 Marks

(Mid Term 20 Marks + End Term 80 Marks)

Unit I - Pātañjala Yogadarśana- 20 Marks

The following *sūtras* from *Samādhipāda* :

Atha yogānusāsanam (1), *Yogaścittavṛtti-nirodhaḥ* (2), *Pratyakṣānumānāgamāḥ pramāṇāni* (7), *Anubhūta viśayāsampramoṣaḥ smṛtiḥ* (11), *Abhyāsavairāgyābhyām tannirodhaḥ* (12), *dṛṣṭānuśravikaviśayavitṛṣṇasya vaśīkārasamjñā vairāgyam* (15), *tatparam puruṣakhyāter guṇavaitṛṣṇyam* (16) and *kleśakarmavipākāśayair aparāmrṣṭaḥ puruṣaviśeṣa īśvaraḥ* (24).

Four Sūtras to be explained. 4 X 5 = 20 Marks

Unit II - Prosody - 20 Marks

The following Chandas from *Śrutabodha*.

Āryā, Śloka, Indravajrā, Upendra vajrā, Upajāti, Vamśastha, Vasanta tilakā, Mālinī, sikhariṇī and *Mandākrāntā*.

4 Chandas to be explained with examples. 4 X 5 = 20 Marks

Unit III - General idea about *Kāvya prayojana, Kāvya lakṣaṇa,*

Kāvya hetu and *Kāvya bheda* from *Sāhityadarpaṇa* - 10 Marks

Two Short Notes - 2 X 5 = 10 Marks

Unit IV - General idea about *Abhidhā,*

Lakṣaṇā and *Vyañjanā* from *Sāhityadarpaṇa* - 10 Marks

Two Short Notes - 2 X 5 = 10

Marks Unit V - Comprehension - 20 Marks

One Sanskrit passage will be given and the students will be asked to answer five Questions in Sanskrit that follow the passage. 5 X 4 = 20 Marks

Books Recommended :

- ☐ Pātañjala yogasutratrṛtiḥ, Vimala Karnataka, Krishnadas Academy, Varanasi.
- ☐ Siddhāntakaumudī, Dr. Minati Mishra, Vidyapuri, Cuttack.
- ☐ Siddhāntakaumudī, Dr. Gopal Krishna Dash & Dr. Kadambini Dash, A.K.Mishra Agency, Cuttack.
- ☐ Sāhityadarpaṇa, P.V.Kane, MLBD, New Delhi.
- ☐ Sāhityadarpaṇa evaṁ Chanda, Dr. Braja Sundar Mishra, Satyanarayan Book Store, Binod Behari, Cuttack.
- ☐ Vyākaraṇadarpaṇa, Published by Odisha State Bureau of Text Book Preparation and production, Pustak Bhavan, Bhubaneswar, 2013.

SEMESTER – IV GE - 4 (A student has to opt one paper from group N & O)

Group: N SOCIO-POLITICAL THOUGHT IN ANCIENT INDIA 80+20 = 100

1. *Yājñavalkyasmṛti* (*Vyavahārādhyāya* verses 1-65) 40 marks
2. *Manusmṛti* (Chap- VII Verses 1-60) 40 marks
- Units- I &II -*Yājñavalkyasmṛti* Five Short Questions 7*5= 35 marks
- Units III & IV - *Manusmṛti* Five Short Questions 7*5= 35 marks
- Unit- V Translation of Two verses from the above Units 5*2= 10 marks

Books for References

- D. *Yājñavalkyasmṛti*, (Ed.) M.N. Dutta, Parimal Publications, New Delhi
- E. *Yājñavalkyasmṛti* (*Vyavahārādhyāya*), (Ed.) Kishore Chandra Mahapara, Jageswari lane, Balighat, Puri
- F. *Manusmṛti*, (Ed.) Braja Kishore Swain, Sadgrantha Niketana, Puri
- G. *Manu's Code of Law: A Critical Edition and Translation of the Mānava Dharmaśāstra*, (Ed.) Ollivele, Patrick, Oxford University Press

Group: O ETHICAL LITERATURE IN SANSKRIT

1. *Cāṇakyanīti* (Chaps- I, II and III from *Cāṇakyanītidarpaṇa*) 30 marks
 2. *Vairagyaśataka* of Bhartṛhari (Verses 1-30) 30 marks
 3. *Viduranīti* (Ch.I Verse 20-60)
- Units-I &II *Cāṇakyanīti*-Four Verses are to be explained - $7^{1/2} \times 4 = 30$ marks
- Units –III &IV *Nītiśataka*-Four Verses are to be explained - $7^{1/2} \times 4 = 30$ marks
- Unit-V Short Questions - 4 5x4= 20 marks

Books for References

- M. *Cāṇakyanītidarpaṇa* (Ed.) Gunjeswar Choudhury, Choukhamba Surabharati Prakashan, Varanasi
- N. *Vairagyaśataka* (Ed.) M.R. Kale, MLBD, New Delhi (Text)
- O. *Viduranīti*, Gunjeswar Choudhury, Chawkhamba Surabharati Prakashan, Varanasi
- P. *Viduranīti*, Gitapress, Gorakh Pur
- Q. *Bhartṛhari Satakatrāyam* B.S. Mishra, Vidyapuri, Cuttack.

SCHEME FOR CHOICE BASED CREDIT SYSTEM

IN B.A. PASS (SANSKRIT)

SEMESTER	M.I.L.	AECC	DSC	SEC	DSE	GE
	ENGLISH					
1 st SEM	ENGLISH- I	AECC- 1 (50)	DSC- 1 A DSC- 2 A			
2 nd SEM	M.I.L- I	AECC- 2 (50)	DSC- 1 B DSC- 2 B			
3 rd SEM	ENGLISH- II		DSC- 1 C DSC- 2 C	SEC- 1 (50)		
4 th SEM	M.I.L- II		DSC- 1 D DSC- 2 D	SEC- 2 (50)		
5 th SEM				SEC- 3 (50)	DSC- 1 A DSC- 2 A	GE- 1
6 th SEM				SEC- 4 (50)	DSC- 1 B DSC- 2 B	GE- 2
	400	100	800	200	400	200
						TOTAL- 2100

1. SKT. M.I.L (If SKT.)	200
2. AECC	50
3. DSC	400
4. SEC	200
5. DSE	200
6. <u>GE</u>	<u>100</u>
	1150

SCHEME FOR B.A. SANSKRIT PASS COURSES UNDER CBC SYSTEM

ABBREVIATION: 1. **DSC**= Discipline Specific Core, 2. **DSE**= Discipline Specific Elective, 3. **GE**= Generic Elective, 4. **SEC**= Skill Enhancement Course, 5. **AECC**= Ability Enhancement Compulsory Course

b. **A student may opt Sanskrit either as Core 1 or Core 2 in DSC and DSE**

SEM- I	Marks-Credits
1. English- 1 xxxxxx	100 – 06
B. DSC-1A (if Sanskrit) Drama I and History of Sanskrit Literature I	100 – 06
C. DSC-2A (if Sanskrit)) Drama and History of Sanskrit Literature I	100 – 06
4. AECC-1 xxxxxx	50 – 02
	350 – 20
SEM-II	
5. M.I.L.-1 (if Sanskrit)	100 – 06
6. DSC- 1B (if Sanskrit) Drama II Dramaturgy	100 – 06
7. DSC-2B (if Sanskrit) Drama II Dramaturgy	100 – 06
8. AECC-2 Alt.Eng/ M.I.L. (if Sanskrit)	50 – 02
	350 – 20
SEM-III	
9. English-II - xxxxxx	100 – 06
10. DSC-1C (if Sanskrit) Poetry and Hist.of Sans. Lit-II	100 – 06
11. DSC- 2C (if Sanskrit) Poetry and Hist.of Sans. Lit-II	100 – 06
12. SEC-1- (if Sanskrit) Yoga	50 – 02
	350 – 20
SEM-IV	
13. M.I.L.-2 (if Sanskrit) M.I.L. II	100 – 06
14. DSC-1D (if Sanskrit) Ornate Prose and Prose Writing	100 – 06
15. DSC-2D (if Sanskrit) Ornate Prose and Prose Writing	100 – 06
16. SEC-2 -(if Sanskrit) Karmakanda	50 – 02
	350 – 20
SEM-V	
17. SEC-3- (if Sanskrit) Vastu	50 – 02
18. DSE-1A (if Sanskrit)	100 – 06
19. DSE-2A (if Sanskrit) Sociopolitical Thought in Ancient India	100 – 06
20. GE-1 (if Sanskrit) Functional Sanskrit	100 - 06
	350 – 20
SEM-VI	
21. SEC-4 (if Sanskrit) Translation and Editing Skill	50 – 02
22. DSE-1B (if Sanskrit) Ethical Literature in Sanskrit	100 – 06
23. DSE-2B (if Sanskrit) Ethical Literature in Sanskrit	100 – 06
24. GE-2 (if Sanskrit) Project/ Dissertation	100 - 06
	350 – 20
Grand Total 24 Papers	Grand Total 2100 Marks / 120 Credits

* **N.B. – Under no circumstances a student can opt. the same paper twice.**

PASS COURSES IN SANSKRIT

SEMESTER - I Discipline Specific Core (DSC) 1A/2A

80 Marks End Term+ 20 Marks Mid-term= 100 Marks/ 6 Credits

DRAMA-I & HISTORY OF SANSKRIT LITERATURE -I

- | | | |
|--|----------|-----------|
| 1. <i>Abhijnanasakuntalam</i> (Act I-IV) | 50 Marks | 04Credits |
| 2. <i>History of Sanskrit Literature-I</i> | 30 Marks | 02Credits |

SEM- II DSC 1B/ 2B 80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

DRAMA -II & DRAMATURGY

- | | |
|--|---------|
| 1. <i>Abhijnanasakuntalam</i> (Acts V-VII) | 50Marks |
| 2. <i>Dramaturgy</i> | 30Marks |

SEMESTER - III DSC 1C/ 2C

80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

POETRY & HISTORY OF SANSKRIT LITERATURE - II

- | | |
|---|----------|
| 1. <i>Meghadutam-</i> (<i>Purvamegha</i>) | 50 Marks |
| 2. <i>History of Sanskrit Literature-I</i> | 30 Marks |

SEMESTER-III

SKILL ENHANCEMENT COURSES (SEC-I) 50 Marks /02 Credits

Yoga (Patanjalayogasutram ch.I sutra 1-25)

SEMESTER- IV DSC 1D / 2D

80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

ORNATE PROSE & PROSE WRITING

- | | |
|--|----------|
| 1. <i>Dasakumaracaritam</i> (<i>Purvapithika dvitiya ucchvasa</i>) | 25 Marks |
| 2. <i>Sukanasopadesa</i> | 25 Marks |
| 3. <i>Essay in Sanskrit</i> | 20 Marks |
| 4. <i>Expansion of Idea in Sanskrit</i> | 10 Marks |

SEMESTER-IV

SKILL ENHANCEMENT COURSES (SEC-II) 50 Marks /02 Credits

Karmkanda(*Yajnopavitadharanam, Kalasapujanam, Pancadevataavahanam, Pancopacarapujanam, Visarjanam*)

SEMESTER - V SEC- III Vastu (*Vastupurusa, Vastuyantra, Subhasubhavrksanirupana, Grhacchadanavyavasta, Prakosthasthananirupana, Jalasayakhodana*)

SEMESTER - V Discipline Specific Elective (DSE) 1A/2A

80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

SOCIO - POLITICAL THOUGHT IN ANCIENT INDIA

80+20 = 100

- | | |
|--|----------|
| 3. <i>Yājñavalkyasmṛti</i> (<i>Vyavahārādhyāya</i> verses 1-65) | 40 marks |
| 4. <i>Manusmṛti</i> (Chap- VII Verses 1-60) | 40 marks |

SEMESTER - V Generic Elective (GE) 1

80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

A student has to opt one GE Paper out of two Groups V & W.

Group V

FUNCTIONAL SANSKRIT – 100

Marks Group W

Darśana, Prosody and Poetics - 100 Marks

SEMESTER - VI SEC- IV TRANSLATION AND EDITING SKILL

SEMESTER - VI Discipline Specific Elective (DSE) 1B/2B

80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

ETHICAL LITERATURE IN SANSKRIT

- | | |
|--|----------|
| 3. <i>Cāṇakyanīti</i> (Chaps- I, II and III from <i>Cāṇakyanītidarpaṇa</i>) | 30 marks |
| 4. <i>Vairagyaśataka</i> of Bhartṛhari (Verses 1-30) | 30 marks |
| 3. <i>Viduranīti</i> (Ch.I Verse 20-60) | 20 marks |

SEM- VI Generic Elective (GE) 2 Project Work

100 Marks

DETAILS OF PASS COURSES IN SANSKRIT

SEMESTER - I Discipline Specific Core (DSC) 1A/2A

80 Marks End Term+ 20 Marks Mid-term= 100 Marks/ 6 Credits

DRAMA-I & HISTORY OF SANSKRIT LITERATURE -I

- | | | |
|--|----------|------------|
| 1. <i>Abhijnanasakuntalam</i> (Act I-IV) | 50 Marks | 04 Credits |
| 2. <i>History of Sanskrit Literature-I</i> | 30 Marks | 02 Credits |
- (*Ramayana, Mahabharata* General out lines of *Puranas* and Sanskrit Drama)

1. *Abhijnanasakuntalam* (Act I-IV)

50 Marks

- | | |
|---------------------------------|---------------|
| Unit-I Long Questions -1 | 14 Marks |
| Unit- II Short Questions -2 | 7×2= 14 Marks |
| Explanation of Verse- 1 | 8 Marks |
| Unit-III Textual Grammar | 14 Marks |
| i) <i>Sandhi</i> | 1×2= 2 Marks |
| ii) <i>Prakṛti- Pratyaya</i> | 2×2= 4 Marks |
| iii) <i>Karaka&Vibhakti</i> | 2×2= 4 Marks |
| iv) <i>Samasa</i> | 2×2= 4 Marks |

2. *History of Sanskrit Literature-I*

30 Marks

- | | |
|--|----------|
| Unit- IV <i>Ramayana&Mahabharata</i> | |
| Long Questions -1 | 10 Marks |
| Short Questions -1 | 05 Marks |

Unit- V General Outlines of Puranas and Sanskrit Drama

(Definition & Classification of Puranas, Bhasa, Kalidasa, Sudraka, Visakhadatta, Bhavabhuti, Bhattanarayana)

Long Questions	-1	10 Marks
Short Questions	-1	05 Marks

Books for Reference:

1. *Abhijnanasakuntalam* (Ed.) R.M. Bose, Modern Book Agency Pvt. Ltd., 10 BankimChatterjee Street, Calcutta
2. *Abhijnanasakuntalam* (Ed.) M.R. Kale, Motilal Banarsidass Publishers Pvt. Ltd., New Delhi-11007, 8th Reprint-2010
3. *Abhijnanasakuntalam* (Ed.) R.M. Mohapatra, Books & Books, Cuttack
4. *Abhijnanasakuntalam* (Ed.) H.K. Satapathy, Students Store, Cuttack
5. *History of Sanskrit literature*, Baladev Upadhyay, Chaukhamba Publications, Varanasi.
6. *History of Sanskrit literature*, A.B. Keith (Trans. into Odia) Bhubaneswar, Text Book Bureau, Govt. of Odisha, Bhubaneswar
7. *Sanskrit Drama*, A.B. Keith, Oxford University Press, London
8. *Samskrta Sahityara Itihasa*, (Odia) H.K. Satapathy, Kitab Mahal Cuttack- 753003.

SEM- II DSC 1B/ 2B 80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

DRAMA -II & DRAMATURGY

1. *Abhijnanasakuntalam* (Acts V-VII) 50 Marks
 2. *Dramaturgy* 30 Marks
- (Nandi, Prastavana, Purvaranga, Pancha-arthaprakṛti, Panchasandhi, Pancha-arthopaksepaka, Nataka, Prakarana.)

1. Abhijnanasakuntalam (Acts V-VII)

Unit-I	Long Questions	-1	14 Marks
Unit- II	Short Questions	s-2	8×2= 16 Marks
Unit-III	i) Explanation of Verse-	1	8 Marks
	ii) Verse/ Dialogue Translation-	1	7 Marks
	iii) Translation from Prakṛit to Sanskrit		5 Marks

2. Dramaturgy (Sahityadarpana, Chapter- VI) 30 Marks

Unit-IV

Nandi, Prastavana, Purvaranga, Nataka, Prakarana, Panchasandhi
(Short Notes on any three) 5×3= 15

Unit-V

Panca - arthaprakṛti and Panca- arthopaksepaka
(Short Notes on any three)

5×3= 15

Books for Reference:

1. *Abhijnanasakuntalam* (Ed.) R.M. Bose, Modern Book Agency Pvt. Ltd., 10 BankimChatterjee Street, Calcutta
2. *Abhijnanasakuntalam* (Ed.) M.R. Kale, Motilal Banarsidass Publishers Pvt. Ltd., New Delhi-11007, 8th Reprint-2010

3. *Abhijnanasakuntalam* (Ed.) R.M.Mohapatra, Books & Books , Cuttack

4. *Abhijnanasakuntalam* (Ed.) H.K. Satapathy, Students Store, Cuttack

A For Dramaturgy- *Sahitya Darpana* (Ed.) P.V.Kane, Motilal Banarsidass Publishers Pvt. Ltd., New Delhi

B *Odia Translation of Sahityadarpana* by Narayana Mohapatra, Odisha Sahitya Academy, Bhubaneswar.

C *Sahitya Darpana* with Laksmi Tika (Sanskrit) and Vimala Tika, (Hindi) (Ed.) K.M. Sastri, Chaukhamba Publications, Varanasi.

D *Sahityadarpana* evam Chanda (Ed.) Dr. Braja Sundar Mishra, Satyanarayan Book Store, Cuttack

9. *Sahityadarpana Chanda* (Ed.) Niranjan Pati, Vidyapuri, Cuttack

SEMESTER - III DSC 1C/ 2C

80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

POETRY & HISTORY OF SANSKRIT LITERATURE - II

1. *Meghadutam-* (*Purvamegha*) 50 Marks

2. *History of Sanskrit Literature-I* 30 Marks

(*Gitikavyas, Khandakavyas, Gadyakavyas* and *Kathasahitya*)

1. *Meghadutam-* (*Purvamegha*) 50 Marks

Unit-I Long Questions -1 15 Marks

Unit- II Short Questions -2 7 ½ ×2= 15 Marks

Unit-III i) Explanation of One Verse 12 Marks

ii) Translation of One Verse 8 Marks

2. *History of Sanskrit Literature-II* 30 Marks

Unit-IV (*Gitikavyas & Khandakavyas*)

Long Questions -1 10 Marks

Short Questions -1 05 Marks

Unit- V (*Gadyakavyas, Kathasahitya*)

Long Questions -1 10 Marks

Short Questions -1 05 Marks

Books for Reference:

1. *Meghadutam* (Ed.) S.R. Ray, Sanskrit Pustak Bhandar, 38 Cornwallis St., Calcutta

2. *Meghadutam* (Ed.) M.R. Kale, Motilal Banarsidass, Delhi

3. *Meghadutam* (Ed.) Radhamohan Mahapatra, Books and Books, Vinodvihari, Cuttack, 1984

4. *Meghadutam* (Ed.) B.S. Mishra, Vidyapuri, Cuttack, 1st Edn-1999

5. *Samskrta Sahitya ka Itihasa*, Baladeva Upadhyaya, Choukhamba, Varanasi.

6. *Samskrta Sahitya ka Ruparekha*, Vacaspati Goreilla, Choukhamba Vidyabhavan, Varanasi.

7. *Samskrta Sahitya ra Itihasa*, H.K. Satapathy, Kitab mahal, Cuttack

SEMESTER-III

DETAILS OF SKILL ENHANCEMENT COURSES (50 Marks /02 Credits each) SKILL ENHANCEMENT COURSES (SEC-I) 50 Marks /02 Credits

Yoga (Patanjalayogasutram ch.I sutra 1-25)

05 Questions 10×5= 50 Marks

Books for References

1. *Pātañjalayogadarśanam* (Ed.) Narayana Mishra, Choukhamba Prakashan, New Delhi
2. *Yogasūtra of Patañjali*, (Ed.) M.R. Yardi, BORI, Poona
3. *Pātañjalayogadarśana* (Odia Tr.) Priyabratya Das, Arya samaj, Bhubaneswar

SEMESTER- IVDSC 1D / 2D

80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

ORNATE PROSE & PROSE WRITING

1. <i>Dasakumaracaritam</i> (<i>Purvapithika dvitiya ucchvasa</i>)	25 Marks
2. <i>Sukanasopadesa</i>	25 Marks
3. <i>Essay in Sanskrit</i>	20 Marks
4. <i>Expansion of Idea in Sanskrit</i>	10 Marks
1. <i>Dasakumaracaritam</i> (<i>Purvapithika dvitiya ucchvasa</i>)	25 Marks
Unit-I Long Questions -1	15 Marks
Unit-II Short Questions - 2	5×2= 10 Marks

2. <i>Sukanasopadesa</i>	25 Marks
Unit-III One long Questions -	15 Marks
Explanation - 1	10 Marks
3. <i>Essay in Sanskrit</i>	20 Marks
Unit-IV Essay in Sanskrit (One)	20 Marks
4. <i>Expansion of Idea in Sanskrit</i>	10 Marks
Unit-V Expansion of Idea in Sanskrit(One)	10 Marks

Books for Reference:

1. *Dasakumaracarita* (Ed.) M.R. Kale, Motilal Banarsidass, Delhi
2. *Dasakumaracarita*, Chaukhamba Publications, Varanasi.
3. *Nibandhamala*, A.T. Sharma
4. *Samskrta-nibandha-shatakam*, Kapila Dev Dvivedi
5. *Brhat Anuvada Shiksha*. Chakradhara Hansa Nautiyal, MLBD, Delhi
6. *Samskrta-nibandhadarshah*, Ramamurti Sharma, Sahitya Niketan, Kanpur
7. *Sukanasopadesa*, (Ed.) Ramakanta Jha, Choukhamba Vidyabhavan, Varanasi
8. *Sukanasopadesa* (Ed.) Dr. Nirmal Sundar Mishra, Kalyani Publishers, New Delhi
9. *Kadambari* (*Purvardham*) with the Com. of Bhanuchandra Siddhanjani, MLBD, New Delhi
10. *Vyakaranadarpana*, Tex Book Bureau, Govt. of Odisha, Sukavihar, Bhubaneswar.

SEMESTER-IV

SKILL ENHANCEMENT COURSES (SEC-II) 50 Marks /02 Credits

Karmkanda (*Yajnopavitadharanam, Kalasapujanam, Pancadevataavahanam, Pancopacarapujanam, Visarjanam*)

05 Questions

10×5= 50 Marks

Books for References

1. *Nityakarma-pujā-prakaraṇa*, Sriramabhabanji Mishra and Lalbihariji Mishra, Gitapress, Gorakhpur
2. *Śodaśa-upacāra*, Gitapress, Gorakhpur
3. *Biharilal Karmakāṇḍa*, Dharmagrantha Store, Cuttack

SEMESTER - V Discipline Specific Elective (DSE) 1A/2A

80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

SOCIO - POLITICAL THOUGHT IN ANCIENT INDIA

80+20 = 100

5. *Yājñavalkyasmṛti* (*Vyavahārādhyāya* verses 1-65)

40 marks

6. *Manusmṛti* (Chap- VII Verses 1-60)

40 marks

Units- I & II - *Yājñavalkyasmṛti* Five Short Questions

7×5= 35 marks

Units III & IV - *Manusmṛti* Five Short Questions

7×5= 35 marks

Unit- V Translation of Two verses from the above Units

5×2= 10 marks

Books for References

5. *Yājñavalkyasmṛti*, (Ed.) M.N. Dutta, Parimal Publications, New Delhi
6. *Yājñavalkyasmṛti* (*Vyavahārādhyāya*), (Ed.) Kishore Chandra Mahapara, Jageswari lane, Balighat, Puri
7. *Manusmṛti*, (Ed.) Prof. Braja Kishore Swain, Sadgrantha Niketana, Puri
8. *Manu's Code of Law: A Critical Edition and Translation of the Mānava Dharmaśāstra*, (Ed.) Ollivele, Patrick, Oxford University Press.

SEMESTER - V SEC- III VASTU

(10 Mid +40 End)

(*Vastupurusa, Vastuyantra, Subhasubhavrksanirupana, Grhacchadanavyavasta, Prakosthasthananirupana, Jalasayakhodana*)

Unit-I & II (*Vastupurusa, Vastuyantra, Subhasubhavrksanirupana, Grhacchadanavyavasta*)

03 Questions 8×3=24 Marks

Unit-III (*Prakosthasthananirupana, Jalasayakhodana*)

02 Questions 8×2=16 Marks

Books for References

1. *Vasturatnakar* (Ed.) Vindhyeshwari Prasad Dwivedi, Chowkhamba Krishnadas Academy, Varanasi
2. *Brhatsamhita* varahmihira, (Ed.) N. Chidambaram Iyer, Divine Books, New Delhi

SEMESTER - V Generic Elective (GE) 1

80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

A student has to opt one GE Paper out of two Groups V & W.

Group V

FUNCTIONAL SANSKRIT – 100 Marks

(Mid Term 20 Marks + End Term 80 Marks)

Unit I - Sanskrit conversation - 20 Marks

A Specific incident/ Occurrence will be given in the Questions Paper (in Sanskrit) and the students will be asked to present that in Sanskrit with Conversation style.

Unit II - General idea about *Vācya*. The divisions of *Vācya* like *Kartṛvācya*, *Karma Vācya* and *Bhāvavācya*. - 20 Marks

The students will be asked to change the voice (*Vācya*) of any 10 sentences as directed. 10 X 2 = 20 Marks

Unit III - Saṃjñā Prakaraṇam from Laghu Siddhānta kaumudī- 20 Marks Four *Sūtras*. 4 X 5 = 20 Marks

Unit IV & V - Nītiśataka of Bhartṛhari (Verses 1 - 20) - 20 Marks

Four Short Questions

4 X 5 = 20 Marks

Books Recommended :

1. Functional Sanskrit: Its Communicative Aspect, Dr. Narendra, Sri Aurovindo Ashram, Pondicherry.
2. Vyākaraṇadarpaṇa, Published by Odisha State Bureau of Text Book Preparation and production, Pustak Bhavan, Bhubaneswar, 2013.
3. Laghu Siddhānta Kaumudī , Sridharananda Sashtri , MLBD , New Delhi.
4. Laghu Siddhānta Kaumudī, Isvara Chandra, Samskrta Granthagara, New Delhi, 2007.
5. Laghu Siddhānta Kaumudī , Sadasiva Shastri, Chowkhamba Sanskrit Office, Varanasi.
6. The Nīti and Vairāgya Śataka of Bhartṛhari, M.R. Kale, MLBD, New Delhi.
7. Śatakatraya , Dr. Braja Sundar Mishra, Vidya puri, Cutack , 2010.

Group W

Darśana, Prosody and Poetics - 100 Marks

(Mid Term 20 Marks + End Term 80 Marks)

Unit I - Pātañjala Yogadarśana- 20 Marks

The following *sūtras* from *Samādhipāda* :

Atha yogānusāsanam (1), *Yogaścittavṛtti-nirodhaḥ* (2), *Pratyakṣānumānāgamāḥ pramāṇāni* (7), *Anubhūta viśayāsaṃpramoṣaḥ smṛtiḥ* (11), *Abhyāsavairāgyābhyām tannirodhaḥ* (12), *drṣṭānuśravika viśayavitrṣṇasya vaśīkārasaṃjñā vairāgyam* (15),

tatparam puruṣakhyāter guṇavaitṛṣṇyam (16) and *kleśakarmavipākāśayair aparāmṛṣṭaḥ puruṣaviśeṣa īśvaraḥ* (24).

Four Sutras to be explained. 4 X 5 = 20 Marks

Unit II - Prosody - 20 Marks

The following Chandas from *Śrutabodha*.

Āryā, Śloka, Indravajrā, Upendra vajrā, Upajāti, Vamśastha, Vasanta tilakā, Mālinī, sikhariṇī and Mandākrāntā.

4 Chandas to be explained with expmpals. 4 X 5 = 20 Marks

Unit III - General idea about *Kāvya prayojana, Kāvyalakṣaṇa, Kāvya hetu and Kāvya bheda* from *Sāhityadarpaṇa* - 10 Marks

Two Short Notes - 2 X 5 = 10 Marks

Unit IV - General idea about *Abhidhā, Lakṣaṇā and Vyañjanā* from *Sāhityadarpaṇa* - 10 Marks

Two Short Notes - 2 X 5 = 10

Marks Unit V - Comprehension - 20 Marks

One Sanskrit passage will be given and the students will be asked to answer five Questions s in Sanskrit that follow the passage. 5 X 4 = 20 Marks

Books Recommended :

1. Pātañjala yogasutravṛttiḥ, Vimala Karnataka, Krishnadas Academy, Varanasi.
2. Siddhāntakaumudī, Dr. Minati Mishra, Vidyapuri, Cuttack.
3. Siddhāntakaumudī, Dr. Gopal Krishna Dash & Dr. Kadambini Dash, A.K.Mishra Agency, Cuttack.
4. Sāhityadarpaṇa, P.V.Kane, MLBD, New Delhi.
5. Sāhityadarpaṇa evaṁ Chanda, Dr. Braja Sundar Mishra, Satyanarayan Book Store, Binod Behari, Cuttack.
6. Vyākaraṇadarpaṇa, Published by Odisha State Bureau of Text Book Preparation and production, Pustak Bhavan, Bhubaneswar, 2013.

SEMESTER- VI Discipline Specific Elective (DSE) 1B/2B
80 Marks End Term+20 Marks Mid-term = 100 Marks /6 Credits

ETHICAL LITERATURE IN SANSKRIT

- | | |
|--|----------------|
| 1. <i>Cāṇakyanīti</i> (Chaps- I, II and III from <i>Cāṇakyanītidarpaṇa</i>) | 30 marks |
| 2. <i>Vairagyaśataka</i> of Bhartṛhari (Verses 1-30) | 30 marks |
| 3. <i>Viduranīti</i> (Ch.I Verse 20-60) | 20 marks |
| Units-I & II <i>Cāṇakyanīti</i> - Three Questions are to be answered | 10x3= 30 marks |
| Units –III &IV <i>Nītiśataka</i> - Three Questions are to be answered | 10x3= 30 marks |
| Unit-V <i>Viduranīti</i> Two Questions are to be answered | 10x2= 20 marks |

Books for References

7. *Cāṇakyanītidarpaṇa* (Ed.) Gunjeswar Choudhury, Choukhamba Surabharati Prakashan, Varanasi
8. *Vairagyaśataka* (Ed.) M.R. Kale, MLBD, New Delhi(Text)
9. *Viduranīti*, Gunjeswar Choudhury, Chawkhamba Surabharati Prakashan, Varanasi
10. *Viduranīti*, Gitapress, Gorakh Pur *Bhartrhari Satakattrayam*, B. S. Mishra, Vidyapuri,Cuttack

SEMESTER- VI SEC- IV TRANSLATION AND EDITING SKILL (10 Mid +40 End)

- | | |
|---|---------------|
| Unit-I Anuvada Kala- | 10marks |
| Translation of one Odia/ English Paragraph in to Sanskrit | |
| Unit-II Precises Writing- | 10marks |
| One Sanskrit Paragraph is to be precised in 1/3 rd words and a suitable title is to be suggested. | |
| Unit-III Proof Correction and Transliteration | 20marks |
| i. Proof Correction- | |
| Two wrongly printed Sanskrit Verses from the Prescribe text are to set for necessary Proof Correction- | 5*2= 10 marks |
| ii. Two Sanskrit Verses from Prescribe text are to be written in Roman/ Italic script with diacritical marks. | 5*2= 10 marks |

Books for References

1. Samskrta Vyakaranadarpana, Odisha Text Book Bureau, Bhubaneswar

SEM- VI Generic Elective (GE) 2 Project Work
100 Marks

DETAILS OF M.I.L. (SANSKRIT)

+3 M.I.L.(Sanskrit)

Paper-1

Full Marks- 80 + 20 = 100Marks

1. Sanskrit Prose	30Marks
2. Sanskrit Poetry	30Marks
3. Modern Sanskrit Poetry	20Marks
Unit- I & II Sanskrit Prose	30Marks

1. Aparīkshita-kārikā

2. Pitr̥bhakti

3. Jīmūtabāhanakathā

One Long Questions

15Marks

Three Short Questions

5×3 = 15Marks

Unit- III & IV Sanskrit Poetry

1. Samjñanasuktam of Rg.veda(Rv..10.191)

2. Valmīkīramāyaṇam, Ayodhyakāṇḍa, Prathamodhyāyāḥ, Verses- 19-43

3. Mahābhārata, Śāntiparvā, Adhyāya 163 (Satyasvarūpam)

4. Vidurānīti, Prathamodhyāyāḥ, Śloka – 61- 90

One Long Questions -

15Marks

Three Short Questions -

5×3 = 15Marks

Unit- V Modern Sanskrit Poetry

a. Śāradāvandanam, SvargataVaikunthabihārī Nandasharma (From Kavyavaitarāṇī, 2006)

b. Viraputrāḥ Kalingāḥ, PāṇḍitPrabodhīkumārMishra (From Kavyamāhanādī, 2004)

c. He Lekhani ! Bhubaneswar kar, (From Kavyamāhanādī, 2004)

d. Utsavah, Prof. Kesav Chandra Dash, (From Andhasrotah, 2004)

e. Jangamdūrābhāsinī, Śrī Sundararājāḥ, (From Kavyagodavarī, 2011)

f. Arunapraṇāmah, BrajaSundar Mishra, (Verses 10- 21 of KargilKavyam, 2008)

One Long Questions -

10Marks

Two Short Questions -

5×2 = 10Marks

Books Recommended:

a. Veda O VaidikaPrakarana, Dr.NiranjanPatī, Vidyāpurī, Cattack.

b. Rāmāyaṇam, Part-I, Gita Press, Gorakhpur.

c. Mahābhārata, Part-V, Śāntiparvā, Gita Press, Gorakhpur.

d. Vidurānīti, Dr. GuṇjeswarChaudhury, ChowkhambāSurābhāratiPrakashan, Varanasi, 2003

e. Kavyavaitarāṇī, Ed. Prafulla Kumar Mishra, Vidyāpurī, Cattack, 2006.

f. Kavyamāhanādī, Ed. ManmohanAcharya, All Odisha Sanskrit Poets Conference, F-31, Sector-

g. C.D.A., Cattack, 2004.

A Andhasrotah, Kesav Chandra Dash, Shasirekha, Bhōdan Nāgar, Puri, 2004.

B KargilKavyam, BrajaSundar Mishra, Adisaila Publications, Kendrapada, 2008.

+3 M.I.L.(Sanskrit)
Paper-II
Full Marks- 80+ 20 = 100Marks

1. Modern Sanskrit Prose

60Marks

2. Essay in Sanskrit

20Marks

Unit- I & II

Modern Sanskrit Prose

30Marks

Mama Satyaprayogakatha(Sanskrit Translation of Gandhiji's work My Experiments with Truth)

The following Portions are to be Studied

i) KhadyePrayogah

ii) Dharmasya Sphuranam

iii) Sevabhabah

iv) Saralajivanam

One Long Questions

15Marks

Two Short Questions

$7^{1/2} \times 2 = 15\text{Marks}$

Unit- III & IV

30Marks

Bharatasya Samskrutkanidhih

The following portions are to be studied:

i) Samskarah

ii) Asramavyabastha : Up to the end of Jainavidyalayah on page 44. The last sentence is :NirmanavyavasthaPrayoVaidikabauddhasamsthanurupabhavat.

One Long Questions

15Marks

Two Short Questions

$7^{1/2} \times 2 = 15\text{Marks}$

Unit- V One Essay in Sanskrit -

20 Marks

Books Recommended:

1. Atmacritaracanamathava Mama Satyaprayogakatha(Sanskrit Translation of Gandhiji's work My Experiments with Truth), Translated by Kshirod Chandra Dash, Vidyapuri, Cuttack, 2009
2. BharatasyaSamskrutkanidhih, RamjiUpadhyaya, ChawkhambaVidyabhawan, Varanasi.
3. Prabandharatnakarah, Ramesh Chandra Sukla, ChawkhambaVidyabhawan, Varanasi.

DETAILS OF ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)
50 Marks /02 Credits each
SEMESTER-II
AECC-2

M.I.L. (ALTERNATIVE SANSKRIT)

UNIT-I : SANSKRIT PROSE

40 Marks

1. *Shri-bhojarajasya rajyapraptih* from the text *Bhojaprabandhah*, *Samskruta Pravesha*, Utkal University
2. *Yasya bhavah tasya devah* from the text *Madhurah kathah*, *Samskratabharati*, Bangaluru
3. *Ambarisha-charitam*, *Samskratapavesa*, Utkal University.

2 Questions to be answered out of 5 asked

5×2=10 Marks

UNIT-II : SANSKRIT POEMS

10 Marks

1. *Canakyanitih* 3rd Chapter from the text *Chanakya-niti-darpanah*, ChowkhambaPublication, Varanasi
2. *Raksa raksa bharatam* by Prof. Srinivasa Rath from the Anthology *Tadeva gaganam saiva dhara*, Rashtriya Sanskruta Samsthan, New Delhi, 1995
3. *Samyogah* by Prof. Radhavallabh Tripathi, from the Anthology *Kavyagodavari*, (Ed.)P.K. Mishra, Rashtriya Sanskrit Sansthan, New Delhi, 2011
4. *Krusakasyakatha* by Prof. Prafulla Kumar Mishra from the anthology *Kavita bhuvanesvari*, P.G. Dept. of Sanskrit, Utkal University, Vanivihar, Bhubaneswar
5. *Jangama-dura-bhasini* by Sri Sundararaja from the anthology *Kavita bhuvanesvari*, P.G.Dept. of Sanskrit, Utkal University, Vanivihar, Bhubaneswar
6. *Dhanurbhanga* by Sri Bhubaneswar Kar, from the anthology *Kavya-vaitarani*, Vidyapuri, Cuttack

2 Questions to be answered out of 4 asked

5×2=10 Marks

UNIT-III : TRANSLATION

20 Marks

Translation from Odia/ English to Sanskrit

5 sentences to be translated out of 7 asked

4×5=20Marks

Proposed Syllabus and Scheme of Examination

**Under Choice Based Credit System
For**

B.A. (Honours)

POLITICAL SCIENCE

Submitted

To

University Grants Commission

New Delhi

April 2015

CHOICE BASED CREDIT SYSTEM

LIST OF PAPERS AND COURSES

B.A (HONOURS) POLITICAL SCIENCE

A) CORE COURSE (14)

Paper I- Understanding Political Theory

Paper II- Constitutional Government and Democracy in India

Paper III – Political Theory-Concepts and Debates

Paper IV- Political Process in India

Paper V- Introduction to Comparative Government and Politics

Paper VI –Perspectives on Public Administration

Paper VII- Perspectives on International Relations and World History

Paper VIII- Political Processes and Institutions in Comparative Perspective

Paper IX- Public Policy and Administration in India

Paper X- Global Politics

Paper XI- Classical Political Philosophy

Paper XII- Indian Political Thought-I

Paper XIII- Modern Political Philosophy

Paper XIV- Indian Political Thought-II

B) Generic Elective -4 (Interdisciplinary): Any Four

1. Feminism: Theory and Practice
2. Gandhi and the Contemporary World
3. Governance: Issues and Challenges
4. United Nations and Global Conflicts

C) Discipline Specific Elective-4 (DSE): Four

1. Human Rights in a Comparative Perspective
2. Development Process and Social Movements in Contemporary India

(PROJECT)

3. India's Foreign Policy in a Globalizing world
4. Women, Power and Politics

D) Ability Enhancement-2 (AE Skill Based): Any Two

1. Legislative Practices and Procedures
2. Peace and Conflict Resolution

E) Ability Enhancement (Compulsory) Foundation: Two

1. Language-MIL/ENGLISH
2. Environmental Science

CHOICE BASED CREDIT SYSTEM

SYLLABI AND READING LIST

BA (HONOURS) POLITICAL SCIENCE

A) CORE COURSE

1.1 Paper I- Understanding Political Theory

Course Objective: This course is divided into two sections. Section A introduces the students to the idea of political theory, its history and approaches, and an assessment of its critical and contemporary trends. Section B is designed to reconcile political theory and practice through reflections on the ideas and practices related to democracy.

I: Introducing Political Theory (30 Lectures)

1. What is Politics: Theorizing the 'Political'
2. Traditions of Political Theory: Liberal, Marxist, Anarchist and Conservative
3. Approaches to Political Theory: Normative, Historical and Empirical
- Critical and Contemporary Perspectives in Political Theory: Feminist and Postmodern

II: Political Theory and Practice (30 Lectures)

The Grammar of Democracy

1. Democracy: The history of an idea
2. Procedural Democracy and its critique
3. Deliberative Democracy
4. Participation and Representation

Essential Readings

I: Introducing Political Theory

Bhargava, R. (2008) 'What is Political Theory', in Bhargava, R and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 2-16.

Bellamy, R. (1993) 'Introduction: The Demise and Rise of Political Theory', in Bellamy, R. (ed.) *Theories and Concepts of Politics*. New York: Manchester University Press, pp. 1-14.

Glaser, D. (1995) 'Normative Theory', in Marsh, D. and Stoker, G. (eds.) *Theory and Methods in Political Science*. London: Macmillan, pp. 21-40.

Sanders, D. (1995) 'Behavioral Analysis', in Marsh, D. and Stoker, G. (eds.) *Theory and Methods in Political Science*. London: Macmillan, pp. 58-75.

Chapman, J. (1995) 'The Feminist Perspective', in Marsh, D. and Stoker, G. (eds.) *Theory and Methods in Political Science*. London: Macmillan, pp. 94-114.

Bhargava, R. 'Why Do We Need Political Theory', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 17-36.

Bannett, J. (2004) 'Postmodern Approach to Political Theory', in Kukathas, Ch. and Gaus, G. F. (eds.) *Handbook of Political Theory*. New Delhi: Sage, pp. 46-54.

Vincent, A. (2004) *The Nature of Political Theory*. New York: Oxford University Press, 2004, pp. 19-80.

II: The Grammar of Democracy

Srinivasan, J. (2008) 'Democracy', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 106-128.

Owen, D. (2003) 'Democracy', in Bellamy, R. and Mason, A. (eds.) *Political Concepts*. Manchester and New York: Manchester University Press, pp. 105-117.

Christiano, Th. (2008) 'Democracy', in Mckinnon, C. (ed.) *Issues in Political Theory*, New York: Oxford University Press, pp. 80-96.

Arblaster, A. (1994) *Democracy*. (2nd Edition). Buckingham: Open University Press.

Roy, A. 'Citizenship', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 130-146.

Brighouse, H. (2008) 'Citizenship', in Mckinnon, C. (ed.) *Issues in Political Theory*, New York: Oxford University Press, pp. 241-258.

1.2 Paper II- Constitutional Government and Democracy in India

Course objective: This course acquaints students with the constitutional design of state structures and institutions, and their actual working over time. The Indian Constitution accommodates conflicting impulses (of liberty and justice, territorial decentralization and a strong union, for instance) within itself. The course traces the embodiment of some of these conflicts in constitutional provisions, and shows how these have played out in political practice. It further encourages a study of state institutions in their mutual interaction, and in interaction with the larger extra-constitutional environment.

I. The Constituent Assembly and the Constitution (16 lectures)

- a. Philosophy of the Constitution, the Preamble, and Features of the Constitution (2 weeks or 8 lectures)
- b. Fundamental Rights and Directive Principles (2 weeks or 8 lectures)

II. Organs of Government (20 lectures)

- a. The Legislature: Parliament (1.5 weeks or 6 lectures)
- b. The Executive: President and Prime Minister (2 weeks or 8 lectures)
- c. The Judiciary: Supreme Court (1.5 weeks or 6 lectures)

III. Federalism and Decentralization (12 lectures)

- a. Federalism: Division of Powers, Emergency Provisions, Fifth and Sixth Schedules (2 weeks or 8 lectures)
- b. Panchayati Raj and Municipalities (1 week or 4 lectures)

READING LIST

I. The Constituent Assembly and the Constitution

a. Philosophy of the Constitution, the Preamble, and Features of the Constitution

Essential Readings:

G. Austin, (2010) 'The Constituent Assembly: Microcosm in Action', in *The Indian Constitution: Cornerstone of a Nation*, New Delhi: Oxford University Press, 15th print, pp.1-25.

R. Bhargava, (2008) 'Introduction: Outline of a Political Theory of the Indian Constitution', in R. Bhargava (ed.) *Politics and Ethics of the Indian Constitution*, New Delhi: Oxford University Press, pp. 1-40.

Additional Reading:

D. Basu, (2012) *Introduction to the Constitution of India*, New Delhi: Lexis Nexis.

S. Chaube, (2009) *The Making and Working of the Indian Constitution*, Delhi: National Book Trust.

b. Fundamental Rights and Directive Principles

Essential Readings:

G. Austin, (2000) 'The Social Revolution and the First Amendment', in *Working a Democratic Constitution*, New Delhi: Oxford University Press, pp. 69-98.

A. Sibal, (2010) 'From Niti to Nyaya,' *Seminar*, Issue 615, pp 28-34.

Additional Reading:

The Constitution of India: Bare Act with Short Notes, (2011) New Delhi: Universal, pp. 4-16.

II. Organs of Government

a. The Legislature: Parliament

Essential Readings:

B. Shankar and V. Rodrigues, (2011) 'The Changing Conception of Representation: Issues, Concerns and Institutions', in *The Indian Parliament: A Democracy at Work*, New Delhi: Oxford University Press, pp. 105-173.

V. Hewitt and S. Rai, (2010) 'Parliament', in P. Mehta and N. Jayal (eds.) *The Oxford Companion to Politics in India*, New Delhi: Oxford University Press, pp. 28-42.

b. The Executive: President and Prime Minister

Essential Readings:

J. Manor, (2005) 'The Presidency', in D. Kapur and P. Mehta P. (eds.) *Public Institutions in India*, New Delhi: Oxford University Press, pp.105-127.

J. Manor, (1994) 'The Prime Minister and the President', in B. Dua and J. Manor (eds.) *Nehruto the Nineties: The Changing Office of the Prime Minister in India*, Vancouver: University of British Columbia Press, pp. 20-47.

H. Khare, (2003) 'Prime Minister and the Parliament: Redefining Accountability in the Age of Coalition Government', in A. Mehra and G. Kueck (eds.) *The Indian Parliament: A Comparative Perspective*, New Delhi: Konark, pp. 350-368.

c. The Judiciary: Supreme Court

Essential Readings:

U. Baxi, (2010) 'The Judiciary as a Resource for Indian Democracy', *Seminar*, Issue 615, pp. 61-67.

R. Ramachandran, (2006) 'The Supreme Court and the Basic Structure Doctrine' in B. Kirpal et.al (eds.) *Supreme but not Infallible: Essays in Honour of the Supreme Court of India*, New Delhi: Oxford University Press, pp. 107-133.

Additional Reading:

L. Rudolph and S. Rudolph, (2008) 'Judicial Review Versus Parliamentary Sovereignty', in *Explaining Indian Institutions: A Fifty Year Perspective, 1956-2006: Volume 2: The Realm of Institutions: State Formation and Institutional Change*. New Delhi: Oxford University Press, pp. 183-210.

III. Federalism and Decentralization

a. Federalism: Division of Powers, Emergency Provisions, Fifth and Sixth Schedules

Essential Readings:

M. Singh, and R. Saxena (eds.), (2011) 'Towards Greater Federalization,' in *Indian Politics: Constitutional Foundations and Institutional Functioning*, Delhi: PHI Learning Private Ltd., pp.166-195.

V. Marwah, (1995) 'Use and Abuse of Emergency Powers: The Indian Experience', in B. Arora and D. Verney (eds.) *Multiple Identities in a Single State: Indian Federalism in a Comparative Perspective*, Delhi: Konark, pp. 136-159.

B. Sharma, (2010) 'The 1990s: Great Expectations'; 'The 2000s: Disillusionment Unfathomable', in *Unbroken History of Broken Promises: Indian State and Tribal People*, Delhi: Freedom Press and Sahyog Pustak Kuteer, pp. 64-91.

The Constitution of India: Bare Act with Short Notes, (2011) New Delhi: Universal, pp 192-213.

Additional Readings:

R. Dhavan and R. Saxena, (2006) 'The Republic of India', in K. Roy, C. Saunders and J. Kincaid (eds.) *A Global Dialogue on Federalism*, Volume 3, Montreal: Queen's University Press, pp. 166-197.

R. Manchanda, (2009) *The No Nonsense Guide to Minority Rights in South Asia*, Delhi: Sage Publications, pp. 105-109.

b. Panchayati Raj and Municipalities

Essential Readings:

P. deSouza, (2002) 'Decentralization and Local Government: The Second Wind of Democracy in India', in Z. Hasan, E. Sridharan and R. Sudarshan (eds.) *India's Living Constitution: Ideas, Practices and Controversies*, New Delhi: Permanent Black, pp. 370-404.

M. John, (2007) 'Women in Power? Gender, Caste and Politics of Local Urban Governance', in *Economic and Political Weekly*, Vol. 42(39), pp. 3986-3993.

Raghunandan, J. R (2012) *Decentralization and local governments: The Indian Experience*, Orient Black Swan, New Delhi

Baviskar, B.S and George Mathew (eds) 2009 *Inclusion and Exclusion in local governance: Field Studies from rural India*, New Delhi, Sage

2.1 Paper III – Political Theory-Concepts and Debates

Course Objective: This course is divided into two sections. Section A helps the student familiarize with the basic normative concepts of political theory. Each concept is related to a crucial political issue that requires analysis with the aid of our conceptual understanding. This exercise is designed to encourage critical and reflective analysis and interpretation of social practices through the relevant conceptual toolkit. Section B introduces the students to the important debates in the subject. These debates prompt us to consider that there is no settled way of understanding concepts and that in the light of new insights and challenges, besides newer ways of perceiving and interpreting the world around us, we inaugurate new modes of political debates.

Section A: Core Concepts

I. Importance of Freedom (10 Lectures)

a) Negative Freedom: Liberty

b) Positive Freedom: Freedom as Emancipation and Development

Important Issue: Freedom of belief, expression and dissent

II. Significance of Equality (12 lectures)

a) Formal Equality: Equality of opportunity

b) Political equality

c) Egalitarianism: Background inequalities and differential treatment

Important Issue: Affirmative action

III. Indispensability of Justice (12 Lectures)

a) Procedural Justice

b) Distributive Justice

c) Global Justice

Important Issue: Capital punishment

IV. The Universality of Rights (13 Lectures)

a) Natural Rights

b) Moral and Legal Rights

c) Three Generations of Rights

d) Rights and Obligations

Important Issue: Rights of the girl child

Section B: Major Debates (13 Lectures)

I. Why should we obey the state? Issues of political obligation and civil disobedience.

II. Are human rights universal? Issue of cultural relativism.

III. How do we accommodate diversity in plural society? Issues of multiculturalism and toleration.

Essential Readings

Section A: Core Concepts

I. Importance of Freedom

Riley, Jonathan. (2008) 'Liberty' in Mckinnon, Catriona (ed.) *Issues in Political Theory*, New York: Oxford University Press, pp. 103-119.

Knowles, Dudley. (2001) *Political Philosophy*. London: Routledge, pp. 69- 132.

Swift, Adam. (2001) *Political Philosophy: A Beginners Guide for Student's and Politicians*.

Cambridge: Polity Press, pp. 51-88.

Carter, Ian. (2003) 'Liberty', in Bellamy, Richard and Mason, Andrew (eds.). *Political Concepts*. Manchester: Manchester University Press, pp. 4-15.

Sethi, Aarti. (2008) 'Freedom of Speech and the Question of Censorship', in Bhargava, Rajeev and Acharya, Ashok. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 308-319.

II. Significance of Equality

Swift, Adam. (2001) *Political Philosophy: A Beginners Guide for Student's and Politicians*.

Cambridge: Polity Press, pp. 91-132.

Casal, Paula & William, Andrew. (2008) 'Equality', in McKinnon, Catriona. (ed.) *Issues in Political Theory*. New York: Oxford University Press, pp. 149- 165.

Acharya, Ashok. (2008) 'Affirmative Action', in Bhargava, Rajeev and Acharya, Ashok. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 298-307.

III. Indispensability of Justice

Menon, Krishna. (2008) 'Justice', in Bhargava, Rajeev and Acharya, Ashok. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 74-86.

Wolf, Jonathan. (2008) 'Social Justice', in McKinnon, Catriona. (ed.) *Issues in Political Theory*. New York: Oxford University Press, pp. 172-187.

Swift, Adam. (2001) *Political Philosophy: A Beginners Guide for Student's and Politicians*.

Cambridge: Polity Press, pp. 9-48.

Knowles, Dudley. (2001) *Political Philosophy*. London: Routledge, pp. 177-238.

McKinnon, Catriona. (ed.) (2008) *Issues in Political Theory*. New York: Oxford University Press, pp. 289-305.

Bedau, Hugo Adam. (2003) 'Capital Punishment', in LaFollette, Hugh (ed.). *The Oxford Handbook of Practical Ethics*. New York: Oxford University Press, pp. 705-733.

IV. The Universality of Rights

Seglow, Jonathan. (2003) 'Multiculturalism' in Bellamy, Richard and Mason, Andrew (eds.). *Political Concepts*. Manchester: Manchester University Press, pp. 156-168.

Tulkdar, P.S. (2008) 'Rights' in Bhargava, Rajeev and Acharya, Ashok. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 88-104.

McKinnon, Catriona. (2003) 'Rights', in Bellamy, Richard and Mason, Andrew. (eds.) *Political Concepts*. Manchester: Manchester University Press, pp. 16-27.
Menlowe, M.A. (1993) 'Political Obligations', in Bellamy Richard.(ed.) *Theories and Concepts of Politics*. New York: Manchester University Press, pp. 174-194.

Amoah, Jewel. (2007) 'The World on Her Shoulders: The Rights of the Girl-Child in the Context of Culture & Identity', in *Essex Human Rights Review*, 4(2), pp. 1-23.

Working Group on the Girl Child (2007), *A Girl's Right to Live: Female Foeticide and Girl Infanticide*, available on [http://www.crin.org/docs/Girl's infanticide CSW 2007.txt](http://www.crin.org/docs/Girl's%20infanticide%20CSW%202007.txt)

Section B: Major Debates

Hyums, Keith. (2008) 'Political Authority and Obligation', in Mckinnon, Catriona. (ed.) *Issues in Political Theory*, New York: Oxford University Press, pp. 9-26

Martin, Rex. (2003) 'Political Obligation', in Bellamy, Richard and Mason, Andrew. (eds.) *Political Concepts*, Manchester: Manchester University Press, pp. 41-51.

Campbell, Tom. (2008) 'Human Rights' in Mckinnon, Catriona. (ed.) *Issues in Political Theory*. New York: Oxford University Press, pp. 194-210.

Mookherjee, Monica, 'Multiculturalism', in Mckinnon, Catriona. (ed.) *Issues in Political Theory*. New York: Oxford University Press, pp. 218- 234.

Seglow, Jonathan, 'Multiculturalism', in Bellamy, Richard and Mason, Andrew. (eds.) *Political Concepts*, Manchester: Manchester University Press, pp. 156-168.

2.2 Paper IV- Political Process in India

Course objective: Actual politics in India diverges quite significantly from constitutional legal rules. An understanding of the political process thus calls for a different mode of analysis - that offered by political sociology. This course maps the working of 'modern' institutions, premised on the existence of an individuated society, in a context marked by communitarian solidarities, and their mutual transformation thereby. It also familiarizes students with the working of the Indian state, paying attention to the contradictory dynamics of modern state power.

I. Political Parties and the Party System (1.5 weeks or 6 lectures)

Trends in the Party System; From the Congress System to Multi-Party Coalitions

II. Determinants of Voting Behaviour (2 weeks or 8 lectures)

Caste, Class, Gender and Religion

III. Regional Aspirations (2 weeks or 8 lectures)

The Politics of Secession and Accommodation

IV. Religion and Politics (2 weeks or 8 lectures)

Debates on Secularism; Minority and Majority Communalism

V. Caste and Politics (1.5 weeks or 6 lectures)

Caste in Politics and the Politicization of Caste

VI. Affirmative Action Policies (1.5 weeks or 6 lectures)

Women, Caste and Class

VII. The Changing Nature of the Indian State (1.5 weeks or 6 lectures)

Developmental, Welfare and Coercive Dimensions

READING LIST

I. Political Parties and the Party System: Trends in the Party System; From the Congress System to Multi-Party Coalitions

Essential Readings:

R. Kothari, (2002) 'The Congress System', in Z. Hasan (ed.) *Parties and Party Politics in India*, New Delhi: Oxford University Press, pp 39-55.

E. Sridharan, (2012) 'Introduction: Theorizing Democratic Consolidation, Parties and Coalitions', in *Coalition Politics and Democratic Consolidation in Asia*, New Delhi: Oxford University Press.

Additional Reading:

Y. Yadav and S. Palshikar, (2006) 'Party System and Electoral Politics in the Indian States, 1952-2002: From Hegemony to Convergence', in P. deSouza and E. Sridharan (eds.) *India's Political Parties*, New Delhi: Sage Publications, pp. 73-115.

II. Determinants of Voting Behaviour: Caste, Class, Gender and Religion

Essential Readings:

Y. Yadav, (2000) 'Understanding the Second Democratic Upsurge', in F. Frankel, Z. Hasan, and R. Bhargava (eds.) *Transforming India: Social and Political Dynamics in Democracy*, New Delhi: Oxford University Press, pp. 120-145.

C. Jaffrelot, (2008) 'Why Should We Vote? The Indian Middle Class and the Functioning of World's Largest Democracy', in *Religion, Caste and Politics in India*, Delhi: Primus, pp. 604-619.

R. Deshpande, (2004) 'How Gendered was Women's Participation in Elections 2004?', *Economic and Political Weekly*, Vol. 39, No. 51, pp. 5431-5436.

S. Kumar, (2009) 'Religious Practices Among Indian Hindus,' *Japanese Journal of Political Science*, Vol. 10, No. 3, pp. 313-332.

III. Regional Aspirations: The Politics of Secession and Accommodation

Essential Readings:

M. Chadda, (2010) 'Integration through Internal Reorganisation', in S. Baruah (ed.) *Ethnonationalism in India: A Reader*, New Delhi: Oxford University Press, pp. 379-402.

P. Brass, (1999) 'Crisis of National Unity: Punjab, the Northeast and Kashmir', in *The*

Politics of India Since Independence, New Delhi: Cambridge University Press and Foundation Books, pp.192-227.

IV. Religion and Politics: Debates on Secularism: Minority and Majority Communalism

Essential Readings:

T. Pantham, (2004) 'Understanding Indian Secularism: Learning from its Recent Critics', in R. Vora and S. Palshikar (eds.) *Indian Democracy: Meanings and Practices*, New Delhi: Sage, pp. 235-256.

N. Menon and A. Nigam, (2007) 'Politics of Hindutva and the Minorities', in *Power and Contestation: India since 1989*, London: Fernwood Publishing, Halifax and Zed Books, pp.36-60.

Additional Reading:

N. Chandhoke, (2010) 'Secularism', in P. Mehta and N. Jayal (eds.) *The Oxford Companion to Politics in India*, New Delhi: Oxford University Press, pp. 333-346.

V. Caste and Politics: Caste in Politics and the Politicization of Caste

Essential Readings:

R. Kothari, (1970) 'Introduction', in *Caste in Indian Politics*, Delhi: Orient Longman, pp.3-25. M. Weiner, (2001) 'The Struggle for Equality: Caste in Indian Politics', in Atul Kohli (ed.) *The Success of India's Democracy*, New Delhi: Cambridge University Press, pp. 193-225.

G. Omvedt, (2002) 'Ambedkar and After: The Dalit Movement in India', in G. Shah (ed.) *Social Movements and the State*, New Delhi: Sage Publications, pp. 293-309.

VI. Affirmative Action Policies: Women, Caste and Class

Essential Readings:

M. Galanter, (2002) 'The Long Half-Life of Reservations', in Z. Hasan, E. Sridharan and R. Sudarshan (eds.) *India's Living Constitution: Ideas, Practices, Controversies*, New Delhi: Permanent Black, pp. 306-318.

C. Jaffrelot, (2005) 'The Politics of the OBCs', in *Seminar*, Issue 549, pp. 41-45.

M. John, (2011) 'The Politics of Quotas and the Women's Reservation Bill in India', in M. Tsujimura and J. Steele (eds.) *Gender Equality in Asia*, Japan: Tohoku University Press, pp. 169-195.

VII. Changing Nature of the Indian State: Developmental, Welfare and Coercive Dimensions

Essential Readings:

S. Palshikar, (2008) 'The Indian State: Constitution and Beyond', in R. Bhargava (ed.) *Politics and Ethics of the Indian Constitution*, New Delhi: Oxford University Press, pp. 143-163.

R. Deshpande, (2005) 'State and Democracy in India: Strategies of Accommodation and Manipulation', Occasional Paper, Series III, No. 4, Special Assistance Programme, Department of Politics and Public Administration, University of Pune.

M. Mohanty, (1989) 'Duality of the State Process in India: A Hypothesis', *Bhartiya*

Additional Readings:

T. Byres, (1994) 'Introduction: Development Planning and the Interventionist State Versus Liberalization and the Neo-Liberal State: India, 1989-1996', in T. Byres (ed.) *The State, Development Planning and Liberalization in India*, New Delhi: Oxford University Press, 1994, pp. 1-35.

A. Verma, (2007) 'Police Agencies and Coercive Power', in S. Ganguly, L. Diamond and M. Plattner (eds.) *The State of India's Democracy*, Baltimore: John Hopkins University Press, pp. 130-139.

3.1 Paper V- Introduction to Comparative Government and Politics

Course objective: This is a foundational course in comparative politics. The purpose is to familiarize students with the basic concepts and approaches to the study of comparative politics. More specifically the course will focus on examining politics in a historical framework while engaging with various themes of comparative analysis in developed and developing countries.

I. Understanding Comparative Politics (8 lectures)

- a. Nature and scope
- b. Going beyond Eurocentrism

II. Historical context of modern government (16 lectures)

- a. Capitalism: meaning and development: globalization
- b. Socialism: meaning, growth and development
- c. Colonialism and decolonization: meaning, context, forms of colonialism; anti-colonialism struggles and process of decolonization

III. Themes for comparative analysis (24 lectures)

A comparative study of constitutional developments and political economy in the following countries: Britain, Brazil, Nigeria and China.

I. Understanding Comparative Politics

Essential Readings:

J. Kopstein, and M. Lichbach, (eds), (2005) *Comparative Politics: Interests, Identities, and Institutions in a Changing Global Order*. Cambridge: Cambridge University Press, pp. 1-5; 16-36; 253-290.

M. Mohanty, (1975) 'Comparative Political Theory and Third World Sensitivity', in *Teaching Politics*, Nos. 1 and 2, pp. 22-38

Additional Readings:

A. Roy, (2001) 'Comparative Method and Strategies of Comparison', in *Punjab Journal of Politics*. Vol. xxv (2), pp. 1-15.

J. Blondel, (1996) 'Then and Now: Comparative Politics', in *Political Studies*. Vol. 47 (1), pp. 152-160.

N. Chandhoke, (1996) 'Limits of Comparative Political Analysis', in *Economic and Political Weekly*, Vol. 31 (4), January 27, pp. PE 2-PE2-PE8

II Historical context of modern government a. Capitalism

Essential Readings:

R. Suresh, (2010) *Economy & Society -Evolution of Capitalism*, New Delhi, Sage Publications, pp. 151-188; 235-268.

G. Ritzer, (2002) 'Globalization and Related Process I: Imperialism, Colonialism, Development, Westernization, Easternization', in *Globalization: A Basic Text*. London: Wiley-Blackwell, pp. 63-84.

Additional Readings:

M. Dobb, (1950) 'Capitalism', in *Studies in the Development of Capitalism*. London: Routledge and Kegan Paul Ltd, pp. 1-32.

E. Wood, (2002) 'The Agrarian origin of Capitalism', in *Origin of Capitalism: A Long View*. London: Verso, pp. 91-95; 166-181.

A. Hoogvelt, (2002) 'History of Capitalism Expansion', in *Globalization and Third World Politics*. London: Palgrave, pp. 14-28.

b. Socialism

Essential Readings:

A. Brown, (2009) 'The Idea of Communism', in *Rise and Fall of Communism*, Harpercollins (e-book), pp. 1-25; 587-601.

J. McCormick, (2007) 'Communist and Post-Communist States', in *Comparative Politics in Transition*, United Kingdom: Wadsworth, pp. 195-209

Additional Readings:

R. Meek, (1957) 'The Definition of Socialism: A Comment', *The Economic Journal*. 67 (265), pp. 135-139.

c. Colonialism, decolonization& postcolonial society

Essential Readings:

P. Duara, (2004) 'Introduction: The Decolonization of Asia and Africa in the Twentieth Century', in P. Duara, (ed), *Decolonization: Perspective From Now and Then*. London: Routledge, pp. 1-18.

J. Chiriyankandath, (2008) 'Colonialism and Post-Colonial Development', in P. Burnell, et. al, *Politics in the Developing World*. New Delhi: Oxford University Press, pp. 31-52.

Additional Reading:

M. Mohanty, (1999) 'Colonialism and Discourse in India and China', Available at http://www.ignca.nic.in/ks_40033.html http, Accessed: 24.03.2011.

III. Themes for Comparative Analysis

Essential Reading:

L. Barrington et. al (2010) *Comparative Politics - Structures & Choices*, Boston, Wadsworth, pp. 212-13; 71-76; 84-89.

M. Grant, (2009) 'United Kingdom Parliamentary System' in *The UK Parliament*. Edinburgh: Edinburgh University Press, pp. 24-43

J. McCormick, (2007) *Comparative Politics in Transition*, UK: Wadsworth, pp. 260-270 (China)

M. Kesselman, J. Krieger and William (2010), *Introduction to Comparative Politics: Political Challenges and Changing Agendas*, UK: Wadsworth. pp. 47-70 (Britain); 364-388 (Nigeria); 625-648 (China); 415-440 (Brazil).

Additional Reading:

P. Rutland, (2007) 'Britain', in J. Kopstein and M. Lichbach. (eds.) *Comparative Politics: Interest, Identities and Institutions in a Changing Global Order*. Cambridge: Cambridge University Press, pp. 39-79.

3.2 PERSPECTIVES ON PUBLIC ADMINISTRATION

Objective: The course provides an introduction to the discipline of public administration. This paper encompasses public administration in its historical context with an emphasis on the various classical and contemporary administrative theories. The course also explores some of the recent trends, including feminism and ecological conservation and how the call for greater democratization is restructuring public administration. The course will also attempt to provide the students a comprehensive understanding on contemporary administrative developments.

I. PUBLIC ADMINISTRATION AS A DISCIPLINE [15 lectures]

- ☐ Meaning, Dimensions and Significance of the Discipline
- ☐ Public and Private Administration
- ☐ Evolution of Public Administration

II. THEORETICAL PERSPECTIVES [25 lectures]

CLASSICAL THEORIES

- ☐ Scientific management (F.W.Taylor)
- ☐ Administrative Management (Gullick, Urwick and Fayol)
- ☐ Ideal-type bureaucracy (Max Weber)

NEO-CLASSICAL THEORIES

- ☐ Human relations theory (Elton Mayo)
- ☐ Rational decision-making (Herbert Simon)

CONTEMPORARY THEORIES

- ☐ Ecological approach (Fred Riggs)
- ☐ Innovation and Entrepreneurship (Peter Drucker)

III. PUBLIC POLICY [10 lectures]

- ☐ Concept, relevance and approaches
- ☐ Formulation, implementation and evaluation

IV. MAJOR APPROACHES IN PUBLIC ADMINISTRATION [20 lectures]

- ☐ New Public Administration
- ☐ New Public Management
- ☐ New Public Service Approach
- ☐ Good Governance
- ☐ Feminist Perspectives

READINGS

I. Public Administration as a Discipline

Meaning, Dimensions and Significance of the Discipline.

Nicholas Henry, *Public Administration and Public Affairs*, Prentice Hall, 1999

D. Rosenbloom, R. Kravchuk. and R. Clerkin, (2009) *Public Administration: Understanding Management, Politics and Law in Public Sector*, 7th edition, New Delhi: McGraw Hill, pp. 1-40

W. Wilson, (2004) 'The Study of Administration', in B. Chakrabarty and M. Bhattacharya (eds), *Administrative Change and Innovation: a Reader*, New Delhi: Oxford University Press, pp. 85-101

b. Public and Private Administration.

M. Bhattacharya, (2008) *New Horizons of Public Administration*, 5th Revised Edition. New Delhi: Jawahar Publishers, pp. 37-44.

G. Alhson, (1997) 'Public and Private Management', in Shafritz, J. and Hyde, A. (eds.) *Classicsof Public Administration*, 4th Edition. Forth Worth: Hartcourt Brace, TX, pp. 510-529.

Evolution of Public Administration

N. Henry, *Public Administration and Public Affairs*, 12th edition. New Jersey: Pearson, 2013

M. Bhattacharya, *Restructuring Public Administration: A New Look*, New Delhi: Jawahar

Publishers, 2012

P. Dunleavy and C. Hood, "From Old Public Administration to New Public Management",

Public Money and Management, Vol. XIV No-3, 1994

M. Bhattacharya, *New Horizons of Public Administration*, New Delhi: Jawahar Publishers, 2011

Basu, Rumki, *Public Administration : Concepts and Theories* Sterling Publishers, New Delhi 2014

II. Theoretical Perspectives Scientific Management

D. Gvishiani, *Organisation and Management*, Moscow: Progress Publishers, 1972

F. Taylor, 'Scientific Management', in J. Shafritz, and A. Hyde, (eds.) *Classics of Public Administration*, 5th Edition. Belmont: Wadsworth, 2004

P. Mouzelis, 'The Ideal Type of Bureaucracy' in B. Chakrabarty, And M. Bhattacharya, (eds), *Public Administration: A Reader*, New Delhi: Oxford University Press, 2003

Administrative Management

H. Ravindra Prasad, Y. Pardhasaradhi, V. S. Prasad and P. Satyarnarayana, [eds.], *Administrative Thinkers*, Sterling Publishers, 2010

I. J. Ferreira, A. W. Erasmus and D. Groenewald , *Administrative Management*, Juta Academics, 2010

Ideal Type-Bureaucracy

R. Weber, 'Bureaucracy', in C. Mills, and H. Gerth, *From Max Weber: Essays in Sociology*. Oxford: Oxford University Press, 1946

Warren. G. Bennis, *Beyond Bureaucracy*, Mc Graw Hill, 1973

Human Relations Theory

D. Gvishiani, *Organisation and Management*, Moscow: Progress Publishers, 1972

B. Miner, 'Elton Mayo and Hawthorne', in *Organisational Behaviour 3: Historical Origins and the Future*. New York: M.E. Sharpe, 2006

Rational-Decision Making

S. Maheshwari, *Administrative Thinkers*, New Delhi: Macmillan, 2009

Fredrickson and Smith, 'Decision Theory', in *The Public Administration Theory Primer*. Cambridge: Westview Press, 2003

Ecological approach

R. Arora, 'Riggs' Administrative Ecology' in B. Chakrabarty and M. Bhattacharya (eds), *Public Administration: A reader*, New Delhi, Oxford University Press, 2003

A. Singh, *Public Administration: Roots and Wings*. New Delhi: Galgotia Publishing Company, 2002

F. Riggs, *Administration in Developing Countries: The Theory of Prismatic Society*. Boston: Houghton Mifflin, 1964

Innovation and Entrepreneurship

Peter Drucker, *Innovation and Entrepreneurship*, Harper Collins, 1999

Peter F. Drucker , *The Practice of Management*, Harper Collins, 2006

III. Public Policy

Concept, Relevance and Approaches

T. Dye, (1984) *Understanding Public Policy*, 5th Edition. U.S.A: Prentice Hall, pp. 1-44

The Oxford Handbook of Public Policy , OUP, 2006

Xun Wu, M. Ramesh, Michael Howlett and Scott Fritzen , *The Public Policy Primer: Managing The Policy Process*, Rutledge, 2010

Mary Jo Hatch and Ann .L. Cunliffe *Organisation Theory : Modern, Symbolic and Postmodern Perspectives*, Oxford University Press, 2006

Michael Howlett, *Designing Public Policies : Principles And Instruments*, Rutledge, 2011 *The Oxford Handbook Of Public Policy*, Oxford University Press,

2006

Formulation, implementation and evaluation

Prabir Kumar De, *Public Policy and Systems*, Pearson Education, 2012

R.V. Vaidyanatha Ayyar, *Public Policy Making In India*, Pearson, 2009

Surendra Munshi and Biju Paul Abraham [Eds.] *Good Governance, Democratic Societies And Globalisation*, Sage Publishers, 2004

IV. Major Approaches in Public Administration a. Development administration

M. Bhattacharya, 'Chapter 2 and 4', in *Social Theory, Development Administration and Development Ethics*, New Delhi: Jawahar Publishers, 2006

F. Riggs, *The Ecology of Public Administration, Part 3*, New Delhi: Asia Publishing House, 1961

c. New Public Administration

Essential Reading:

M. Bhattacharya, *Public Administration: Issues and Perspectives*, New Delhi: Jawahar Publishers, 2012

H. Frederickson, 'Toward a New Public Administration', in J. Shafritz, & A. Hyde, (eds.) *Classics of Public Administration*, 5th Edition, Belmont: Wadsworth, 2004

d. New Public Management

U. Medury, *Public administration in the Globalization Era*, New Delhi: Orient Black Swan, 2010

A. Gray, and B. Jenkins, 'From Public Administration to Public Management' in E. Otenyo and N. Lind, (eds.) *Comparative Public Administration: The Essential Readings*: Oxford University Press, 1997

C. Hood, 'A Public Management for All Seasons', in J. Shafritz, & A. Hyde, (eds.) *Classics of Public Administration*, 5th Edition, Belmont: Wadsworth, 2004

d. New Public Service Approach

R.B. Denhart & J.V. Denhart [Arizona State University] "The New Public Service: Serving Rather Than Steering", in *Public Administration Review*, Volume 60, No-6, November-December 2000

e. Good Governance

A. Leftwich, 'Governance in the State and the Politics of Development', in *Development and Change*. Vol. 25, 1994

M. Bhattacharya, 'Contextualizing Governance and Development' in B. Chakrabarty and

M. Bhattacharya, (eds.) *The Governance Discourse*. New Delhi: Oxford University Press, 1998 B. Chakrabarty, *Reinventing Public Administration: The India Experience*. New Delhi: Orient Longman, 2007

U. Medury, *Public administration in the Globalisation Era*, New Delhi: Orient Black Swan, 2010

f. Feminist Perspective

Camila Stivers, *Gender Images In Public Administration*, California : Sage Publishers, 2002
 Radha Kumar, *The History of Doing*, New Delhi: Kali For Women, 1998
 Sylvia Walby, *Theorising Patriarchy*, Oxford, Basil Blackwell. 1997
 Amy. S. Wharton, *The Sociology Of Gender*, West Sussex : Blackwell-Wiley Publishers, 2012
 Nivedita Menon [ed.], *Gender and Politics*, Delhi: Oxford University Press, 1999
 Simone De Beauvoir, *The Second Sex*, London: Picador, 1988
 Alison Jaggar, *Feminist Politics And Human Nature*, Brighton: Harvester Press, 1983
 Maxine Molyneux and Shahra Razavi , *Gender, Justice, Development and Rights* ,Oxford: Oxford University Press, 2002

3.3 Paper VII- Perspectives on International Relations and World History

Course Objective: This paper seeks to equip students with the basic intellectual tools for understanding International Relations. It introduces students to some of the most important theoretical approaches for studying international relations. The course begins by historically contextualizing the evolution of the international state system before discussing the agency-structure problem through the levels-of-analysis approach. After having set the parameters of the debate, students are introduced to different theories in International Relations. It provides a fairly comprehensive overview of the major political developments and events starting from the twentieth century. Students are expected to learn about the key milestones in world history and equip them with the tools to understand and analyze the same from different perspectives. A key objective of the course is to make students aware of the implicit Euro - centricism of International Relations by highlighting certain specific perspectives from the Global South.

A. Studying International Relations (15 Lectures)

- i. How do you understand International Relations: Levels of Analysis (3 lectures)
- ii. History and IR: Emergence of the International State System (2 Lectures)
- iii. Pre-Westphalia and Westphalia (5 lectures)
- iv. Post-Westphalia (5 lectures)

D. Theoretical Perspectives (25 Lectures)

- i. Classical Realism & Neo-Realism (6 lectures)
- ii. Liberalism & Neoliberalism (5 lectures)
- iii. Marxist Approaches (5 lectures)
- iv. Feminist Perspectives (4 lectures)
- v. Eurocentricism and Perspectives from the Global South (5 Lectures)

C. An Overview of Twentieth Century IR History (20 Lectures)

- i. World War I: Causes and Consequences (1 Lecture)
- ii. Significance of the Bolshevik Revolution (1 Lecture)
- iii. Rise of Fascism / Nazism (2 Lectures)
- iv. World War II: Causes and Consequences (3 Lectures)
- v. Cold War: Different Phases (4 Lectures)
- vi. Emergence of the Third World (3 Lectures)

- vii. Collapse of the USSR and the End of the Cold War (2 Lectures)
- viii. Post Cold War Developments and Emergence of Other Power Centers of Power (4 Lectures)

Essential Readings:

M. Nicholson, (2002) *International Relations: A Concise Introduction*, New York: Palgrave, pp. 1-4.

R. Jackson and G. Sorensen, (2007) *Introduction to International Relations: Theories and Approaches*, 3rd Edition, Oxford: Oxford University Press, pp. 2-7

S. Joshua. Goldstein and J. Pevehouse, (2007) *International Relations*, New York: Pearson Longman, 2007, pp. 29-35

C. Brown and K. Ainley, (2009) *Understanding International Relations*, Basingstoke: Palgrave, pp. 1-16.

Additional Readings:

K. Mingst and J. Snyder, (2011) *Essential Readings in International Relations*, New York: W.W. Norton and Company, pp. 1-15.

M. Smith and R. Little, (eds) (2000) 'Introduction', in *Perspectives on World Politics*, New York: Routledge, 2000, 1991, pp. 1-17.

J. Baylis and S. Smith (eds), (2008) *The Globalization of World Politics: An Introduction to International Relations*, New York: Oxford University Press, pp. 1-6.

R. Mansbach and K. Taylor, (2008) *Introduction to Global Politics*, New York: Routledge, pp. 2-32.

Rumki Basu, (ed) (2012) *International Politics: Concepts, Theories and Issues* New Delhi, Sage.

History and IR: Emergence of the International State System:

Essential Readings:

R. Mansbach and K. Taylor, (2012) *Introduction to Global Politics*, New York: Routledge, pp. 33-68.

K. Mingst, (2011) *Essentials of International Relations*, New York: W.W. Norton and Company, pp. 16-63.

P. Viotti and M. Kauppi, (2007) *International Relations and World Politics: Security, Economy, Identity*, Pearson Education, pp. 40-85.

Additional Readings:

J. Baylis, S. Smith and P. Owens, (2008) *The Globalization of World Politics: An Introduction to International Relations*, New York: Oxford University Press, pp. 36-

89.

R. Mansbach and K. Taylor, (2008) *Introduction to Global Politics*, New York: Routledge, pp. 70-135.

J Goldstein and J. Pevehouse, (2007) *International Relations*, New York: Pearson Longman, pp. 50-69.

E. Hobsbawm, (1995) *Age of Extremes: The Short Twentieth Century 1914-1991*, Vikings.

S. Lawson, (2003) *International Relations*, Cambridge: Polity Press, pp. 21-60.

How do you Understand IR (Levels of Analysis):

Essential Readings:

J. Singer, (1961) 'The International System: Theoretical Essays', *World Politics*, Vol. 14(1), pp. 77-92.

B. Buzan, (1995) 'The Level of Analysis Problem in International Relations Reconsidered,' in K. Booth and S. Smith, (eds), *International Relations Theory Today*, Pennsylvania: The Pennsylvania State University Press, pp. 198-216.

Additional Readings:

K. Mingst, (2011) *Essentials of International Relations*, New York: W.W. Norton and Company, pp. 93-178.

J. Goldstein and J. Pevehouse, (2007) *International Relations*, New York: Pearson Longman, pp. 35-49.

K. Waltz, (1959) *Man, The State and War*, Columbia: Columbia University Press.

Theoretical Perspectives:

Classical Realism and Neorealism

Essential Readings:

E. Carr, (1981) *The Twenty Years Crisis, 1919-1939: An Introduction to the Study of International Relations*, London: Macmillan, pp. 63-94.

H. Morgenthau, (2007) 'Six Principles of Political Realism', in R. Art and R. Jervis, *International Politics*, 8th Edition, New York: Pearson Longman, pp. 7-14.

T. Dunne and B. Schmidt, (2008) 'Realism', in J. Baylis and S. Smith (eds), *The Globalization of World Politics: An Introduction to International Relations*, New York: Oxford University Press, pp. 90-107.

K. Waltz, (2007) 'The Anarchic Structure of World Politics', in R. Art and R. Jervis, *International Politics*, 8th Edition, New York: Pearson Longman, pp. 29-49.

Additional Readings:

M. Nicholson, (2002) *International Relations: A Concise Introduction*, New York: Palgrave, pp. 6-7.

H. Bull, (2000) 'The Balance of Power and International Order', in M. Smith and R. Little (eds), *Perspectives on World Politics*, New York: Routledge, pp. 115-124.

Liberalism and Neoliberalism

Essential Readings:

T. Dunne, (2008) 'Liberalism', in J. Baylis and S. Smith (eds.), *The Globalization of World Politics: An Introduction to International Relations*, New York: Oxford University Press, pp. 108-123.

R. Keohane and J. Nye, (2000) 'Transgovernmental Relations and the International Organization', in M. Smith and R. Little (eds.), *Perspectives on World Politics*, New York: Routledge, pp. 229-241.

Additional Readings:

J. Goldstein and J. Pevehouse, (2007) *International Relations*, New York: Pearson Longman, pp. 127-137.

R. Jackson and G. Sorensen, (2007) *Introduction to International Relations: Theories and Approaches*, 3rd Edition, Oxford: Oxford University Press, pp. 97-128.

Marxist Approaches

Essential Readings:

I. Wallerstein, (2000) 'The Rise and Future Demise of World Capitalist System: Concepts for Comparative Analysis', in Michael Smith and Richard Little (eds), *Perspectives on World Politics*, New York: Routledge, pp. 305-317.

S. Hobden and R. Jones, (2008) 'Marxist Theories of International Relations' in J. Baylis and S. Smith (eds), *The Globalization of World Politics: An Introduction to International Relations*, New York: Oxford University Press, pp. 142-149; 155-158.

J. Goldstein and J. Pevehouse, (2007) *International Relations*, New York: Pearson Longman, pp. 494-496; 500-503.

Additional Readings:

J. Galtung, (2000) 'A Structural Theory of Imperialism', in M. Smith and R. Little, (eds), *Perspectives on World Politics*, New York: Routledge, pp. 292-304.

A. Frank, (1966) 'The Development of Underdevelopment' *Monthly Review*, pp. 17-30.

P. Viotti and M. Kauppi (2007), *International Relations and World*

Politics: Security, Economy, Identity, Pearson Education, pp. 40-85.

Modern History Sourcebook: Summary of Wallerstein on World System Theory,
Available at <http://www.fordham.edu/halsall/mod/Wallerstein.asp>, Accessed:
19.04.2013

Feminist Perspectives

Essential Readings:

J. Tickner, (2007) 'A Critique of Morgenthau's Principles of Political Realism', in R. Art and R. Jervis, *International Politics*, 8th Edition, New York: Pearson Longman, pp. 15-28.

F. Halliday, (1994) *Rethinking International Relations*, London: Macmillan, pp. 147-166. Additional Readings:

M. Nicholson, *International Relations: A Concise Introduction*, New York: Palgrave, 2002, pp. 120-122.

J. Goldstein and J. Pevehouse, (2007) *International Relations*, New York: Pearson Longman, pp. 138-148.

S. Smith and P. Owens, (2008) 'Alternative Approaches to International Theory' in J. Baylis and S. Smith (eds), *The Globalization of World Politics: An Introduction to International Relations*, New York: Oxford University Press, pp. 181-184.

IR, Eurocentrism and Perspectives from the Global South on Eurocentrism

Essential Readings:

A. Acharya and B. Buzan, (2007) 'Why Is There No Non- Western IR Theory: Reflections on and From Asia', *International Relations Of The Asia- Pacific*, Vol 7(3), pp. 285-286.

T. Kayaoglu, (2010) 'Westphalian Eurocentrism in I R Theory', in *International Studies Review*, Vol. 12(2), pp. 193-217.

Additional Readings:

O. Weaver and A. Tickner, (2009) 'Introduction: Geocultural Epistemologies', in A. Tickner and O. Waever (eds), *International Relations: Scholarship Around The World*, London: Routledge, pp. 1-31.

R. Kanth (ed), (2009) *The Challenge of Eurocentrism: Global Perspectives, Policy & Prospects*, New York: Palgrave-McMillan.

S. Amin, (2010) *Eurocentrism: Modernity, Religion & Democracy*, New York: Monthly Review Press.

An Overview of Twentieth Century IR History

(a) World War I: Causes and Consequences

Hobsbawm, E. (1995) *Age of Extreme: The Short Twentieth Century, 1914—1991*. London: Abacus, pp. 22-35.

(b) Significance of the Bolshevik Revolution

Hobsbawm, E. (1995) *Age of Extreme: The Short Twentieth Century, 1914—1991*. London: Abacus, pp. 54-78.

(c) Rise of Fascism / Nazism

Hobsbawm, E. (1995) *Age of Extreme: The Short Twentieth Century, 1914—1991*. London: Abacus, pp. 108-141.

Carr, E.H. (2004) *International Relations between the Two World Wars: 1919-1939*. New York: Palgrave, pp. 197-231 and 258-278.

(d) World War II: Causes and Consequences

Taylor, A.J.P. (1961) *The Origins of the Second World War*. Harmondsworth: Penguin, pp.29-65.

Carruthers, S.L. (2005) 'International History, 1900-1945' in Baylis, J. and Smith, S. (eds.) (2008)

The Globalization of World Politics. An Introduction to International Relations. 4th edn. Oxford: Oxford University Press, pp. 76-84.

(e) Cold War: Different Phases

Calvocoressi, P. (2001) *World Politics: 1945—2000*. Essex: Pearson, pp. 3-91.

Scott, L. (2005) 'International History, 1945-1990' in Baylis, J. and Smith, S. (eds.) (2008) *The Globalization of World Politics. An Introduction to International Relations*. 4th edn. Oxford: Oxford University Press, pp. 93-101.

Hobsbawm, E. (1995) *Age of Extreme: The Short Twentieth Century, 1914—1991*. London: Abacus, pp. 225-226.

(f) Emergence of the Third World

Hobsbawm, E. (1995) *Age of Extreme: The Short Twentieth Century, 1914—1991*. London: Abacus, pp. 207-222.

(g) Collapse of the USSR and the End of the Cold War

Scott, L. (2005) 'International History, 1945-1990' in Baylis, J. and Smith, S. (eds.)

(2008) *The Globalization of World Politics. An Introduction to International Relations*. 4th edn. Oxford: Oxford University Press, pp. 93-101.

(h) Post Cold War Developments and Emergence of Other Power Centres of Power: Japan, European Union (EU) and Brazil, Russia, India, China (BRIC)

Brezeknski, Z. (2005) *Choice: Global Dominance or Global Leadership*. New York: Basic Books, pp. 85-127.34

Gill, S. (2005) 'Contradictions of US Supremacy' in Panitch, L. and Leys, C. (eds.) *Socialist Register: The Empire Reloaded*. London: Merlin Press. 2004, London, Merlin Press and New York, Monthly Review Press. *Socialist Register*, pp.24-47.

Therborn, G. (2006) 'Poles and Triangles: US Power and Triangles of Americas, Asia and Europe' in Hadiz, V.R. (ed.) *Empire and Neo Liberalism in Asia*. London: Routledge, pp.23-37.

4.1 Paper VIII- Political Processes and Institutions in Comparative Perspective

Course objective: In this course students will be trained in the application of comparative methods to the study of politics. The course is comparative in both what we study and how we study. In the process the course aims to introduce undergraduate students to some of the range of issues, literature, and methods that cover comparative political.

I. Approaches to Studying Comparative Politics (8 lectures)
a. Political Culture
b. New Institutionalism

II. Electoral System (8 lectures)

Definition and procedures: Types of election system (First Past the Post, Proportional Representation, Mixed Representation)

III. Party System (8 lectures)

Historical contexts of emergence of the party system and types of parties

IV. Nation-state (8 lectures)

What is nation–state? Historical evolution in Western Europe and postcolonial contexts
'Nation' and 'State': debates

V. Democratization (8 lectures)

Process of democratization in postcolonial, post- authoritarian and post-communist countries

VI. Federalism (8 lectures) Historical context Federation and Confederation: debates around territorial division of power.

READING LIST

I: Approaches to Studying Comparative Politics

Essential Readings:

M. Pennington, (2009) 'Theory, Institutional and Comparative Politics', in J. Bara and Pennington. (eds.) *Comparative Politics: Explaining Democratic System*. Sage Publications, New Delhi, pp. 13-40.

M. Howard, (2009) 'Culture in Comparative Political Analysis', in M. Lichback and A. Zuckerman, pp. 134- S. (eds.) *Comparative Political: Rationality, Culture, and Structure*. Cambridge: Cambridge University Press.

B. Rosamond, (2005) 'Political Culture', in B. Axford, et al. *Politics*, London: Routledge, pp. 57-81.

Additional Readings:

P. Hall, Taylor and C. Rosemary, (1996) 'Political Science and the Three New Institutionalism', *Political Studies*. XLIV, pp. 936-957.

L. Rakner, and R. Vicky, (2011) 'Institutional Perspectives', in P. Burnell, et al. (eds.) *Political in the Developing World*. Oxford: Oxford University Press, pp. 53-70.

II: Electoral System

Essential Readings:

A. Heywood, (2002) 'Representation, Electoral and Voting', in *Politics*. New York: Palgrave, pp. 223-245.

A. Evans, (2009) 'Elections Systems', in J. Bara and M. Pennington, (eds.) *Comparative politics*. New Delhi: Sage Publications, pp. 93-119.

Additional Reading:

R. Moser, and S. Ethan, (2004) 'Mixed Electoral Systems and Electoral System Effects: Controlled Comparison and Cross-national Analysis', in *Electoral Studies*. 23, pp. 575-599.

III: Party System

Essential Readings:

A. Cole, (2011) 'Comparative Political Parties: Systems and Organizations', in J. Ishiyama, and M. Breuning, (eds) *21st Century Political Science: A Reference Book*. Los Angeles: Sage Publications, pp. 150-158.

A. Heywood, (2002) 'Parties and Party System', in *Politics*. New York : Palgrave, pp. 247-268.

Additional Readings:

B. Criddle, (2003) 'Parties and Party System', in R. Axtmann, (ed.) *Understanding*

Democratic Politics: An Introduction. London: Sage Publications, pp. 134-142.

IV: Nation-state

Essential Readings:

W. O'Connor, (1994) 'A Nation is a Nation, is a State, is a Ethnic Group, is a ...', in J. Hutchinson and A. Smith, (eds.) *Nationalism*. Oxford: Oxford University Press, pp. 36-46.

K. Newton, and J. Deth, (2010) 'The Development of the Modern State', in *Foundations of Comparative Politics: Democracies of the Modern World*. Cambridge: Cambridge University Press, pp. 13-33.

Additional Reading:

A. Heywood, (2002), 'The State', in *Politics*. New York: Palgrave, pp. 85-102

V. Democratization

Essential Readings:

T. Landman, (2003) 'Transition to Democracy', in *Issues and Methods of Comparative Methods: An Introduction*. London: Routledge, pp. 185-215.

K. Newton, and J. Deth, (2010) 'Democratic Change and Persistence', in *Foundations of Comparative Politics: Democracies of the Modern World*. Cambridge: Cambridge University Press, pp. 53-67.

J. Haynes, (1999) 'State and Society', in *The Democratization*. Oxford: Blackwell, pp. 20-38; 39-63.

Additional Reading:

B. Smith, (2003) 'Democratization in the Third World', in *Understanding Third World Politics: Theories of Political Change and Development*. London: Palgrave Macmillan, pp. 250-274.

VI: Federalism

Essential Readings:

M. Burgess, (2006) *Comparative Federalism: Theory and Practice*. London: Routledge, pp. 135-161.

R. Watts, (2008) 'Introduction', in *Comparing Federal Systems*. Montreal and Kingston: McGill Queen's University Press, pp. 1-27

Additional Reading:

R. Saxena, (2011) 'Introduction', in Saxena, R (eds.) *Varieties of Federal Governance: Major Contemporary Models*. New Delhi: Cambridge University Press, pp. xii-x1.

4.2 Paper-IX PUBLIC POLICY AND ADMINISTRATION IN INDIA

Objective: The paper seeks to provide an introduction to the interface between public policy and administration in India. The essence of public policy lies in its effectiveness in translating the governing philosophy into programs and policies and making it a part of the community living. It deals with issues of decentralization, financial management, citizens and administration and social welfare from a non-western perspective.

I. Public Policy [10 lectures]

- a. Definition, characteristics and models
- b. Public Policy Process in India

II. Decentralization [10 lectures]

- g. Meaning, significance and approaches and types
- h. Local Self Governance: Rural and Urban

III. Budget [12 lectures]

- h. Concept and Significance of Budget
- i. Budget Cycle in India
- j. Various Approaches and Types Of Budgeting

IV. Citizen and Administration Interface [15 lectures]

- a. Public Service Delivery
- b. Redressal of Public Grievances: RTI, Lokpal, Citizens' Charter and E-Governance

V. Social Welfare Administration [20 lectures]

- a. Concept and Approaches of Social Welfare
- b. Social Welfare Policies:
 - ☐ **Education:** Right To Education,
 - ☐ **Health:** National Health Mission,
 - ☐ **Food:** Right To Food Security
 - ☐ **Employment:** MNREGA

READINGS

Public Policy

T. Dye, (1984) *Understanding Public Policy*, 5th Edition. U.S.A: Prentice Hall

R.B. Denhardt and J.V. Denhardt, (2009) *Public Administration*, New Delhi: Brooks/Cole

J. Anderson, (1975) *Public Policy Making*. New York: Thomas Nelson and sons Ltd.

M. Howlett, M. Ramesh, and A. Perl, (2009), *Studying Public Policy: Policy Cycles and Policy subsystems*, 3rd edition, Oxford: Oxford University Press

T. Dye, (2002) *Understanding Public Policy*, New Delhi: Pearson

Y. Dror, (1989) *Public Policy Making Reexamined*. Oxford: Transaction Publication

Decentralization

Satyajit Singh and Pradeep K. Sharma [eds.] *Decentralisation: Institutions And Politics In Rural India*, OUP, 2007

D. A. Rondinelli and S. Cheema, *Decentralisation and Development*, Beverly Hills: Sage Publishers, 1983

N.G. Jayal, *Democracy and The State: Welfare, Secular and Development in Contemporary India*, Oxford : Oxford University Press, 1999

Bidyut Chakrabarty, *Reinventing Public Administration: The Indian Experience*, Orient Longman, 2007

Noorjahan Bava, *Development Policies and Administration in India*, Delhi: Uppal Publishers, 2001

Gabriel Almond and Sidney Verba, *The Civic Culture*, Boston: Little Brown, 1965

M.P. Lester, *Political Participation- How and Why do People Get Involved in Politics* Chicago: McNally, 1965

III. Budget

Erik-Lane, J. (2005) *Public Administration and Public Management: The Principal Agent Perspective*. New York: Routledge

Henry, N. (1999) *Public Administration and Public Affairs*. New Jersey: Prentice Hall

Caiden, N. (2004) 'Public Budgeting Amidst Uncertainty and Instability', in Shafritz, J.M. & Hyde, A.C. (eds.) *Classics of Public Administration*. Belmont: Wadsworth

IV Citizen And Administration Interface

R. Putnam , *Making Democracy Work* , Princeton University Press, 1993

Jenkins, R. and Goetz, A.M. (1999) 'Accounts and Accountability: Theoretical Implications of the Right to Information Movement in India', in *Third World Quarterly*. June

Sharma, P.K. & Devasher, M. (2007) 'Right to Information in India' in Singh, S. and Sharma, P. (eds.) *Decentralization: Institutions and Politics in Rural India*. New Delhi: Oxford University Press

Vasu Deva, *E-Governance In India: A Reality*, Commonwealth Publishers, 2005

World Development Report, World Bank, Oxford University Press, 1992.

M.J.Moon, *The Evolution of Electronic Government Among Municipalities: Rheoteric or Reality*, American Society For Public Administration, *Public Administration Review*, Vol 62, Issue 4, July –August 2002

Pankaj Sharma, *E-Governance: The New Age Governance*, APH Publishers, 2004

Pippa Norris, *Digital Divide: Civic Engagement, Information Poverty and the Internet in Democratic Societies*, Cambridge: Cambridge University Press, 2001.

Stephan Goldsmith and William D. Eggers, *Governing By Network: The New Shape of the Public Sector*, Brookings Institution [Washington], 2004

United Nation Development Programme, *Reconceptualising Governance*, New York, 1997 Mukhopadhyay, A. (2005) 'Social Audit', in *Seminar*. No.551.

V. Social Welfare Administration

Jean Drèze and Amartya Sen, *India, Economic Development and Social Opportunity*, Oxford: Oxford University Press, 1995

J.Dreze and Amartya Sen, *Indian Development: Selected Regional Perspectives*, Oxford: Clareland Press, 1997

Reetika Khera- Rural Poverty And Public Distribution System, EPW, Vol-XLVIII, No.45-46, Nov 2013

Pradeep Chaturvedi [ed.], *Women And Food Security: Role Of Panchayats*, Concept Publishers, 1997

National Food Security Mission: nfsm.gov.in/Guidelines/XIIPlan/NFSMXII.pdf

Jugal Kishore, *National Health Programs of India: National Policies and Legislations*, Century Publications, 2005

K. Lee and Mills, *The Economic Of Health In Developing Countries*, Oxford: Oxford University Press, 1983

K. Vijaya Kumar, *Right to Education Act 2009: Its Implementation as to Social Development in India*, Delhi: Akansha Publishers, 2012.

Marma Mukhopadhyay and Madhu Parhar(ed.) *Education in India: Dynamics of Development*, Delhi: Shipra Publications, 2007

Nalini Juneja, *Primary Education for All in the City of Mumbai: The Challenge Set By Local Actors*', International Institute For Educational Planning, UNESCO: Paris, 2001

Surendra Munshi and Biju Paul Abraham [eds.] *Good Governance, Democratic Societies and Globalisation*, Sage Publishers, 2004

Basu Rumki (2015) *Public Administration in India Mandates, Performance and Future Perspectives*, New Delhi, Sterling Publishers

www.un.org/millenniumgoals
<http://www.cefsindia.org>
www.righttofoodindia.org

4.3 Paper X- Global Politics

Course objective: This course introduces students to the key debates on the meaning and nature of globalization by addressing its political, economic, social, cultural and technological dimensions. In keeping with the most important debates within the globalization discourse, it imparts an understanding of the working of the world economy, its anchors and resistances offered by global social movements while analyzing the changing nature of relationship between the state and trans-national actors and networks. The course also offers insights into key contemporary global issues such as the proliferation of nuclear weapons, ecological issues, international terrorism, and human security before concluding with a debate on the phenomenon of global governance.

I. Globalization: Conceptions and Perspectives (23 lectures)

- a. Understanding Globalization and its Alternative Perspectives (6 lectures)
- b. Political: Debates on Sovereignty and Territoriality (3 lectures)
- c. Global Economy: Its Significance and Anchors of Global Political Economy: IMF,
- d. World Bank, WTO, TNCs (8 lectures)
- e. Cultural and Technological Dimension (3 lectures)
- f. Global Resistances (Global Social Movements and NGOs) (3 lectures)

II. Contemporary Global Issues (20 lectures)

- a. Ecological Issues: Historical Overview of International Environmental Agreements,

- Climate Change, Global Commons Debate (7 lectures)
- b. Proliferation of Nuclear Weapons (3 lectures)
- c. International Terrorism: Non-State Actors and State Terrorism; Post 9/11 developments (4 lectures)
- d. Migration (3 lectures)
- e. Human Security (3 lectures)

III. Global Shifts: Power and Governance (5 lectures)

READING LIST

I. Globalization – Conceptions and Perspectives Understanding Globalization and its Alternative Perspectives

Essential Readings:

- G. Ritzer, (2010) *Globalization: A Basic Text*, Sussex: Wiley-Blackwell, pp. 33-62.
- M. Strager, (2009) *Globalization: A Very Short Introduction*, London: Oxford University Press, pp. 1-16.
- R. Keohane and J. Nye Jr, (2000) 'Globalization: What's New? What's Not? (And So What?)', in *Foreign Policy*, No 118, pp. 104-119.

Additional Reading:

- A. McGrew, (2011) 'Globalization and Global Politics', in J. Baylis, S. Smith and P. Owens (eds.) *Globalization of World Politics: An Introduction to International Relations*, New York: Oxford University Press, pp. 14-31.
- A. Heywood, (2011) *Global Politics*, New York: Palgrave-McMillan, pp. 1-24.
- W. Ellwood, (2005) *The No-nonsense Guide to Globalization*, Jaipur: NI-Rawat Publications, pp. 12-23.

Political: Debates on Sovereignty and Territoriality

Essential Readings:

- A. Heywood, (2011) *Global Politics*, New York: Palgrave-McMillan, pp. 112-134.
- R. Keohane, (2000) 'Sovereignty in International Society', in D. Held and A. McGrew (eds.) *The Global Trans-Formations Reader*, Cambridge: Polity Press, pp. 109-123.

Additional Reading:

- K. Shimko, (2005) *International Relations: Perspectives and Controversies*, New York: Houghton Mifflin, pp. 195-219.

Global Economy: Its Significance and Anchors of Global Political Economy: IMF, World Bank, WTO, TNCs

Essential Readings:

- A. Heywood, (2011) *Global Politics*, New York: Palgrave-McMillan, pp. 454-479.
- T. Cohn, (2009) *Global Political Economy: Theory and Practice*, pp. 130-140 (IMF), 208-218 (WTO).
- R. Picciotto, (2003) 'A New World Bank for a New Century', in C. Roe Goddard et al., *International Political: State-Market Relations in a Changing Global Order*, Boulder:

LynneReinner, pp. 341-351.

A. Narlikar, (2005) *The World Trade Organization: A Very Short Introduction*, New York: Oxford University Press, pp. 22-98.

J. Goldstein, (2006) *International Relations*, New Delhi: Pearson, pp. 392-405 (MNC).

P. Hirst, G. Thompson and S. Bromley, (2009) *Globalization in Question*, Cambridge: Polity Press, pp. 68-100 (MNC).

Additional Readings:

G. Ritzer, (2010) *Globalization: A Basic Text*, Sussex: Wiley-Blackwell, pp. 180-190.

F. Lechner and J. Boli (ed.), (2004) *The Globalization Reader*, London: Blackwell, pp. 236-239 (WTO).

D. Held et al, (1999) *Global Transformations: Politics, Economics and Culture*, California: Stanford University Press, pp. 242-282 (MNC).

T. Cohn, (2009) *Global Political Economy*, New Delhi: Pearson, pp. 250-323 (MNC).

Cultural and Technological Dimension

Essential Readings:

D. Held and A. McGrew (eds.), (2002) *Global Transformations Reader: Politics, Economics and Culture*, Cambridge: Polity Press, pp. 1-50; 84-91.

M. Steger, (2009) 'Globalization: A Contested Concept', in *Globalization: A Very Short Introduction*, London: Oxford University Press, pp. 1-16.

A. Appadurai, (2000) 'Grassroots Globalization and the Research Imagination', in *Public Culture*, Vol. 12(1), pp. 1-19.

Additional Reading:

J. Beynon and D. Dunkerley, (eds.), (2012) *Globalisation: The Reader*, New Delhi: Rawat Publications, pp. 1-19.

A. Vanaik, (ed.), (2004) *Globalization and South Asia: Multidimensional Perspectives*, New Delhi: Manohar Publications, pp. 171-191, 192-213, 301-317, 335-357.

Global Resistances (Global Social Movements and NGOs)

Essential Readings:

G. Ritzer, (2010) *Globalization: A Basic Text*, Sussex: Wiley-Blackwell, pp. 487-504.

R. O'Brien et al., (2000) *Contesting Global Governance: Multilateral Economic Institutions and Global Social Movements*, Cambridge: Cambridge University Press, pp. 1-23.

J. Fisher, (1998) *Non-Governments: NGOs and Political Development in the Third World*,

Connecticut: Kumarian Press, pp. 1- 37 (NGO).

Additional Readings:

G. Laxter and S. Halperin (eds.), (2003) *Global Civil Society and Its Limits*, New York: Palgrave, pp. 1-21.

A. Heywood, (2011) *Global Politics*, New York: Palgrave-McMillan, pp. 150-156 (NGO).

P. Willets, (2011) 'Trans-National Actors and International Organizations in Global Politics', in J. Baylis, S. Smith and P. Owens (eds.) *Globalization of World Politics*, New York: Oxford University Press, pp. 334-342. (NGO)

II. Contemporary Global Issues

Ecological Issues: Historical Overview of International Environmental Agreements, Climate Change, Global Commons Debate

Essential Readings:

- J. Volger, (2011) 'Environmental Issues', in J. Baylis, S. Smith and P. Owens (eds.) *Globalization of World Politics*, New York: Oxford University Press, pp. 348-362.
A. Heywood, (2011) *Global Politics*, New York: Palgrave, pp. 383-411.
N. Carter, (2007) *The Politics of Environment: Ideas, Activism, Policy*, Cambridge: Cambridge University Press, pp. 13-81.

Additional Readings:

- P. Bidwai, (2011) 'Durban: Road to Nowhere', in *Economic and Political Weekly*, Vol.46, No. 53, December, pp. 10-12.
K.Shimko, (2005) *International Relations Perspectives and Controversies*, New York: Hughton-Mifflin, pp. 317-339.

Proliferation of Nuclear Weapons

Essential Readings:

- D. Howlett, (2011) 'Nuclear Proliferation', in J. Baylis, S. Smith and P. Owens (eds.) *Globalization of World Politics*, New York: Oxford University Press, pp. 384-397.
P. Viotti and M. Kauppi, (2007) *International Relations and World Politics: Security, Economy and Identity*, New Delhi: Pearson, pp. 238-272.

Additional Reading:

- A. Heywood, (2011) *Global Politics*, New York: Palgrave, pp. 264-281.

International Terrorism: Non-State Actors and State Terrorism; Post 9/11 developments

Essential Readings:

- P. Viotti and M. Kauppi, (2007) *International Relations*, New Delhi: Pearson, pp. 276-307.
A.Heywood, (2011) *Global Politics*, New York: Palgrave, pp. 282-301. Additional Readings:
J. Kiras, (2011) 'Terrorism and Globalization', in J. Baylis, S. Smith and P. Owens (eds.) *Globalization of World Politics*, New York: Oxford University Press, pp. 366-380.
A.Vanaik, (2007) *Masks of Empire*, New Delhi: Tulika, pp. 103-128.

Migration

Essential Readings:

- G. Ritzer, (2010) *Globalization: A Basic Text*, Sussex: Wiley-Blackwell, pp. 298-322.
S. Castles, (2012) 'Global Migration', in B. Chimni and S. Mallavarapu (eds.) *International Relations: Perspectives For the Global South*, New Delhi: Pearson, pp. 272-285.

Human Security

Essential Readings:

A. Acharya, (2011) 'Human Security', in J. Baylis, S. Smith and P. Owens (eds.) *Globalization of World Politics*, New York: Oxford University Press, pp. 480-493.

S. Tadjbakhsh and A. Chenoy, (2007) *Human Security*, London: Routledge, pp. 13-19; 123-127; 236-243.

Additional Reading:

A. Acharya, (2001) 'Human Security: East versus West', in *International Journal*, Vol. 56, no. 3, pp. 442-460.

III. Global Shifts: Power and Governance

Essential Readings:

J. Rosenau, (1992) 'Governance, Order, and Change in World Politics', in J. Rosenau, and E. Czempiel (eds.) *Governance without Government: Order and Change in World Politics*, Cambridge: Cambridge University Press, pp. 1-29.

A. Kumar and D. Messner (eds), (2010) *Power Shifts and Global Governance: Challenges from South and North*, London: Anthem Press.

P. Dicken, (2007) *Global Shift: Mapping the Changing Contours of the World Economy*, New York: The Guilford Press.

J. Close, (2001) 'The Global Shift: A quantum leap in human evolution', Available at <http://www.stir-global-shift.com/page22.php>, Accessed: 19.04.2013.

5.1 Paper XI- Classical Political Philosophy

Course objective: This course goes back to Greek antiquity and familiarizes students with the manner in which the political questions were first posed. Machiavelli comes as an interlude inaugurating modern politics followed by Hobbes and Locke. This is a basic foundation course for students.

I. Text and Interpretation (2 weeks)

II. Antiquity Plato (2 weeks)

Philosophy and Politics, Theory of Forms, Justice, Philosopher King/Queen, Communism Presentation theme: Critique of Democracy; Women and Guardianship, Censorship

Aristotle (2 weeks)

Forms, Virtue, Citizenship, Justice, State and Household

Presentation themes: Classification of governments; man as *zoon politikon*

III. Interlude:

Machiavelli (2 weeks)

Virtu, Religion, Republicanism
Presentation themes: morality and statecraft; vice and virtue

**IV. Possessive
Individualism Hobbes (2
weeks)**

Human nature, State of Nature, Social Contract, State
Presentation themes: State of nature; social contract; Leviathan; atomistic individuals.

Locke (2 weeks)

Laws of Nature, Natural Rights, Property,
Presentation themes: Natural rights; right to dissent; justification of property

READING LIST

I. Text and Interpretation

Essential Readings:

T. Ball, (2004) 'History and Interpretation' in C. Kukathas and G. Gaus, (eds.) *Handbook of Political Theory*, London: Sage Publications Ltd. pp. 18-30.

B. Constant, (1833) 'The Liberty of the Ancients Compared with that of the Moderns', in D. Boaz, (ed), (1997) *The Libertarian Reader*, New York: The Free Press.

Additional Readings:

J. Coleman, (2000) 'Introduction', in *A History of Political Thought: From Ancient Greece to Early Christianity*, Oxford: Blackwell Publishers, pp. 1-20.

Q. Skinner, (2010) 'Preface', in *The Foundations of Modern Political Thought Volume I*, Cambridge: Cambridge University Press pp. ix-xv.

II.

Antiquity:

Plato

Essential Readings:

A. Skoble and T. Machan, (2007) *Political Philosophy: Essential Selections*. New Delhi: Pearson Education, pp. 9-32.

R. Kraut, (1996) 'Introduction to the study of Plato', in R. Kraut (ed.) *The Cambridge Companion to Plato*. Cambridge: Cambridge University Press, pp. 1-50.

C. Reeve, (2009) 'Plato', in D. Boucher and P. Kelly, (eds) *Political Thinkers: From Socrates to the Present*, Oxford: Oxford University Press, pp. 62-80

Additional Readings:

S. Okin, (1992) 'Philosopher Queens and Private Wives', in S. Okin *Women in Western Political Thought*, Princeton: Princeton University Press, pp. 28-50

R. Kraut, (1996) 'The Defence of Justice in Plato's Republic', in R. Kraut (ed.) *The*

Cambridge Companion to Plato. Cambridge: Cambridge University Press, pp. 311-337

T. Saunders, (1996) 'Plato's Later Political Thought', in R. Kraut (ed.) *The Cambridge Companion to Plato*. Cambridge: Cambridge University Press, pp. 464-492.

Aristotle

Essential Readings:

A. Skoble and T. Machan, (2007) *Political Philosophy: Essential Selections*. New Delhi: Pearson Education, pp. 53-64.

T. Burns, (2009) 'Aristotle', in D. Boucher, and P. Kelly, (eds) *Political Thinkers: From Socrates to the Present*. Oxford: Oxford University Press, pp.81-99.

C. Taylor, (1995) 'Politics', in J. Barnes (ed.), *The Cambridge Companion to Aristotle*. Cambridge: Cambridge University Press, pp. 232-258

Additional Readings:

J. Coleman, (2000) 'Aristotle', in J. Coleman *A History of Political Thought: From Ancient Greece to Early Christianity*, Oxford: Blackwell Publishers, pp.120-186

D. Hutchinson, (1995) 'Ethics', in J. Barnes, (ed.), *The Cambridge Companion to Aristotle* Cambridge: Cambridge University Press, pp. 195-232.

III. Interlude:

Machiavelli

Essential Readings:

A. Skoble and T. Machan, (2007) *Political Philosophy: Essential Selections*. New Delhi: Pearson Education, pp. 124-130

Q. Skinner, (2000) 'The Adviser to Princes', in *Machiavelli: A Very Short Introduction*, Oxford: Oxford University Press, pp. 23-53

J. Femia, (2009) 'Machiavelli', in D. Boucher, and P. Kelly, (eds) *Political Thinkers: From Socrates to the Present*. Oxford: Oxford University Press, pp. 163-184

Additional Reading:

Q. Skinner, (2000) 'The Theorist of Liberty', in *Machiavelli: A Very Short Introduction*. Oxford: Oxford University Press, pp. 54-87.

IV. Possessive

Individualism Hobbes

Essential Readings:

A. Skoble and T. Machan, (2007) *Political Philosophy: Essential Selections*. New Delhi: Pearson Education pp. 131-157.

D. Baumgold, (2009) 'Hobbes', in D. Boucher and P. Kelly (eds) *Political Thinkers:*

From Socrates to the Present. Oxford: Oxford University Press, pp. 189-206.

C. Macpherson (1962) *The Political Theory of Possessive Individualism: Hobbes to Locke*. Oxford University Press, Ontario, pp. 17-29.

Additional Readings:

I. Hampsher-Monk, (2001) 'Thomas Hobbes', in *A History of Modern Political Thought: Major Political Thinkers from Hobbes to Marx*, Oxford: Blackwell Publishers, pp. 1-67.

A. Ryan, (1996) 'Hobbes's political philosophy', in T. Sorell, (ed.) *Cambridge Companion to Hobbes*. Cambridge: Cambridge University Press, pp. 208-245.

Locke

Essential Readings:

A. Skoble and T. Machan, (2007) *Political Philosophy: Essential Selections*. New Delhi: Pearson Education, pp. 181-209.

J. Waldron, (2009) 'John Locke', in D. Boucher and P. Kelly, (eds) *Political Thinkers: From Socrates to the Present*. Oxford: Oxford University Press, pp. 207-224

C. Macpherson, (1962) *The Political Theory of Possessive Individualism: Hobbes to Locke*. Oxford University Press, Ontario, pp. 194-214.

Additional Readings:

R. Ashcraft, (1999) 'Locke's Political Philosophy', in V. Chappell (ed.) *The Cambridge Companion to Locke*, Cambridge. Cambridge University Press, pp. 226-251.

I. Hampsher-Monk, (2001) *A History of Modern Political Thought: Major Political Thinkers from Hobbes to Marx*, Oxford: Blackwell Publishers, pp. 69-116

5.2 Paper XII- Indian Political Thought-I

Course objective: This course introduces the specific elements of Indian Political Thoughtspanning over two millennia. The basic focus of study is on individual thinkers whose ideas are however framed by specific themes. The course as a whole is meant to provide a sense of the broad streams of Indian thought while encouraging a specific knowledge of individual thinkers and texts. Selected extracts from some original texts are also given to discuss in class. The list of additional readings is meant for teachers as well as the more interested students.

I. Traditions of Pre-colonial Indian Political Thought (8 lectures)

- a. Brahmanic and Shramanic
- b. Islamic and Syncretic.

II. Ved Vyasa (Shantiparva): Rajadharma (5 lectures)

III. Manu: Social Laws (6 lectures)

IV. Kautilya: Theory of State (7 lectures)

V. Aggannasutta (Digha Nikaya): Theory of kingship (5 lectures)

VI. Barani: Ideal Polity (6 lectures)

VII. Abul Fazal: Monarchy (6 lectures)

VIII. Kabir: Syncretism (5 lectures)

READING LIST

I. Traditions of Pre-modern Indian Political Thought:

Essential Readings:

B. Parekh, (1986) 'Some Reflections on the Hindu Tradition of Political Thought', in T. Pantham, and K. Deutsch (eds.), *Political Thought in Modern India*, New Delhi: Sage Publications, pp. 17- 31.

A. Altekar, (1958) 'The Kingship', in *State and Government in Ancient India*, 3rd edition, Delhi: Motilal Banarsidass, pp. 75-108.

M. Shakir, (1986) 'Dynamics of Muslim Political Thought', in T. Pantham, and K. Deutsch (eds.), *Political Thought in Modern India*, New Delhi: Sage Publications, pp. 142- 160

G. Pandey, (1978) *Sraman Tradition: Its History and Contribution to Indian Culture*, Ahmedabad: L. D. Institute of Indology, pp. 52-73.

S. Saberwal, (2008) 'Medieval Legacy', in *Spirals of Contention*, New Delhi: Routledge, pp.1-31

II. Ved Vyasa (Shantiparva): Rajadharma

Essential Readings:

The Mahabharata (2004), Vol. 7 (Book XI and Book XII, Part II), Chicago and London: University of Chicago Press.

V. Varma, (1974) *Studies in Hindu Political Thought and Its Metaphysical Foundations*, Delhi: Motilal Banarsidass, pp. 211- 230.

B. Chaturvedi, (2006) 'Dharma-The Foundation of Raja-Dharma, Law and Governance', in *The Mahabharata: An Inquiry in the Human Condition*, Delhi: Orient Longman, pp. 418-

III. Manu: Social Laws

Essential Readings:

Manu, (2006) 'Rules for Times of Adversity', in P. Olivelle, (ed. & trans.) *Manu's Code of Law: A Critical Edition and Translation of the Manava- Dharamsastra*, New Delhi: OUP, pp. 208-213.

V. Mehta, (1992) 'The Cosmic Vision: Manu', in *Foundations of Indian Political Thought*, Delhi: Manohar, pp. 23- 39.

R. Sharma, (1991) 'Varna in Relation to Law and Politics (c 600 BC-AD 500)', in *Aspects of Political Ideas and Institutions in Ancient India*, Delhi: Motilal Banarsidass, pp. 233- 251.

P. Olivelle, (2006) 'Introduction', in *Manu's Code of Law: A Critical Edition and Translation of the Manava –Dharmasastra*, Delhi: Oxford University Press, pp. 3- 50.

IV. Kautilya: Theory of State

Essential Readings:

Kautilya, (1997) 'The Elements of Sovereignty' in R. Kangle (ed. and trns.), *Arthashastra of Kautilya*, New Delhi: Motilal Publishers, pp. 511- 514.

V. Mehta, (1992) 'The Pragmatic Vision: Kautilya and His Successor', in *Foundations of Indian Political Thought*, Delhi: Manohar, pp. 88- 109.

R. Kangle, (1997) *Arthashastra of Kautilya-Part-III: A Study*, Delhi: Motilal Banarsidass, rpt., pp. 116- 142.

Additional Reading:

J. Spellman, (1964) 'Principle of Statecraft', in *Political Theory of Ancient India: A Study of Kingship from the Earliest time to Circa AD 300*, Oxford: Clarendon Press, pp. 132- 170.

V. Agganna Sutta (Digha Nikaya): Theory of Kingship

Essential Readings:

S. Collins, (ed), (2001) *Agganna Sutta: An Annotated Translation*, New Delhi: Sahitya Academy, pp. 44-49.

S. Collins, (2001) 'General Introduction', in *Agganna Sutta: The Discussion on What is Primary (An Annotated Translation from Pali)*, Delhi: Sahitya Akademi, pp. 1- 26.

B. Gokhale, (1966) 'The Early Buddhist View of the State', in *The Journal of Asian Studies*, Vol. XXVI, (1), pp. 15- 22.

Additional Reading:

L. Jayasurya, 'Buddhism, Politics and Statecraft', Available at ftp.buddhism.org/Publications/.../Voll1_03_Laksiri%20Jayasuriya.pdf, Accessed: 19.04.2013.

VI. Barani: Ideal Polity

Essential Reading:

I. Habib, (1998) 'Ziya Barni's Vision of the State', in *The Medieval History Journal*, Vol. 2, (1), pp. 19- 36.

Additional Reading:

M. Alam, (2004) 'Sharia Akhlaq', in *The Languages of Political Islam in India 1200-1800*, Delhi: Permanent Black, pp. 26- 43

VII. Abul Fazal: Monarchy

Essential Readings:

A. Fazl, (1873) *The Ain-i Akbari* (translated by H. Blochmann), Calcutta: G. H. Rouse, pp. 47-57.

V. Mehta, (1992) 'The Imperial Vision: Barni and Fazal', in *Foundations of Indian Political Thought*, Delhi: Manohar, pp. 134- 156.

Additional Readings:

M. Alam, (2004) 'Sharia in Naserean Akhlaq', in *Languages of Political Islam in India 1200-1800*, Delhi: Permanent Black, pp. 46- 69.

I. Habib, (1998) 'Two Indian Theorist of The State: Barani and Abul Fazal', in *Proceedings of the Indian History Congress*. Patiala, pp. 15- 39.

VIII. Kabir: Syncreticism

Essential Readings:

Kabir. (2002) *The Bijak of Kabir*, (translated by L. Hess and S. Singh), Delhi: Oxford University Press, No. 30, 97, pp. 50- 51 & 69- 70.

V. Mehta, (1992) *Foundation of Indian Political Thought*, Delhi: Manohar, pp. 157-183.

G. Omvedt, (2008) 'Kabir and Ravidas, Envisioning Begumpura', in *Seeking Begumpura: The Social Vision of Anti Caste Intellectual*, Delhi: Navayana, pp. 91- 107.

Additional Reading:

L. Hess and S. Singh, (2002) 'Introduction', in *The Bijak of Kabir*, New Delhi: Oxford University Press, pp. 3- 35.

6.1 Paper XIII- Modern Political Philosophy

Course objective: Philosophy and politics are closely intertwined. We explore this convergence by identifying four main tendencies here. Students will be exposed to the manner in which the questions of politics have been posed in terms that have implications for larger questions of thought and existence.

I. Modernity and its discourses (8 lectures)

This section will introduce students to the idea of modernity and the discourses around modernity. Two essential readings have been prescribed.

II. Romantics (16 lectures)

a. Jean Jacques Rousseau (8 Lectures)

Presentation themes: General Will; local or direct democracy; self-government; origin of inequality.

b. Mary Wollstonecraft (8 Lectures)

Presentation themes: Women and paternalism; critique of Rousseau's idea of education; legal rights

III. Liberal socialist (8 lectures)

a. John Stuart Mill

Presentation themes: Liberty, suffrage and subjection of women, right of minorities; utility principle.

IV. Radicals (16 lectures)

a. Karl Marx

(8 Lectures)

Presentation themes: Alienation; difference with other kinds of materialism; class struggle

b. Alexandra Kollontai (8 Lectures)

Presentation themes: Winged and wingless Eros; proletarian woman; socialization of housework; disagreement with Lenin

Reading List

I. Modernity and its discourses

Essential Readings:

I. Kant. (1784) 'What is Enlightenment?,' available at <http://theliterarylink.com/kant.html>, Accessed: 19.04.2013

S. Hall (1992) 'Introduction', in *Formations of Modernity* UK: Polity Press pages 1-16

II. Romantics

Essential Readings:

B. Nelson, (2008) *Western Political Thought*. New York: Pearson Longman, pp. 221-255.

M. Keens-Soper, (2003) 'Jean Jacques Rousseau: The Social Contract', in M. Forsyth and M. Keens-Soper, (eds) *A Guide to the Political Classics: Plato to Rousseau*. New York: Oxford University Press, pp. 171-202.

C. Jones, (2002) 'Mary Wollstonecraft's *Vindications* and their Political Tradition' in C. Johnson, (ed.) *The Cambridge Companion to Mary Wollstonecraft*, Cambridge: Cambridge University Press, pp. 42-58.

S. Ferguson, (1999) 'The Radical Ideas of Mary Wollstonecraft', in *Canadian Journal of Political Science* XXXII (3), pp. 427-50, Available at <http://digitalcommons.ryerson.ca/politics>, Accessed: 19.04.2013.

III. Liberal Socialist

Essential Readings:

H. Magid, (1987) 'John Stuart Mill', in L. Strauss and J. Cropsey, (eds), *History of Political Philosophy*, 2nd edition. Chicago: Chicago University Press, pp. 784-801.

P. Kelly, (2003) 'J.S. Mill on Liberty', in D. Boucher, and P. Kelly, (eds.) *Political Thinkers: From Socrates to the Present*. New York: Oxford University Press, pp. 324-359.

IV. Radicals

Essential Readings:

J. Cropsey, (1987) 'Karl Marx', in L. Strauss and J. Cropsey, (eds) *History of Political Philosophy*, 2nd Edition. Chicago: Chicago University Press, pp. 802-828.

L. Wilde, (2003) 'Early Marx', in D. Boucher and P. Kelly, P. (eds) *Political Thinkers: From Socrates to the Present*. New York: Oxford University Press, pp. 404-435.

V. Bryson, (1992) 'Marxist Feminism in Russia' in *Feminist Political Theory*, London: Palgrave Macmillan, pp. 114-122

C. Sypnowich, (1993) 'Alexandra Kollontai and the Fate of Bolshevik Feminism' *Labour/Le Travail* Vol. 32 (Fall 1992) pp. 287-295

A. Kollontai (1909), *The Social Basis of the Woman Question*, Available at <http://www.marxists.org/archive/kollonta/1909/social-basis.htm>, Accessed: 19.04.2013

Additional Readings:

A. Bloom, (1987) 'Jean-Jacques Rousseau', in Strauss, L. and Cropsey, J. (eds.) *History of Political Philosophy*, 2nd edition. Chicago: Chicago University Press, pp. 559-580.

Selections from *A Vindication of the Rights of Woman*, Available at <http://oregonstate.edu/instruct/phl302/texts/wollstonecraft/woman-a.html#CHAPTER%20II>, Accessed: 19.04.2013.

A. Skoble and T. Machan, (2007) *Political Philosophy: Essential Selections*, New Delhi: Pearson Education, pp. 328-354.

B.Ollman (1991) *Marxism: An Uncommon Introduction*, New Delhi: Sterling Publishers.

G. Blakely and V. Bryson (2005) *Marx and Other Four Letter Words*, London: Pluto

A. Skoble, and T. Machan, (2007) *Political Philosophy: Essential Selections*, New Delhi: Pearson Education, pp. 286-327.

A.Kollontai, (1977) 'Social Democracy and the Women's Question', in *Selected Writings of Alexandra Kollontai*, London: Allison & Busby, pp. 29-74.

A.Kollontai, (1977) 'Make Way for Winged Eros: A Letter to the Youth', in *Selected Writings of Alexandra Kollontai* Allison & Busby, pp. 201-292.

C. Porter, (1980) *Alexandra Kollontai: The Lonely Struggle of the Woman who defied Lenin*, New York: Dutton Children's Books.

6.2 Paper XIV- Indian Political Thought-II

Course objective: Based on the study of individual thinkers, the course introduces a widespan of thinkers and themes that defines the modernity of Indian political thought. The objective is to study general themes that have been produced by thinkers from varied social and temporal contexts. Selected extracts from original texts are also given to discuss in the class. The list of additional readings is meant for teachers as well as the more interested students.

I. Introduction to Modern Indian Political Thought (4 lectures)

II. Rammohan Roy: Rights (4 lectures)

III. Pandita Ramabai: Gender (4 lectures)

IV. Vivekananda: Ideal Society (5 lectures)

V. Gandhi: Swaraj (5 lectures)

VI. Ambedkar: Social Justice (5 lectures)

VII. Tagore: Critique of Nationalism (4 lectures)

VIII. Iqbal: Community (5 lectures)

IX. Savarkar: Hindutva (4 lectures)

X. Nehru: Secularism (4 lectures)

XI. Lohia: Socialism (4 lectures)

Reading List

I. Introduction to Modern Indian Political Thought

Essential Readings:

V. Mehta and T. Pantham (eds.), (2006) '*A Thematic Introduction to Political Ideas in Modern India: Thematic Explorations, History of Science, Philosophy and Culture in Indian civilization*'

Vol. 10, Part: 7, New Delhi: Sage Publications, pp. xxvii-ixi.

D. Dalton, (1982) 'Continuity of Innovation', in *Indian Idea of Freedom: Political Thought of Swami Vivekananda, Aurobindo Ghose, Rabindranath Tagore and Mahatma Gandhi*,

Academic Press: Gurgaon, pp. 1-28.

II. Rammohan Roy: Rights

Essential Readings:

R. Roy, (1991) 'The Precepts of Jesus, the Guide to Peace and Happiness', S. Hay, (ed.) *Sources of Indian Tradition*, Vol. 2. Second Edition. New Delhi: Penguin, pp. 24-29.

C. Bayly, (2010) 'Rammohan and the Advent of Constitutional Liberalism in India 1800-1830', in Sh. Kapila (ed.), *An intellectual History for India*, New Delhi: Cambridge University Press, pp. 18- 34.

T. Pantham, (1986) 'The Socio-Religious Thought of Rammohan Roy', in Th. Pantham and K. Deutsch, (eds.) *Political Thought in Modern India*, New Delhi: Sage, pp.32-52.

Additional Reading:

S. Sarkar, (1985) 'Rammohan Roy and the break With the Past', in *A Critique on colonial India*, Calcutta: Papyrus, pp. 1-17.

III. Pandita Ramabai: Gender

Essential Readings:

P. Ramabai, (2000) 'Woman's Place in Religion and Society', in M. Kosambi (ed.), *Pandita Ramabai Through her Own Words: Selected Works*, New Delhi: Oxford

University Press, pp.150-155.

M. Kosambi, (1988) 'Women's Emancipation and Equality: Pandita Ramabai's Contribution to Women's Cause', in *Economic and Political Weekly*, Vol. 23(44), pp. 38-49.

Additional Reading:

U. Chakravarti, (2007) *Pandita Ramabai - A Life and a Time*, New Delhi: Critical Quest, pp. 1-40.

G. Omvedt, (2008) 'Ramabai: Women in the Kingdom of God', in *Seeking Begumpura: The Social Vision of Anti Caste Intellectuals*, New Delhi: Navayana. pp. 205-224.

IV. Vivekananda: Ideal Society

Essential Readings:

S. Vivekananda, (2007) 'The Real and the Apparent Man', S. Bodhasarananda (ed.), *Selections from the Complete Works of Swami Vivekananda*, Kolkata: Advaita Ashrama, pp.126-129.

A. Sen, (2003) 'Swami Vivekananda on History and Society', in *Swami Vivekananda*, Delhi: Oxford University Press, pp. 62- 79.

H. Rustav, (1998) 'Swami Vivekananda and the Ideal Society', in W. Radice (ed.), *Swami Vivekananda and the Modernisation of Hinduism*, Delhi: Oxford University Press, pp. 264-280.

Additional Reading:

Raghuramaraju, (2007) 'Swami and Mahatma, Paradigms: State and Civil Society', in *Debates in Indian Philosophy: Classical, Colonial, and Contemporary*, Delhi: Oxford University Press, pp. 29-65.

V. Gandhi: Swaraj

Essential Readings:

M. Gandhi, (1991) 'Satyagraha: Transforming Unjust Relationships through the Power of the Soul', in S. Hay (ed.), *Sources of Indian Tradition*, Vol. 2. Second Edition, New Delhi: Penguin, pp. 265-270.

A. Parel, (ed.), (2002) 'Introduction', in *Gandhi, freedom and Self Rule*, Delhi: Vistaar Publication.

D. Dalton, (1982) *Indian Idea of Freedom: Political Thought of Swami Vivekananda, Aurobindo Ghose, Mahatma Gandhi and Rabindranath Tagore*, Gurgaon: The Academic Press, pp. 154- 190.

Additional Reading:

R. Terchek, (2002) 'Gandhian Autonomy in Late Modern World', in A. Parel (ed.),

Gandhi, Freedom and Self Rule. Delhi: Sage.

VI. Ambedkar: Social Justice

Essential Readings:

B. Ambedkar, (1991) 'Constituent Assembly Debates', S. Hay (ed.), *Sources of Indian Tradition*, Vol. 2, Second Edition, New Delhi: Penguin, pp. 342-347.

V. Rodrigues, (2007) 'Good society, Rights, Democracy Socialism', in S. Thorat and Aryama (eds.), *Ambedkar in Retrospect - Essays on Economics, Politics and Society*, Jaipur: IIDS and Rawat Publications.

B. Mungekar, (2007) 'Quest for Democratic Socialism', in S. Thorat, and Aryana (eds.),

Ambedkar in Retrospect - Essays on Economics, Politics and Society, Jaipur: IIDS and Rawat Publications, pp. 121-142.

Additional Reading:

P. Chatterjee, (2005) 'Ambedkar and the Troubled times of Citizenship', in V. Mehta and Th. Pantham (eds.), *Political ideas in modern India: Thematic Explorations*, New Delhi: Sage, pp. 73-92.

VII. Tagore: Critique of Nationalism

Essential Readings:

R. Tagore, (1994) 'The Nation', S. Das (ed.), *The English Writings of Rabindranath Tagore*, Vol. 3, New Delhi: Sahitya Akademi, pp. 548-551.

R. Chakravarty, (1986) 'Tagore, Politics and Beyond', in Th. Panthams and K. Deutsch (eds.),

Political Thought in Modern India, New Delhi: Sage, pp. 177-191.

M. Radhakrishnan, and Debasmita, (2003) 'Nationalism is a Great Menace: Tagore and Nationalism' in P. Hogan, Colm and L. Pandit, (eds.) *Rabindranath Tagore: Universality and Tradition*, London: Rosemont Publishing and Printing Corporation, pp. 29-39.

Additional Reading:

A. Nandy, (1994) 'Rabindranath Tagore & Politics of Self', in *Illegitimacy of Nationalism*, Delhi: Oxford University Press, pp. 1-50.

VIII. Iqbal: Community

Essential Readings:

M. Iqbal, (1991) 'Speeches and Statements', in S. Hay (ed.), *Sources of Indian Tradition*, Vol.2, Second Edition, New Delhi: Penguin, pp. 218-222.

A. Engineer, (1980) 'Iqbal's Reconstruction of Religious Thought in Islam', in *Social Scientist*, Vol.8 (8), pp. 52-63.

Madani, (2005) *Composite Nationalism and Islam*, New Delhi: Manohar, pp. 66-91.

Additional Reading:

L. Gordon-Polonskya, (1971) 'Ideology of Muslim Nationalism', in H. Malik (ed.), *Iqbal: Poet-Philosopher of Pakistan*, New York: Columbia University Press, pp. 108-134.

IX. Savarkar: Hindutva

Essential Readings:

V. Savarkar, 'Hindutva is Different from Hinduism', available at <http://www.savarkar.org/en/hindutva-/essentials-hindutva/hindutva-different-hinduism>, Accessed: 19.04.2013

J. Sharma, (2003) *Hindutva: Exploring the Idea of Hindu Nationalism*, Delhi: Penguin, pp. 124-172.

Additional Reading:

Dh. Keer, (1966) *Veer Savarkar*, Bombay: Popular Prakashan, pp. 223-250.

X. Nehru: Secularism

Essential Readings:

J. Nehru, (1991) 'Selected Works', in S. Hay (ed.), *Sources of Indian Tradition, Vol. 2*, Second Edition, New Delhi: Penguin, pp. 317-319.

R. Pillai, (1986) 'Political thought of Jawaharlal Nehru', in Th. Pantham, and K. Deutsch (eds.), *Political Thought in Modern India*, New Delhi: Sage, pp. 260- 274.

B. Zachariah, (2004) *Nehru*, London: Routledge Historical Biographies, pp. 169-213.

Additional Reading:

P. Chatterjee, (1986) 'The Moment of Arrival: Nehru and the Passive Revolution', in *Nationalist Thought and the Colonial World: A Derivative Discourse?* London: Zed Books, pp. 131-166

XI. Lohia: Socialism

Essential Readings:

M. Anees and V. Dixit (eds.), (1984) *Lohia: Many Faceted Personality*, Rammanohar Lohia Smarak Smriti.

S. Sinha, (2010) 'Lohia's Socialism: An underdog's perspective', in *Economic and Political Weekly*, Vol. XLV (40) pp. 51-55.

A. Kumar, (2010) 'Understanding Lohia's Political Sociology: Intersectionality of

Caste, Class, Gender and Language Issue', in *Economic and Political Weekly*, Vol. XLV (40), pp. 64-70.

B) Generic Elective (Interdisciplinary): 4

1. Feminism: Theory and Practice

Course Objective: The aim of the course is to explain contemporary debates on feminism and the history of feminist struggles. The course begins with a discussion on construction of gender and an understanding of complexity of patriarchy and goes on to analyze theoretical debates within feminism. Part II of the paper covers history of feminism in the west, socialist societies and in anti-colonial struggles. Part III focuses a gendered analysis of Indian society, economy and polity with a view to understanding the structures of gender inequalities. And the last section aims to understand the issues with which contemporary Indian women's movements are engaged with.

I. Approaches to understanding Patriarchy (22 Lectures)

- Feminist theorising of the sex/gender distinction. Biologism versus social constructivism
- Understanding Patriarchy and Feminism
- Liberal, Socialist, Marxist, Radical feminism, New Feminist Schools/Traditions

II. History of Feminism (22 Lectures)

- Origins of Feminism in the West: France, Britain and United States of America
- Feminism in the Socialist Countries: China, Cuba and erstwhile USSR
- Feminist issues and women's participation in anti-colonial and national liberation movements with special focus on India

III. The Indian Experience (16 Lectures)

- Traditional Historiography and Feminist critiques. Social Reforms Movement and position of women in India. History of Women's struggle in India
- Family in contemporary India - patrilineal and matrilineal practices. Gender Relations in the Family, Patterns of Consumption: Intra Household Divisions, entitlements and bargaining, Property Rights
- Understanding Woman's Work and Labour – Sexual Division of Labour, Productive and Reproductive labour, Visible - invisible work – Unpaid (reproductive and care), Underpaid and Paid work,- Methods of computing women's work , Female headed households

Essential Readings

I. Approaches to understanding Patriarchy

Geetha, V. (2002) *Gender*. Calcutta: Stree.

Geetha, V. (2007) *Patriarchy*. Calcutta: Stree.

Jagger, Alison. (1983) *Feminist Politics and Human Nature*. U.K.: Harvester Press, pp. 25-350.

Supplementary Readings:

Ray, Suranjita. *Understanding Patriarchy*. Available at:

http://www.du.ac.in/fileadmin/DU/Academics/course_material/hrge_06.pdf

Lerner, Gerda. (1986) *The Creation of Patriarchy*. New York: Oxford University Press.

II. History of Feminism

Rowbotham, Shiela. (1993) *Women in Movements*. New York and London: Routledge, Section I, pp. 27-74 and 178-218.

Jayawardene, Kumari. (1986) *Feminism and Nationalism in the Third World*. London: Zed Books, pp. 1-24, 71-108, and Conclusion.

Forbes, Geraldine (1998) *Women in Modern India*. Cambridge: Cambridge University Press, pp. 1-150.

Supplementary Readings:

Eisentein, Zillah. (1979) *Capitalist Patriarchy and the Case for Socialist Feminism*. New York: Monthly Review Press, pp. 271-353.

Funk, Nanette & Mueller, Magda. (1993) *Gender, Politics and Post-Communism*. New York and London: Routledge, Introduction and Chapter 28.

Chaudhuri, Maiyatee. (2003) 'Gender in the Making of the Indian Nation State', in Rege, Sharmila. (ed.) *The Sociology of Gender: The Challenge of Feminist Sociological Knowledge*. New Delhi: Sage.

Banarjee, Sikata. (2007) 'Gender and Nationalism: The Masculinisation of Hinduism and Female Political Participation', in Ghadially, Rehana. (ed.) *Urban Women in Contemporary India: A Reader*. New Delhi: Sage.

III. Feminist Perspectives on Indian Politics

Roy, Kumkum. (1995) 'Where Women are Worshipped, There Gods Rejoice: The Mirage of the Ancestress of the Hindu Women', in Sarkar, Tanika & Butalia, Urvashi. (eds.) *Women and the Hindu Right*. Delhi: Kali for Women, pp. 10-28.

Chakravarti, Uma. (1988) 'Beyond the Altekarian Paradigm: Towards a New Understanding of Gender Relations in Early Indian History', *Social Scientist*, Volume 16, No. 8.

Banerjee, Nirmala. (1999) 'Analysing Women's work under Patriarchy' in Sangari, Kumkum & Chakravarty, Uma. (eds.) *From Myths to Markets: Essays on Gender*. Delhi: Manohar.

Additional Readings

Gandhi, Nandita & Shah, Nandita. (1991) *The Issues at Stake – Theory and Practice in Contemporary Women's Movement in India*. Delhi: Zubaan, pp. 7-72.

Shinde, Tarabai (1993) 'Stri-Purush Tulna', in Tharu, Susie & Lalita, K. (eds.) *Women Writing in India, 600 BC to the Present. Vol. I*. New York: Feminist Press.

Desai, Neera & Thakkar, Usha. (2001) *Women in Indian Society*. New Delhi: National Book Trust.

2 . Gandhi and the Contemporary World

Course objective: Locating Gandhi in a global frame, the course seeks to elaborate Gandhian thought and examine its practical implications. It will introduce students to key instances of Gandhi's continuing influence right up to the contemporary period and enable them to critically evaluate his legacy.

I. Gandhi on Modern Civilization and Ethics of Development (2 weeks)

- a. Conception of Modern Civilisation and Alternative Modernity
- b. Critique of Development: Narmada Bachao Andolan

II. Gandhian Thought: Theory and Action (4 weeks)

- a. Theory of Satyagraha
- b. Satyagraha in Action
 - i. Peasant Satyagraha: Kheda and the Idea of Trusteeship
 - ii. Temple Entry and Critique of Caste
 - iii. Social Harmony: 1947 and Communal Unity

III. Gandhi's Legacy (4 weeks)

- a) Tolerance: Anti - Racism Movements (Anti - Apartheid and Martin Luther King)
- b) The Pacifist Movement
- c) Women's Movements
- d) *Gandhigiri*: Perceptions in Popular Culture

IV. Gandhi and the Idea of Political (2 weeks)

- a) Swaraj
- b) Swadeshi

READINGS

I. Gandhi on Modern Civilization and Ethics of Development

Essential Readings:

B. Parekh, (1997) 'The Critique of Modernity', in *Gandhi: A Brief Insight*, Delhi: Sterling Publishing Company, pp. 63-74.

K. Ishii, (2001) 'The Socio-economic Thoughts of Mahatma Gandhi: As an Origin of Alternative Development', *Review of Social Economy*. Vol. 59 (3), pp. 297-312.

D. Hardiman, (2003) 'Narmada Bachao Andolan', in *Gandhi in his Time and Ours*. Delhi: Oxford University Press, pp. 224- 234.

A. Baviskar, (1995) 'The Politics of the Andolan', in *In the Belly of the River: Tribal Conflict Over Development in the Narmada Valley*, Delhi: Oxford University Press, pp.202-228.

R. Iyer, (ed) (1993) 'Chapter 4' in *The Essential Writings of Mahatma Gandhi*, New Delhi: Oxford University Press.

R. Ramashray, (1984) 'Liberty Versus Liberation', in *Self and Society: A Study in Gandhian Thought*, New Delhi: Sage Publication.

II. Gandhian Thought: Theory and Action

Essential Readings:

B. Parekh, (1997) 'Satyagrah', in *Gandhi: A Brief Insight*, Delhi: Sterling Publishing Company, pp. 51-63.

D. Dalton, (2000) 'Gandhi's originality', in A. Parel (ed) *Gandhi, Freedom and Self-Rule*, New Delhi: Lexington Books, pp.63-86.

D. Hardiman, (1981) 'The Kheda Satyagraha', in *Peasant Nationalists of Gujarat: Kheda District, 1917-1934*, Delhi: Oxford University Press, pp. 86-113.

J. Brown, (2000) 'Gandhi and Human Rights: In search of True humanity', in A. Parel (ed) *Gandhi, Freedom and Self-Rule*, New Delhi: Lexington Books, pp. 93-100.

R. Iyer, (2000) 'Chapter 10 and 11', in *The Moral and Political Thought of Mahatma Gandhi*, New Delhi: Oxford University Press, pp. 251-344

I. Knudegaard, (2010), *Gandhi's Vision for Indian Society: Theory and Action*, Master Thesis in History, University of Oslo, Available at https://docs.google.com/viewer?a=v&q=cache:Eqj9br1n3_oJ:https://www.duo.uio.no/bitstream/handle/123456789/23275/IngfridKnudegaardmasteroppgavexixhistorie.pdf?seq

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ce%3D1+gandhi+and+temple+entry&hl=en&gl=in&pid=bl&srcid=ADGEESiKGssA7q2z1kxiuit
m3bciHPh_HI3chWKbJlVo9HE4LcWCLmKdKXCirPaIzh7Tp47fyoBQlHX9GUesefn8YCAQeaQSK
MRdrwvYT2Q8c7XV95tQhSGuO9bNCGEdlYGoBjzoVdJc&sig=AHIEtbQ78zwxGvh92AnwmRHi A7t2wWXXJQ, Accessed: 14.04.2013, pp.27-38.

P. Rao, (2009) 'Gandhi, Untouchability and the Postcolonial Predicament: A Note'. *SocialScientist*. Vol. 37 (1/2). Pp. 64-70.

B. Parekh, (1999) 'Discourse on Unsociability', in *Colonialism, Tradition and Reform: An Analysis of Gandhi's Political Discourse*, New Delhi: Sage Publication.

D. Hardiman, (2003) 'Fighting Religious Hatreds', in *Gandhi in His Time and Ours*. Delhi: Oxford University Press.

III. Gandhi's Legacy

Essential Readings:

D. Hardiman, (2003) 'Gandhi's Global Legacy', in *Gandhi in His Time and Ours*. Delhi: Oxford University Press, pp. 238-283.

Manimala, (1984) 'Zameen Kenkar? Jote Onkar: Women's participation in the Bodhgaya struggles', in M. Kishwar and R. Vanita (eds) *In Search of Answers: Indian Women's Voices from Manushi*, London: Zed Press.

M. Shah, (2006) 'Gandhigiri; A Philosophy of Our Times', *The Hindu*
Available at
<http://www.hindu.com/2006/09/28/stories/2006092802241000.htm>,
Accessed: 14.04.2013.

A. Ghosh and T. Babu, (2006) 'Lage Raho Munna Bhai: Unravelling Brand 'Gandhigiri'',
Economic and Political Weekly, 41 (51), pp. 5225 – 5227.

H. Trivedi (2011) 'Literary and Visual Portrayal of Gandhi', in J Brown and A Parel (eds) *Cambridge Companion to Gandhi*, Cambridge University Press 2011, pp. 199-218.

IV. Gandhi and the Idea of Political

Essential Readings:

P. Chatterjee, (1986) 'The Moment of Maneuver', in *Nationalist Thought and the Colonial World: A derivative discourse?*, Delhi: Zed Books.

Indian Council for Historical Research (1976) 'The Logic of Gandhian Nationalism: Civil Disobedience and the Gandhi – Irwin Pact, 1930-31', *Indian Historical Review*, Available at <http://www.ichrindia.org/journal.pdf>, Accessed: 18.04.2013.

D. Dalton, (1996) 'Swaraj: Gandhi's Idea of Freedom', in *Mahatma Gandhi: Selected Political Writings*, USA: Hackett Publishing, pp. 95-148.

A. Parel (ed.) (1997) 'Editor's Introduction', in *Gandhi, Hind Swaraj and Other Writings* Cambridge: Cambridge University Press.

Additional Readings:

A. Baviskar, (1995) 'National Development, Poverty and the environment', in *In the Belly of the River: Tribal Conflict Over Development in the Narmada Valley*, Delhi: Oxford University Press, pp. 18-33.

B. Parekh, (1997) 'Religious Thought', in *Gandhi: A Brief Insight*, Delhi: Sterling Publishing Company.

R. Iyer, (1993) *The Essential Writings of Mahatma Gandhi*, New Delhi: Oxford University Press, pp. 299-344; 347-373.

S. Sarkar, (1982) *Modern India 1885-1947*, New Delhi: Macmillan, pp. 432-39.

R. Iyer, (2001) *The Moral and Political Thought of Mahatma Gandhi*, New Delhi: Oxford University Press. pp. 344-358.

H. Coward, (2003) 'Gandhi, Ambedkar, and Untouchability', in H. Coward (ed) *Indian Critiques of Gandhi*, New York: State University of New York Press, pp. 41-66.

J. Lipner, (2003) 'A Debate for Our Times', in Harold Coward (ed) *Indian Critiques of Gandhi*, New York: State University of New York Press, pp. 239-58

M. Gandhi, (1941) 'Chapter 1, 2, 9, 15, and 16', in *Constructive Programme: Its Meaning and Place*, Ahmedabad: Navjivan Trust.

R. Terchek, (1998) *Gandhi: Struggling for Autonomy*, USA: Rowman and Littlefield Publishers.

N. Dirks, (2001), 'The Reformation of Caste: Periyar, Ambedkar and Gandhi', in *Castes of Mind: Colonialism and the making of Modern India*, Princeton: Princeton University Press.

R. Mukharjee, (ed) (1995), *The Penguin Gandhi Reader*, New Delhi: Penguin.

T. Weber, (2006) 'Gandhi is dead, Long live Gandhi- The Post Gandhi Gandhian Movement in India', in *Gandhi, Gandhism and the Gandhians*, New Delhi: Roli.

A. Taneja, (2005) *Gandhi Women and the National Movement 1920-1947*, New Delhi: Haranand Publishers.

J. Brown, (2008) *Gandhi and Civil Disobedience: The Mahatma in Indian Politics*, Cambridge: Cambridge University Press, 2008

R. Ramashray, (1984) 'What Beyond the Satanic Civilization?', in *Self and Society: A Study in Gandhian Thought*, New Delhi: Sage Publication.

Activities

Topic 1

1. Reading of primary texts:- M K Gandhi Chapter VI and XIII "Hind Swaraj" Navjeevan Trust, Ahmedabad, 1910
2. A site visit to any on-going developmental project preferably in NCT Delhi by students and submission of report on Environmental law Violation and Resistance by People in a Gandhian Way.

Topic 2

1. Reading of primary texts:- M K Gandhi Chapter XII&XIII, "Satyagraha in South Africa, Navjivan Trust, Ahmedabad, 1928, pp. 95-107
2. A Report followed by presentation on functioning of Cooperative and Community engagement for example Amul and/or SEWA in Gujarat to understand Trusteeship and its relevance

Topic 3

1. Movie Screenings (Movies like Lage Raho Munna Bhai, Gandhi by Richard Attenborough and Student's Participation in reviewing/discussing the movie from a Gandhian perspective or Cultural engagement of Students with Gandhian Ideas through Staging of a street play.

Topic 4

Student Visit to Any Gandhian Institution in Delhi like, Gandhi Darshan and Smriti to understand on-going Gandhian work and programme and interacting with Gandhian activists.

3. GOVERNANCE: ISSUES AND CHALLENGES

Objectives: This paper deals with concepts and different dimensions of governance highlighting the major debates in the contemporary times. There is a need to understand the importance of the concept of governance in the context of a globalising world, environment, administration, development. The essence of governance is explored through the various good governance initiatives introduced in India.

1. GOVERNMENT AND GOVERNANCE: CONCEPTS [12 lectures]

Role of State In The Era Of Globalisation State, Market and Civil Society

2. GOVERNANCE AND DEVELOPMENT [12 lectures]

Changing Dimensions of Development Strengthening Democracy through Good Governance

3. ENVIRONMENTAL GOVERNANCE [12 lectures]

Human-Environment Interaction

Green Governance: Sustainable Human Development

4. LOCAL GOVERNANCE [12 lectures]

Democratic

Decentralisation

People's Participation In Governance

5. GOOD GOVERNANCE INITIATIVES IN INDIA: BEST PRACTICES [20 lectures]

- a. Public Service Guarantee Acts
- b. Electronic Governance
- c. Citizens Charter & Right to Information
- d. Corporate Social Responsibility

READINGS

GOVERNMENT AND GOVERNANCE: CONCEPTS

B. Chakrabarty and M. Bhattacharya, (eds.) *The Governance Discourse*. New Delhi: Oxford University Press, 1998

Surendra Munshi and Biju Paul Abraham [eds.] , *Good Governance, Democratic Societies And Globalisation*, Sage Publishers, 2004

United Nation Development Programme , *Reconceptualising Governance*, New York, 1997

Carlos Santiso, *Good Governance and Aid Effectiveness: The World Bank and Conditionality*

Johns Hopkins University, The Georgetown Public Policy Review , Volume VII, No.1, 2001 Vasudha Chotray and Gery Stroker , *Governance Theory: A Cross Disciplinary Approach* ,

Palgrave Macmillan , 2008

J. Rosenau, 'Governance, Order, and Change in World Politics', in J. Rosenau, and E. Czempiel (eds.) *Governance without Government: Order and Change in World Politics*, Cambridge: Cambridge University Press , 1992

B. Nayar (ed.), *Globalization and Politics in India*. Delhi: Oxford University Press, 2007 pp. 218-240.

Smita Mishra Panda , *Engendering Governance Institutions: State, Market And Civil Society*, Sage Publications, 2008

Neera Chandhoke, *State And Civil Society Explorations In Political Theory* , Sage

Publishers,1995

GOVERNANCE AND DEVELOPMENT

B. C. Smith, *Good Governance and Development*, Palgrave, 2007

World Bank Report, *Governance And Development*, 1992

P. Bardhan, 'Epilogue on the Political Economy of Reform in India', in *The Political Economy of Development in India*. 6th edition, Delhi: Oxford University Press, 2005

J. Dreze and A. Sen, *India: Economic Development and Social Opportunity*. New Delhi: Oxford University Press, 1995

Niraja Gopal Jayal[ed.], *Democracy in India*, Oxford University Press, 2007

ENVIRONMENTAL GOVERNANCE

Ramachandra Guha, *Environmentalism: A Global History*, Longman Publishers, 1999

J.P. Evans, *Environmental Governance*, Routledge , 2012

Emilio F. Moran, *Environmental Social Science: Human - Environment interactions and Sustainability*, Wiley-Blackwell, 2010

Burns H Weston and David Bollier, *Green Governance: Ecological Survival, Human Rights, and the Law of the Commons*, Cambridge University Press, 2013

Bina Agarwal, *Gender And Green Governance* , Oxford University Press, Oxford, 2013

J. Volger, 'Environmental Issues', in J. Baylis, S. Smith and P. Owens (eds.) *Globalization of World Politics*, New York: Oxford University Press, 2011, pp. 348-362.

A. Heywood, *Global Politics*, New York: Palgrave, 2011, pp. 383-411.

N. Carter, *The Politics of Environment: Ideas, Activism, Policy*, Cambridge: Cambridge University Press, 2007, pp. 13-81.

LOCAL GOVERNANCE

Pranab Bardhan and Dilip Mookherjee, *Decentralization And Local Governance In Developing Countries: A Comparative Perspective*, MIT Press, 2006

T.R. Raghunandan, *Decentralization And Local Governments: The Indian Experience, Readings On The Economy, Polity And Society*, Orient Blackswan, 2013

Pardeep Sachdeva, *Local Government In India*, Pearson Publishers, 2011

P. de Souza, (2002) 'Decentralization and Local Government: The Second Wind of Democracy in India', in Z. Hasan, E. Sridharan and R. Sudarshan (eds.) *India's*

Living Constitution: Ideas, Practices and Controversies, New Delhi: Permanent Black, 2002

Mary John, 'Women in Power? Gender, Caste and Politics of Local Urban Governance', in *Economic and Political Weekly*, Vol. 42(39), 2007

GOOD GOVERNANCE INITIATIVES IN INDIA: BEST PRACTICES

Niraja Gopal Jayal, *Democracy and the State: Welfare, Secularism, and Development in Contemporary India*, Oxford University Press, 1999

Reetika Khera[ed.], *The Battle for Employment Guarantee*, Oxford University Press, 2011

Nalini Juneja, *Primary Education for All in the City of Mumbai: The Challenge Set By Local Actors*, International Institute For Educational Planning, UNESCO : Paris, 2001

Maxine Molyneux and Shahra Razavi, *Gender, Justice, Development, and Rights*, Oxford University Press, 2002

Jugal Kishore, *National Health Programs of India: National Policies and Legislations*, Century Publications, 2005

Jean Drèze and Amartya Sen, *India, Economic Development and Social Opportunity*, Oxford University Press, 1995

K. Lee and Mills, *The Economic Of Health In Developing Countries*, Oxford University Press, 1983

Marmar Mukhopadhyay and Madhu Parhar (eds.) *Education in India: Dynamics of Development*, Shipra Publications, 2007

K. Vijaya Kumar, *Right to Education Act 2009: Its Implementation as to Social Development in India*, Akansha Publishers, 2012

Amartya Sen and Jean Dreze, *Omnibus: Poverty and Famines, Hunger and Public Action, India- Economic Development and Social Opportunity*, Oxford University Press, 1998

Jean Dreze and Amartya Sen, *An Uncertain Glory: India And Its Contradictions*, Princeton University Press, 2013

Reetika Khera- *Rural Poverty And Public Distribution System*, EPW, Vol- XLVIII, No. 45-46, Nov 2013

Pradeep Chaturvedi , *Women And Food Security: Role Of Panchayats* , Concept Publishing House, 2002

Bidyut Mohanty, “Women, Right to Food and Role of Panchayats”, *Mainstream*, Vol. LII, No. 42, October 11, 2014

D. Crowther, *Corporate Social Responsibility*, Deep and Deep Publishers, 2008

Sanjay K. Agarwal, *Corporate Social Responsibility in India*, Sage Publishers, 2008

Pushpa Sundar, *Business & Community: The Story of Corporate Social Responsibility in India*, New Delhi: Sage Publications, 2013

4. UNITED NATIONS AND GLOBAL CONFLICTS

Course Objective: This course provides a comprehensive introduction to the most importantmultilateral political organization in international relations. It provides a detailed account of the organizational structure and the political processes of the UN, and how it has evolved since 1945, especially in terms of dealing with the major global conflicts. The course imparts a critical understanding of the UN’s performance until now and the imperatives as well as processes of reforming the organization in the context of the contemporary global system.

I. The United Nations (29 Lectures)

(a) An Historical Overview of the United Nations

(b) Principles and Objectives

(c) Structures and Functions: General Assembly; Security Council, and Economic and Social Council; the International Court of Justice and the specialised agencies (International Labour Organisation [ILO], United Nations Educational, Scientific and Cultural Organisation [UNESCO], World Health Organisation [WHO], and UN programmes and funds: United Nations Children’s Fund [UNICEF], United Nations Development Programme [UNDP], United

Nations Environment Programme [UNEP], United Nations High Commissioner for Refugees [UNHCR])

(d) Peace Keeping, Peace Making and Enforcement, Peace Building and Responsibility to Protect (e) Millennium Development Goals

II. Major Global Conflicts since the Second World War (20 Lectures)

(a) Korean War

(b) Vietnam War

(c) Afghanistan Wars

(d) Balkans: Serbia and Bosnia

III. Assessment of the United Nations as an International Organisation: Imperatives of Reforms and the Process of Reforms (11 Lectures)

Essential Readings I. The United Nations (a) An Historical Overview of the United Nations

Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations*. Delhi: Pearson Education, pp. 39-62.

Goldstein, J. and Pevehouse, J.C. (2006) *International relations*. 6th edn. New Delhi: Pearson, pp. 265-282.

Taylor, P. and Groom, A.J.R. (eds.) (2000) *The United Nations at the millennium*. London: Continuum, pp. 1-20.

Gareis, S.B. and Varwick, J. (2005) *The United Nations: an introduction*. Basingstoke: Palgrave, pp. 1-40.

Gowan, P. (2010) 'US: UN', in Gowan, P. 'A calculus of power: grand strategy in the twenty-first century. London: Verso, pp. 47-71.

Baylis, J. and Smith, S. (eds.) (2008) *The globalization of world politics. an introduction to international relations*. 4th edn. Oxford: Oxford University Press, pp. 405-422.

Thakur, R. (1998) 'Introduction', in Thakur, R. (eds.) *Past imperfect, future uncertain: The UN at Fifty*. London: Macmillan, pp. 1-14.

Basu, Rumki (2014) *United Nations: Structure and Functions of an international organization*, New Delhi, Sterling Publishers

(b) Principles and Objectives

Gareis, S.B. and Varwick, J. (2005) *The United Nations: An introduction*. Basingstoke: Palgrave, pp. 15-21.

(c) Structures and Functions: General Assembly; Security Council, and Economic and Social Council; the International Court of Justice and the specialised agencies (International Labour Organisation [ILO], United Nations Educational, Scientific and Cultural Organisation [UNESCO], World Health Organisation [WHO], and UN programmes and funds: United Nations Children's Fund [UNICEF], United Nations Development Programme [UNDP], United Nations Environment Programme [UNEP], United Nations High Commissioner for Refugees [UNHCR])

Taylor, P. and Groom, A.J.R. (eds.) (2000) *The United Nations at the millennium*. London: Continuum, pp. 21-141.

Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations*. Delhi: Pearson Education, pp. 119-135.

(d) Peace Keeping, Peace Making and Enforcement, Peace Building and Responsibility to Protect

Nambiar, S. (1995) 'UN peace-keeping operations', in Kumar, S. (eds.) *The United Nations at fifty*. New Delhi, UBS, pp. 77-94.

Whittaker, D.J. (1997) 'Peacekeeping', in *United Nations in the contemporary world*. London: Routledge, pp. 45-56.

White, B. et al. (eds.) (2005) *Issues in world politics*. 3rd edn. New York: Macmillan, pp. 113-132.

(e) Millennium Development Goals

Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations*. Delhi: Pearson Education, pp.264-266.

Sangal, P.S. (1986) 'UN, peace, disarmament and development', in Saxena, J.N. et.al. *United Nations for a better world*. New Delhi: Lancers, pp.109-114.

Baxi, U. (1986) 'Crimes against the right to development', in Saxena, J.N. et.al. *United Nations for a better world*. New Delhi: Lancers, pp.240-248.

Ghali, B.B. (1995) *An agenda for peace*. New York: UN, pp.5-38.

United Nations Department of Public Information. (2008) *The United Nations Today*. New York: UN.

II. Major Global Conflicts since the Second World War (a) Korean War

Calvocoressi, P. (2001) *World Politics: 1945-200*. 3rd edn. Harlow: Pearson Education, pp. 116-124.

Armstrong, D., Lloyd, L. and Redmond, J. (2004) *International organisations in world politics*.

3rd edn. New York: Palgrave Macmillan, pp. 42-43.

Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations*. Delhi: Pearson Education, pp. 64-65 and 172-173.

(b) Vietnam War

Calvocoressi, P. (2001) *World Politics: 1945-200*. 3rd edn. Harlow: Pearson Education, pp. 528-546.

Baylis, J. and Smith, S. (eds.) (2008) *The globalization of world politics. an introduction to international relations*. 4th edn. Oxford: Oxford University Press, pp. 562-564.

(c) Afghanistan Wars

Achcar, G. (2004) *Eastern cauldron*. New York: Monthly Review Press, pp. 29-45 and 234-241.

Achcar, G. (2003) *The clash of barbarisms: Sept. 11 and the making of the new world disorder*. Kolkata: K.P. Bachi & Co., pp. 76-81.

Prashad, V. (2002) *War against the planet*. New Delhi: Leftword, pp. 1-6. Ali, T. (ed.)

(2000) *Masters of the Universe*. London: Verso, pp. 203-216.

Calvocoressi, P. (2001) *World Politics: 1945-200*. 3rd edn. Harlow: Pearson Education, pp.570-576.

(d) Balkans: Serbia and Bosnia Ali, T. (ed.) (2000)*Masters of the Universe*. London: Verso,pp. 230-245 and 271-284.

Kaldor, M. and Vashee, B. (eds.) (1997) *New wars*. London: Wider Publications for the UN University, pp. 137-144 and 153-171.

Viotti, P.R. and Kauppi, M.V. (2007) *International relations and world politics-security,economy, identity*. 3rd edn. New Delhi: Pearson Education, pp. 470-471.

Goldstein, J.S. (2003) *International relations*. 3rd edn. Delhi: Pearson Education, pp 43-51.

Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations*. Delhi: Pearson Education, pp.24-27.

III. Political Assessment of the United Nations as an International Organisation: Imperatives of Reforms and the Process of Reforms

Roberts, A. and Kingsbury, B. (eds.) (1994) *United Nations, Divided World*. 2nd edn. Oxford: Clarendon Press, pp. 420-436.

Taylor, P. and Groom, A.J.R. (eds.) (2000) *The United Nations at the millennium*. London: Continuum, pp. 196-223 and 295-326.

Gareis, S.B. and Varwick, J. (2005) *The United Nations: An introduction*. Basingstoke: Palgrave, pp. 214-242.

Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations*. Delhi: Pearson Education, pp. 91-112.

Additional Readings

Claude, I. (1984) *Swords into plowshares: the progress and problems of internationalorganisation*. 4th edn. New York: Random House.

Dodds, F. (ed.) (1987) *The way forward: beyond the agenda 21*. London: Earthscan.

Rajan, M.S., Mani, V.S and Murthy, C.S.R. (eds.) (1987) *The nonaligned and the UnitedNations*. New Delhi: South Asian Publishers.

South Asia Human Rights Documentation Centre. (2006) *Human rights: an overview*. New Delhi: Oxford University Press.

Anan, K. (1997) *Renewing the United Nations: A Programme for Survival*. General Assembly Document: A/51/950; 14 July 1997. Available from:

<http://daccessdds.un.org/doc/UNDOC/GEN/N97/189/79/1IMG/n9718979.pdf>,Open Element (accessed on 13 October 2011).

(C)DISCIPLINE SPECIFIC ELECTIVE -4 (DSE)

1. Human Rights in a Comparative Perspective

Course objective: This course attempts to build an understanding of human rights among students through a study of specific issues in a comparative perspective. It is important for students to see how debates on human rights have taken distinct forms historically and in the contemporary world. The course seeks to anchor all issues in the Indian context, and pulls out another country to form a broader comparative frame. Students will be expected to use a range of resources, including films, biographies, and official documents to study each theme. Thematic discussion of sub-topics in the second and third sections should include state response to issues and structural violence questions.

I. Human Rights: Theory and Institutionalization (3 weeks)

- a. Understanding Human Rights: Three Generations of Rights
- b. Institutionalization: Universal Declaration of Human Rights
- c. Rights in National Constitutions: South Africa and India

II. Issues (5 weeks)

- a. Torture: USA and India
- b. Surveillance and Censorship: China and India
- c. Terrorism and Insecurity of Minorities: USA and India

III. Structural Violence (4 weeks)

- a. Caste and Race: South Africa and India
- b. Gender and Violence: India and Pakistan
- c. Adivasis/Aboriginals and the Land Question: Australia and India

READING LIST

I. Human Rights: Theory and Institutionalization

Essential Readings:

J. Hoffman and P. Graham, (2006) 'Human Rights', *Introduction to Political Theory*, Delhi, Pearson, pp. 436-458.

SAHRDC (2006) 'Introduction to Human Rights'; 'Classification of Human Rights: An Overview of the First, Second, and Third Generational Rights', in *Introducing Human Rights*, New Delhi: Oxford University Press.

The Constitution of the Republic of South Africa, Chapter 2: Bill of Rights.

The Constitution of India, Chapter 3: Fundamental Rights

II. Issues

a. Torture: USA and India

Essential Readings:

M. Lippman, (1979) 'The Protection of Universal Human Rights: The Problem of

Torture'

Universal Human Rights, Vol. 1(4), pp. 25-55

J. Lokaneeta, (2011) 'Torture in the TV Show 24: Circulation of Meanings'; 'Jurisprudence on Torture and Interrogations in India', in *Transnational Torture Law, Violence, and State Power in the United States and India*, Delhi: Orient Blackswan,

D. O'Byrne, (2007) 'Torture', in *Human Rights: An Introduction*, Delhi: Pearson, pp. 164-197.

b. Surveillance and Censorship: China and India

Essential Readings:

D. O'Byrne, (2007) 'Censorship', in *Human Rights: An Introduction*, Delhi: Pearson, pp. 106-138.

D. Lyon, (2008) Surveillance Society, Talk for Festival del Diritto, Piacenza, Italia, September 28, pp.1-7.

Fu Hualing, (2012) 'Politicized Challenges, Depoliticized Responses: Political Monitoring in China's Transitions', paper presented at a conference on States of Surveillance: Counter-Terrorism and Comparative Constitutionalism, at the University of New South Wales, Sydney, 13-14 December.

U. Singh, (2012) 'Surveillance Regimes in India', paper presented at a conference on States of Surveillance: Counter-Terrorism and Comparative Constitutionalism, at the University of New South Wales, Sydney, 13-14 December.

c. Terrorism and Insecurity of Minorities: USA and India

Essential Readings:

E. Scarry, (2010) 'Resolving to Resist', in *Rule of Law, Misrule of Men*, Cambridge: Boston Review Books, MIT, pp.1-53.

M. Ahmad, (2002) 'Homeland Insecurities: Racial Violence the Day after September 11', *Social Text*, 72, Vol. 20(3), pp. 101-116.

U. Singh, (2007) 'The Unfolding of Extraordinariness: POTA and the Construction of Suspect Communities', in *The State, Democracy and Anti-terror Laws in India*, Delhi: Sage Publications, pp.165-219

3. Structural Conflicts

a. Caste and Race: South Africa and India

Essential Readings:

A. Pinto, (2001) 'UN Conference against Racism: Is Caste Race?', in *Economic and Political Weekly*, Vol. 36(30)

D. O'Byrne, (2007) 'Apartheid', in *Human Rights: An Introduction*, Delhi: Pearson, pp. 241-262.

R. Wasserstorm, (2006), 'Racism, Sexism, and Preferential Treatment: An approach to

the Topics', in R. Goodin and P. Pettit, *Contemporary Political Philosophy: an Anthology*, Oxford: Blackwell, pp-549-574

R. Wolfrum, (1998) 'Discrimination, Xenophobia and Racism' in J. Symonides, *Human Rights: New Dimensions and Challenges*, Aldershot, Ashgate/UNESCO, pp.181-198.

b. Gender and Violence: India and Pakistan

Essential Readings:

A. Khan and R. Hussain, (2008), 'Violence Against Women in Pakistan: Perceptions and Experiences of Domestic Violence', *Asian Studies Review*, Vol. 32, pp. 239 – 253

K. Kannabiran (2012) 'Rethinking the Constitutional Category of Sex', in *Tools of Justice: Non-Discrimination and the Indian Constitution*, New Delhi, Routledge, pp.425-443

N. Menon (2012) 'Desire', *Seeing Like a Feminist*, New Delhi: Zubaan/Penguin, pp. 91-146

c. Adivasis/Aboriginals and the Land Question: Australia and India

Essential Readings:

H. Goodall, (2011) 'International Indigenous Community Study: Adivasi Indigenous People in India', in A. Cadzow and J. Maynard (eds.), *Aboriginal Studies*, Melbourne: Nelson Cengage Learning, pp.254-259.

K. Kannabiran, (2012) 'Adivasi Homelands and the Question of Liberty', in *Tools of Justice: Non-Discrimination and the Indian Constitution*, New Delhi: Routledge, pp.242-271.

N. Watson (2011) 'Aboriginal and Torres Strait Islander Identities' in A. Cadzow and J. Maynard (eds.), *Aboriginal Studies*, Melbourne: Nelson Cengage Learning, pp.43-52.

W. Fernandes (2008) 'India's Forced Displacement Policy and Practice. Is Compensation up to its Functions?', in M. Cernea and H. Mathus (eds), *Can Compensation Prevent Impoverishment? Reforming Resettlement through Investments and Benefit-Sharing*, pp.181-207, New Delhi: Oxford University Press.

Additional Readings:

A. Laws and V. Iacopino, (2002) 'Police Torture in Punjab, India: An Extended Survey', in *Health and Human Rights*, Vol. 6(1), pp. 195-210

D. O'Byrne, (2007) 'Theorizing Human Rights', in *Human Rights: An Introduction*, Delhi, Pearson, pp.26-70.

J. Morsink, (1999) *The Universal Declaration of Human Rights: Origins, Drafting and Intent*, Philadelphia: University of Pennsylvania Press, pp. ix-xiv

J. Nickel, (1987) *Making Sense of Human Rights: Philosophical Reflections on the Universal Declaration of Human Rights*, Berkeley: University of California Press.

J. Goldman, (2005) 'Of Treaties and Torture: How the Supreme Court Can Restrain the Executive', in *Duke Law Journal*, Vol. 55(3), pp. 609-640.

K. Tsutsui and C. Wotipka, (2004) Global Civil Society and the International Human Rights Movement: Citizen Participation in Human Rights International Nongovernmental Organizations, in *Social Forces*, Vol. 83(2), pp. 587-620.

L. Rabben, (2001) Amnesty International: Myth and Reality, in *Agni*, No. 54, Amnesty International Fortieth Anniversary pp. 8-28

M. Mohanty, (2010) 'In Pursuit of People's Rights: An Introduction', in M. Mohanty et al., *Weapon of the Oppressed: Inventory of People's Rights in India*, New Delhi: Danish Books, pp. 1-11

M. Cranston, (1973) *What are Human Rights?* New York: Taplinger

M. Ishay, (2004) *The History of Human Rights: From Ancient Times to the Globalization Era*, Delhi: Orient Blackswan.

R. Sharan, (2009) 'Alienation and Restoration of Tribal Land in Jharkhand in N Sundar (ed.) *Legal Grounds*, New Delhi: Oxford University Press, pp. 82-112

Text of UDHR available at <http://www.un.org/en/documents/udhr/index.shtml>

U. Baxi, (1989) 'From Human Rights to the Right to be Human: Some Heresies', in S. Kothari and H. Sethi (eds.), *Rethinking Human Rights*, Delhi: Lokayan, pp. 181-166

2. Development Process and Social Movements in Contemporary India

Course objective: Under the influence of globalization, development processes in India have undergone transformation to produce spaces of advantage and disadvantage and new geographies of power. The high social reproduction costs and dispossession of vulnerable social groups involved in such a development strategy condition new theatres of contestation and struggles. A variety of protest movements emerged to interrogate and challenge this development paradigm that evidently also weakens the democratic space so very vital to the formulation of critical consensus. This course proposes to introduce students to the conditions, contexts and forms of political contestation over development paradigms and their bearing on the retrieval of democratic voice of citizens.

I. Development Process since Independence (2 weeks)

a. State and planning

b. Liberalization and reforms

II. Industrial Development Strategy and its Impact on the Social Structure (2

weeks)

- a. Mixed economy, privatization, the impact on organized and unorganized labour
- b. Emergence of the new middle class

III. Agrarian Development Strategy and its Impact on the Social Structure (2weeks)

- a. Land Reforms, Green Revolution
- b. Agrarian crisis since the 1990s and its impact on farmers

IV. Social Movements (6 weeks)

- a. Tribal, Peasant, Dalit and Women's movements
- b. Maoist challenge
- c. Civil rights movements

READING LIST

I. The Development Process since Independence

Essential Readings:

A. Mozoomdar, (1994) 'The Rise and Decline of Development Planning in India', in T. Byres (ed.) *The State and Development Planning in India*. Delhi: Oxford University Press, pp. 73-108.

A. Varshney, (2010) 'Mass Politics or Elite Politics? Understanding the Politics of India's Economic Reforms' in R. Mukherji (ed.) *India's Economic Transition: The Politics of Reforms*, Delhi: Oxford University Press, pp 146-169.

P. Chatterjee, (2000) 'Development Planning and the Indian State', in Zoya Hasan (ed.), *Politics and the State in India*, New Delhi: Sage, pp.116-140.

P. Patnaik and C. Chandrasekhar, (2007) 'India: Dirigisme, Structural Adjustment, and the Radical Alternative', in B. Nayar (ed.), *Globalization and Politics in India*. Delhi: Oxford University Press, pp. 218-240.

P. Bardhan, (2005) 'Epilogue on the Political Economy of Reform in India', in *The Political Economy of Development in India*. 6th impression, Delhi: Oxford University Press.

T. Singh, (1979) 'The Planning Process and Public Process: a Reassessment', *R. R. Kale Memorial Lecture*, Pune: Gokhale Institute of Politics and Economics.

II. Industrial development strategy and its impact on social structure

Essential Readings:

A. Aggarwal, (2006) 'Special Economic Zones: Revisiting the Policy Debate', in *Economic and Political Weekly*, XLI (43-44), pp.4533-36.

B. Nayar (1989) *India's Mixed Economy: The Role of Ideology and its Development*, Bombay: Popular Prakashan.

F. Frankel, (2005) 'Crisis of National Economic Planning', in *India's Political Economy (1947-2004): The Gradual Revolution*, Delhi: Oxford University Press, pp. 93-340.

L. Fernandes, (2007) *India's New Middle Class: Democratic Politics in an Era of Economic Reform*, Delhi: Oxford University Press.

S. Shyam, (2003) 'Organizing the Unorganized', in *Seminar*, [Footloose Labour: A Symposium on Livelihood Struggles of the Informal Workforce, 531] pp. 47-53.

S. Chowdhury, (2007) 'Globalization and Labour', in B. Nayar (ed.) *Globalization and Politics in India*, Delhi: Oxford University Press, pp.516-526.

V. Chibber, (2005) 'From Class Compromise to Class Accommodation: Labor's Incorporation into the Indian Political Economy' in R. Ray, and M.F. Katzenstein (eds.) *Social Movements in India*, Delhi: Oxford University Press, pp 32-60.

III. Agrarian development strategy and its impact on social structure

Essential Readings:

A. Desai, (ed.), (1986) *Agrarian Struggles in India After Independence*, Delhi: Oxford University Press, pp. xi-xxxvi

F. Frankel, (1971) *India's Green Revolution: Economic Gains and Political Costs*, Princeton and New Jersey: Princeton University Press.

F. Frankel, (2009) *Harvesting Despair: Agrarian Crisis in India*, Delhi: Perspectives, pp. 161-169.

J. Harriss, (2006) 'Local Power and the Agrarian Political Economy' in Harriss, J. (ed) *Power Matters: Essays on Institutions, Politics, and Society in India*, Delhi. Oxford University Press, pp. 29-32.

K. Suri, (2006) 'Political economy of Agrarian Distress', in *Economic and Political Weekly*, XLI(16) pp. 1523-1529.

P. Joshi, (1979) *Land Reforms in India: Trends and Perspectives*, New Delhi: Allied publishers.

P. Appu, (1974) 'Agrarian Structure and Rural Development', in *Economic and Political Weekly*, IX (39), pp.70 – 75.

P. Sainath, (2010) 'Agrarian Crisis and Farmers', Suicide', *Occasional Publication* 22, New Delhi: India International Centre (IIC).

M. Sidhu, (2010) 'Globalisation vis-à-vis Agrarian Crisis in India', in R. Deshpande and S. Arora, (eds.) *Agrarian Crises and Farmer Suicides (Land Reforms in India Series)*, New Delhi: Sage, pp. 149-174.

V. Sridhar, (2006) 'Why Do Farmers Commit Suicide? The Case Study of Andhra Pradesh', in *Economic and Political Weekly*, XLI (16).

IV. Social Movements

Essential Readings:

G. Haragopal, and K. Balagopal, (1998) 'Civil Liberties Movement and the State in India', in M. Mohanty, P. Mukherji and O. Tornquist, (eds.) *People's Rights: Social Movements and the State in the Third World* New Delhi: Sage, pp. 353-371.

M. Mohanty, (2002) 'The Changing Definition of Rights in India', in S. Patel, J. Bagchi, and K. Raj (eds.) *Thinking Social Sciences in India: Essays in Honour of Alice Thorner Patel*, New Delhi: Sage.

G. Omvedt, (2012) 'The Anti-caste Movement and the Discourse of Power', in N. Jayal (ed.) *Democracy in India*, New Delhi: Oxford India Paperbacks, sixth impression, pp.481-508.

P. Ramana, (2011) 'India's Maoist Insurgency: Evolution, Current Trends and Responses', in M. Kugelman (ed.) *India's Contemporary Security Challenges*, Woodrow Wilson International Centre for Scholars Asia Programme, Washington D.C., pp.29-47.

A.Ray, (1996) 'Civil Rights Movement and Social Struggle in India', in *Economic and Political Weekly*, XXI (28). pp. 1202-1205.

A.Roy, (2010) 'The Women's Movement', in N.Jayal and P. Mehta (eds.) *The Oxford Companion to Politics in India*, New Delhi: Oxford University Press, pp.409-422.

N. Sundar, (2011) 'At War with Oneself: Constructing Naxalism as India's Biggest Security Threat', in M. Kugelman (ed.) *India's Contemporary Security Challenges*, Woodrow Wilson International Centre for Scholars Asia Programme, Washington D.C., pp.46-68.

M. Weiner, (2001) 'The Struggle for Equality: Caste in Indian Politics', in A.Kohli. (ed.) *The Success of India's Democracy*, Cambridge: CUP, pp.193-225.

S. Sinha, (2002) 'Tribal Solidarity Movements in India: A Review', in G. Shah. (ed.) *Social Movements and the State*, New Delhi: Sage, pp. 251-266.

Additional Readings:

S. Banerjee, (1986) 'Naxalbari in Desai', in A.R. (ed.) *Agrarian Struggles in India After Independence*. Delhi: Oxford University Press, pp.566-588.

B. Nayar, (ed.), (2007) *Globalization and Politics in India*. Delhi: Oxford University Press. S. Roy and K. Debal, (2004) *Peasant Movements in Post-*

Colonial India: Dynamics of Mobilization and Identity, Delhi: Sage.

G. Omvedt, (1983) *Reinventing Revolution, New Social Movements and the Socialist Tradition in India*, New York: Sharpe.

G. Shah, (ed.), (2002) *Social Movements and the State*. New Delhi: Sage Publications.

G. Shah, (2004) *Social Movements in India: A Review of Literature*, New Delhi: Sage Publications.

G. Rath, (ed.), (2006) *Tribal development in India: The Contemporary Debate*, New Delhi: Sage Publications.

J. Harris, (2009) *Power Matters: Essays on Institutions, Politics, and Society in India*. Delhi: Oxford University press.

K. Suresh, (ed.), (1982) *Tribal Movements in India*, Vol I and II, New Delhi: Manohar (emphasis on the introductory chapter).

M. Mohanty, P. Mukherji and O. Tornquist, (1998) *People's Rights: Social Movements and the State in the Third World*. New Delhi: Sage Publications.

M. Rao, (ed.), (1978) *Social Movements in India*, Vol. 2, Delhi: Manohar.

N. Jayal, and P. Mehta, (eds.), (2010) *The Oxford Companion to Politics in India*, Delhi: Oxford University Press.

P. Bardhan, (2005) *The Political Economy of Development in India*, 6th impression, Delhi: Oxford University Press.

R. Mukherji, (ed.), (2007) *India's Economic Transition: The Politics of Reforms*, Delhi: Oxford University Press.

R. Ray and M. Katzenstein, (eds.), (2005) *Social Movements in India*, Delhi: Oxford University Press.

S. Chakravarty, (1987) *Development Planning: The Indian Experience*, Delhi: Oxford University Press.

3. India's Foreign Policy in a globalizing world

Course objective: This course's objective is to teach students the domestic sources and the structural constraints on the genesis, evolution and practice of India's foreign policy. The endeavour is to highlight integral linkages between the 'domestic' and the 'international' aspects of India's foreign policy by stressing on the shifts in its domestic identity and the corresponding changes at the international level. Students will be instructed on India's shifting identity as a postcolonial state to the contemporary dynamics of India attempting to carve its identity as an 'aspiring power'. India's evolving relations with the superpowers during the Cold War and after, bargaining

strategy and positioning in international climate change negotiations, international economic governance, international terrorism and the United Nations facilitate an understanding of the changing positions and development of India's role as a global player since independence.

I. India's Foreign Policy: From a Postcolonial State to an Aspiring Global Power (7 lectures)

II. India's Relations with the USA and USSR/Russia (9

lectures) III. India's Engagements with China (6 lectures)

IV. India in South Asia: Debating Regional Strategies (9 lectures)

V. India's Negotiating Style and Strategies: Trade, Environment and Security Regimes (11 lectures)

VI. India in the Contemporary Multipolar World (6 lectures)

READING LIST

I. India's Foreign Policy: From a Postcolonial State to an Aspiring Global Power

Essential Readings:

S. Ganguly and M. Pardesi, (2009) 'Explaining Sixty Years of India's Foreign Policy', in *IndiaReview*, Vol. 8 (1), pp. 4–19.

Ch. Ogden, (2011) 'International 'Aspirations' of a Rising Power', in David Scott (ed.), *Handbook of India's International Relations*, London: Routledge, pp.3-31

W. Anderson, (2011) 'Domestic Roots of Indian Foreign Policy', in W. Anderson, *Trusts with Democracy: Political Practice in South Asia*, Anthem Press: University Publishing Online.

Additional Reading:

J. Bandhopadhyaya, (1970) *The Making Of India's Foreign Policy*, New Delhi: Allied Publishers.

II: India's Relations with the USA and USSR/Russia

Essential Readings:

S. Mehrotra, (1990) 'Indo-Soviet Economic Relations: Geopolitical and Ideological Factors', in *India and the Soviet Union: Trade and Technology Transfer*, Cambridge University Press: Cambridge, pp. 8-28.

R. Hathaway, (2003) 'The US-India Courtship: From Clinton to Bush', in S. Ganguly (ed.), *India as an Emerging Power*, Frank Cass: Portland.

A. Singh, (1995) 'India's Relations with Russia and Central Asia', in *International Affairs*, Vol. 71 (1): 69-81.

M. Zafar, (1984), 'Chapter 1', in *India and the Superpowers: India's Political Relations with the Superpowers in the 1970s*, Dhaka, University Press.

Additional Readings:

H. Pant, (2008) 'The U.S.-India Entente: From Estrangement to Engagement', in H. Pant, *Contemporary Debates in Indian Foreign and Security Policy: India Negotiates Its Rise in the International System*, Palgrave Macmillan: London.

D. Mistry, (2006) 'Diplomacy, Domestic Politics, and the U.S.-India Nuclear Agreement', in *Asian Survey*, Vol. 46 (5), pp. 675-698.

III: India's Engagements with China

Essential Readings:

H. Pant, (2011) 'India's Relations with China', in D. Scott (ed.), *Handbook of India's International Relations*, London: Routledge, pp. 233-242.

A. Tellis and S. Mirski, (2013) 'Introduction', in A. Tellis and S. Mirski (eds.), *Crux of Asia: China, India, and the Emerging Global Order*, Carnegie Endowment for International Peace: Washington.

S. Raghavan, (2013) 'Stability in Southern Asia: India's Perspective', in A. Tellis and S. Mirski (eds.), *Crux of Asia: China, India, and the Emerging Global Order*, Carnegie Endowment for International Peace: Washington.

Additional Reading:

Li Li, (2013) 'Stability in Southern Asia: China's Perspective', in A. Tellis and S. Mirski (eds.), *Crux of Asia: China, India, and the Emerging Global Order*, Carnegie Endowment for International Peace: Washington.

IV: India in South Asia: Debating Regional Strategies

Essential Readings:

S. Muni, (2003) 'Problem Areas in India's Neighbourhood Policy', in *South Asian Survey*, Vol. 10 (2), pp. 185-196.

S. Cohen, (2002) *India: Emerging Power*, Brookings Institution Press. V. Sood, (2009) 'India and regional security interests', in Alyssa Ayres and C. Raja Mohan (eds), *Power realignments in Asia: China, India, and the United States*, New Delhi: Sage.

Additional Readings:

M. Pardesi, (2005) 'Deducing India's Grand Strategy of Regional Hegemony from Historical and Conceptual Perspectives', IDSS Working Paper, 76, Available at <http://www.rsis.edu.sg/publications/WorkingPapers/WP76.pdf>, Accessed: 19.04.2013.

D. Scott, (2009) 'India's "Extended Neighbourhood" Concept: Power Projection for a Rising Power', in *India Review*, Vol. 8 (2), pp. 107-143

V: India's Negotiating Style and Strategies: Trade, Environment and Security Regimes

Essential Readings:

S. Cohen, (2002) 'The World View of India's Strategic Elite', in S. Cohen, *India: Emerging Power*, Brookings Institution Press, pp. 36-65.

A. Narlikar, (2007) 'All that Glitters is not Gold: India's Rise to Power', in *Third World Quarterly*, Vol. 28 (5) pp. 983 – 996.

N. Dubash, (2012) 'The Politics of Climate Change in India: Narratives of Enquiry and Co-benefits', Working Paper, New Delhi: Centre for Policy Research.

N. Jayaprakash, (2000) 'Nuclear Disarmament and India', in *Economic and Political Weekly*, Vol. 35 (7), pp. 525-533.

Additional Readings:

P. Bidwai, (2005) 'A Deplorable Nuclear Bargain', in *Economic and Political Weekly*, Vol. 40 (31), pp. 3362-3364.

A. Anant, (2011) 'India and International Terrorism', in D. Scott (ed.), *Handbook of India's International Relations*, London: Routledge, pp. 266-277.

VI: India in the Contemporary Multipolar World

Essential Readings:

R. Rajgopalan and V. Sahni (2008), 'India and the Great Powers: Strategic Imperatives, Normative Necessities', in *South Asian Survey*, Vol. 15 (1), pp. 5–32.

C. Mohan, (2013) 'Changing Global Order: India's Perspective', in A. Tellis and S. Mirski (eds.), *Crux of Asia: China, India, and the Emerging Global Order*, Carnegie Endowment for International Peace: Washington.

A. Narlikar, (2006) 'Peculiar Chauvinism or Strategic Calculation? Explaining the Negotiating Strategy of a Rising India', in *International Affairs*, Vol. 82 (1), pp. 59-76.

Additional Reading:

P. Mehta, (2009) 'Still Under Nehru's Shadow? The Absence of Foreign Policy Frameworks in India', in *India Review*, Vol. 8 (3), pp. 209–233.

Online Resources:

Government of India's Ministry of External Relations website at <http://www.mea.gov.in/> and specially its library which provides online resources at <http://mealib.nic.in/>

The Council of Foreign Relations has a regularly updated blog on India's foreign policy: <http://www.cfr.org/region/india/ri282> Centre for Policy Research's blog on IR and strategic affairs though it is not exclusively on India's foreign policy. <http://www.cprindia.org/blog/international-relations-and-security-blog>

Institute for Defence Studies and Analyses: <http://www.idsa.in/>
Research and Information System: www.ris.org.in/

Indian Council of World Affairs: www.icwa.in/
Institute of Peace and Conflict Studies:
www.ipcs.org/

Indian Council for Research on International Economic Relations: www.icrier.org/

4. Women, Power and Politics

Course objective: This course opens up the question of women's agency, taking it beyond 'women's empowerment' and focusing on women as radical social agents. It attempts to question the complicity of social structures and relations in gender inequality. This is extended to cover new forms of precarious work and labour under the new economy. Special attention will be paid to feminism as an approach and outlook. The course is divided into broad units, each of which is divided into three sub-units.

I. Groundings (6 weeks)

1. Patriarchy (2 weeks)
 - a. Sex-Gender Debates
 - b. Public and Private
 - c. Power
2. Feminism (2 weeks)
3. Family, Community, State (2 weeks)
 - a. Family
 - b. Community
 - c. State

II. Movements and Issues (6 weeks)

1. History of the Women's Movement in India (2 weeks)
2. Violence against women (2 weeks)
3. Work and Labour (2 weeks)
 - a. Visible and Invisible work
 - b. Reproductive and care work
 - c. Sex work

Reading List

I. Groundings

1. Patriarchy

Essential Readings:

T. Shinde, (1993) 'Stree Purusha Tulna', in K. Lalitha and Susie Tharu (eds), *Women Writing in India*, New Delhi, Oxford University Press, pp. 221-234

U. Chakravarti, (2001) 'Pitrasatta Par ek Note', in S. Arya, N. Menon & J. Lokneeta (eds.)

Naarivaadi Rajneeti: Sangharsh evam Muddey, University of Delhi: Hindi Medium Implementation Board, pp.1-7

a. Sex Gender Debates

Essential Reading:

V. Geetha, (2002) *Gender*, Kolkata, Stree, pp. 1-

20 b. Public and Private

Essential Reading:

M. Kosambi, (2007) *Crossing the Threshold*, New Delhi, Permanent Black, pp. 3-10; 40-46

c. Power

Essential Reading:

N. Menon, (2008) 'Power', in R. Bhargava and A. Acharya (eds), *Political*

Theory: An Introduction, Delhi: Pearson, pp.148-157

2. Feminism

Essential Readings:

B. Hooks, (2010) 'Feminism: A Movement to End Sexism', in C. Mc Cann and S. Kim (eds), *The Feminist Reader: Local and Global Perspectives*, New York: Routledge, pp. 51-57

R. Delmar, (2005) 'What is Feminism?', in W. Kolmar & F. Bartkowski (eds) *Feminist Theory: A Reader*, pp. 27-37

3. Family, Community and State

a. Family

Essential Readings:

R. Palriwala, (2008) 'Economics and Patriline: Consumption and Authority within the Household' in M. John. (ed) *Women's Studies in India*, New Delhi: Penguin, pp. 414-423

b. Community

Essential Reading:

U. Chakravarti, (2003) *Gendering Caste through a Feminist Lens*, Kolkata, Stree, pp. 139-159.

c. State

Essential Reading:

C. MacKinnon, 'The Liberal State' from *Towards a Feminist Theory of State*, Available at <http://fair-use.org/catharine-mackinnon/toward-a-feminist-theory-of-the-state/chapter-8>, Accessed: 19.04.2013.

Additional Readings:

K. Millet, (1968) *Sexual Politics*, Available at <http://www.marxists.org/subject/women/authors/millett-kate/sexual-politics.htm>, Accessed: 19.04.2013.

N. Menon (2008) 'Gender', in R. Bhargava and A. Acharya (eds), *Political Theory: An Introduction*, New Delhi: Pearson, pp. 224-233

R. Hussain, (1988) 'Sultana's Dream', in *Sultana's Dream and Selections from the Secluded Ones – translated by Roushan Jahan*, New York: The Feminist Press

S. Ray 'Understanding Patriarchy', Available at http://www.du.ac.in/fileadmin/DU/Academics/course_material/hrge_06.pdf, Accessed: 19.04.2013.

S. de Beauvoir (1997) *Second Sex*, London: Vintage.

Saheli Women's Centre, (2007) *Talking Marriage, Caste and Community: Women's Voices from Within*, New Delhi: monograph

II. Movements and Issues

1. History of Women's Movement in India

Essential Readings:

I. Agnihotri and V. Mazumdar, (1997) 'Changing the Terms of Political Discourse: Women's Movement in India, 1970s-1990s', *Economic and Political Weekly*, 30 (29), pp. 1869-1878.

R. Kapur, (2012) 'Hecklers to Power? The Waning of Liberal Rights and Challenges to Feminism in India', in A. Loomba *South Asian Feminisms*, Durham and London: Duke University Press, pp. 333-355

2. Violence against Women

Essential Readings:

N. Menon, (2004) 'Sexual Violence: Escaping the Body', in *Recovering Subversion*, New Delhi: Permanent Black, pp. 106-165

3. Work and Labour

a. Visible and Invisible work

Essential Reading:

P. Swaminathan, (2012) 'Introduction', in *Women and Work*, Hyderabad: Orient Blackswan, pp.1-17

b. Reproductive and care work

Essential Reading:

J. Tronto, (1996) 'Care as a Political Concept', in N. Hirschmann and C. Stephano, *Revisioning the Political*, Boulder: Westview Press, pp. 139-156

c. Sex work

Essential Readings:

Darbar Mahila Samanwaya Committee, Kolkata (2011) 'Why the so-called Immoral

Traffic (Preventive) Act of India Should be Repealed', in P. Kotiswaran, *Sex Work*, New Delhi, Women Unlimited, pp. 259-262

N. Jameela, (2011) 'Autobiography of a Sex Worker', in P. Kotiswaran, *Sex Work*, New Delhi: Women Unlimited, pp. 225-241

Additional Readings:

C. Zetkin, 'Proletarian Woman', Available at <http://www.marxists.org/archive/zetkin/1896/10/women.htm>, Accessed: 19.04.2013.

F. Engels, *Family, Private Property and State*, Available at <http://readingfromtheleft.com/PDF/EngelsOrigin.pdf>, Accessed: 19.04.2013.

J. Ghosh, (2009) *Never Done and Poorly Paid: Women's Work in Globalising India*, Delhi: Women Unlimited

Justice Verma Committee Report, Available at <http://nlrd.org/womens-rights-initiative/justice-verma-committee-report-download-full-report>, Accessed: 19.04.2013.

N. Gandhi and N. Shah, (1992) *Issues at Stake – Theory and Practice in the Women's Movement*, New Delhi: Kali for Women.

V. Bryson, (1992) *Feminist Political Theory*, London: Palgrave-MacMillan, pp. 175-180; 196-200

M. Mies, (1986) 'Colonisation and Housewifisation', in *Patriarchy and Accumulation on a World Scale* London: Zed, pp. 74-111, Available at

<http://caringlabor.wordpress.com/2010/12/29/maria-mies-colonization-and-housewifization/>, Accessed: 19.04.2013.

R. Ghadially, (2007) *Urban Women in Contemporary India*, Delhi: Sage Publications.

S. Brownmiller, (1975) *Against our Wills*, New York: Ballantine.

Saheli Women's Centre (2001) 'Reproductive Health and Women's Rights, Sex Selection and feminist response' in S Arya, N. Menon, J. Lokneeta (eds), *Nariwadi Rajneeti*, Delhi, pp. 284-306

V. Bryson (2007) *Gender and the Politics of Time*, Bristol: Polity Press

Readings in Hindi:

D. Mehrotra, (2001) *Bhartiya Mahila Andolan: Kal, Aaj aur Kal*, Delhi: Books for Change

G. Joshi, (2004) *Bharat Mein Stree Asmaanta: Ek Vimarsh*, University of Delhi: Hindi

Medium Implementation Board

N. Menon (2008) 'Power', in R. Bhargava and A. Acharya (eds) *Political Theory: An Introduction*, New Delhi: Pearson

N. Menon (2008) 'Gender', in R. Bhargava and A. Acharya (eds) *Political Theory: An Introduction*, New Delhi, Pearson

R. Upadhyay and S. Upadhyay (eds.) (2004) *Aaj ka Stree Andolan*, Delhi: Shabd Sandhan.

S. Arya, N. Menon and J. Lokneeta (eds.) (2001) *Naarivaadi Rajneeti: Sangharsh evam Muddey*, University of Delhi: Hindi Medium Implementation Board.

(D) Ability Enhancement (Skill Based)-2

1. Legislative Practices and Procedures

Course objective: To acquaint the student broadly with the legislative process in India at various levels, introduce them to the requirements of peoples' representatives and provide elementary skills to be part of a legislative support team and expose them to real life legislative work. These will be, to understand complex policy issues, draft new legislation, track and analyse ongoing bills, make speeches and floor statements, write articles and press releases, attend legislative meetings, conduct meetings with various stakeholders, monitor media and public developments, manage constituent relations and handle inter-office communications. It will also deepen their understanding and appreciation of the political process and indicate the possibilities of making it work for democracy.

I. Powers and functions of people's representative at different tiers of governance (6 lectures)

Members of Parliament, State legislative assemblies, functionaries of rural and urban local self - government from Zila Parishad, Municipal Corporation to Panchayat/ward.

II. Supporting the legislative process (2 lectures)

How a bill becomes law, role of the Standing committee in reviewing a bill, legislative consultants, the framing of rules and regulations.

III. Supporting the Legislative Committees (6 lectures)

Types of committees, role of committees in reviewing government finances, policy, programmes, and legislation.

IV. Reading the Budget Document (6 lectures)

Overview of Budget Process, Role of Parliament in reviewing the Union Budget, Railway Budget, Examination of Demands for Grants of Ministries, Working of Ministries.

V. Support in media monitoring and communication (4 lectures)

Types of media and their significance for legislators; Basics of communication in print and electronic media.

READING LIST

I. Powers and functions of people's representative at different tiers of governance

Essential Readings:

M. Madhavan, and N. Wahi, (2008) *Financing of Election Campaigns* PRS, Centre for Policy Research, New Delhi, Available at: http://www.prsindia.org/uploads/media/conference/Campaign_finance_brief.pdf, Accessed: 19.04.2013

S. Vanka, (2008) *Primer on MPLADS*, Centre for Policy Research, New Delhi, Available at <http://www.prsindia.org/parliamenttrack/primers/mplads-487/>, Accessed: 19.04.2013

H. Kalra, (2011) *Public Engagement with the Legislative Process* PRS, Centre for Policy Research, New Delhi, Available at: <http://www.prsindia.org/administrator/uploads/media/Conference%202011/Public%20Engagement%20with%20the%20Legislative%20Process.pdf>, Accessed: 19.04.2013.

Government of India (Lok Sabha Secretariat), (2009) *Parliamentary Procedures (Abstract Series)*, Available at <http://164.100.47.132/LssNew/abstract/index.aspx>, Accessed: 19.04.2013

II. Supporting the legislative process

Essential Readings:

Government of India, (Ministry of Parliamentary Affairs), (2009) *Legislation, Parliamentary Procedure*, Available at http://mpa.nic.in/Manual/Manual_English/Chapter/chapter-09.htm, Accessed: 19.04.2013

Government of India, (Ministry of Parliamentary Affairs) (2009), *Subordinate Legislation, Parliamentary Procedure*, Available at: http://mpa.nic.in/Manual/Manual_English/Chapter/chapter-11.htm Accessed: 19.04.2013

D. Kapur and P. Mehta, (2006) 'The Indian Parliament as an Institution of Accountability', *Democracy, Governance and Human Rights*, Programme Paper Number 23, United Nations Research Institute for Social Development, Available at: [http://www.unrisd.org/UNRISD/website/document.nsf/240da49ca467a53f80256b4f005ef245/8e6fc72d6b546696c1257123002fccc/\\$FILE/KapMeht.pdf](http://www.unrisd.org/UNRISD/website/document.nsf/240da49ca467a53f80256b4f005ef245/8e6fc72d6b546696c1257123002fccc/$FILE/KapMeht.pdf), Accessed: 19.04.2013

O. Agarwal and T. Somanathan, (2005) 'Public Policy Making in India: Issues and Remedies', Available at:

[http://www.cprindia.org/admin/paper/Public_Policy_Making_in_India_14205_TV_SO MANA THAN.pdf](http://www.cprindia.org/admin/paper/Public_Policy_Making_in_India_14205_TV_SO_MANA_THAN.pdf), Accessed: 19.04.2013

B. Debroy, (2001) 'Why we need law reform' *Seminar* January.

III. Supporting the Legislative Committees

Essential Readings:

P. Mehta, 'India's Unlikely Democracy: The Rise of Judicial Sovereignty', *Journal of Democracy*, Vol. 18(2), pp.70-83.

Government link: <http://loksabha.nic.in/>; <http://rajyasabha.nic.in/>; <http://mpa.nic.in/>

K. Sanyal, (2011) *Strengthening Parliamentary Committees* PRS, Centre for Policy Research, New Delhi, Available at: [http://www.prsindia.org/administrator/uploads/media/Conference%202011/Strengthening %20Parliamentary%20Committees.pdf](http://www.prsindia.org/administrator/uploads/media/Conference%202011/Strengthening%20Parliamentary%20Committees.pdf), Accessed: 19.04.2013

IV. Reading the Budget Document

Essential Readings

A. Celestine, (2011) *How to Read the Union Budget* PRS, Centre for Policy Research, New Delhi, Available at <http://www.prsindia.org/parliamenttrack/primers/how-to-read-the-union-budget-1023/>, Accessed: 19.04.2013

V. Support in media monitoring and communication

Essential Reading:

G. Rose, (2005) 'How to Be a Media Darling: There's No getting Away From It', *State Legislatures*, Vol. 31(3).

Additional Readings:

N. Jayal and P. Mehta (eds), (2010) *The Oxford Companion to Politics in India*, Oxford University Press: New Delhi,

B. Jalan, (2007) *India's Politics*, New Delhi: Penguin.

Initiating Discussion on Various Type of Debates in *Rajya Sabha*, Available at http://rajyasabha.nic.in/rsnew/publication_electronic/75RS.pdf, Accessed: 19.04.2013.

Praxis of Parliamentary Committees: Recommendations of Committee on Rules published by *Rajya Sabha*, available at: http://rajyasabha.nic.in/rsnew/publication_electronic/Praxis.pdf, Accessed: 19.04.2013.

S.J. Phansalkar, *Policy Research in the Indian Context*

N. Singh, 'Some Economic Consequences of India's Institutions of Governance: A Conceptual Framework', Available at: http://econ.ucsc.edu/faculty/boxjenk/wp/econ_conseq_2003_rev2.pdf, Accessed: 19.04.2013.

R. Guha, (2007), *India After Gandhi*, Macmillan: New Delhi.
Parliamentary Procedures (Abstract Series) published by *Lok Sabha*, Available at <http://164.100.47.132/LssNew/abstract/index.aspx>, website: www.loksabha.nic.in, Accessed: 19.04.2013.

Committees of Lok Sabha, Available at: http://164.100.47.134/committee/committee_list.aspx Accessed: 19.04.2013.

Ethics Committee of Rajya Sabha, available at: http://rajyasabha.nic.in/rsnew/publication_electronic/ethics_committee.pdf, Accessed: 19.04.2013.

Committees of Parliament, Parliamentary Procedure, Ministry of Parliamentary Affairs, Available at http://mpa.nic.in/Manual/Manual_English/Chapter/chapter-12.htm, Accessed: 19.04.2013.

Nomination of Members of Parliament on Committees, Councils, Boards and Commissions, etc., set up by the Government, Ministry of Parliament Affairs, Available at http://mpa.nic.in/Manual/Manual_English/Chapter/chapter-14.htm, Accessed: 19.04.2013.

Parliamentary Procedures: Problems and Perspectives 2009 Published by *Rajya Sabha*, Available at http://rajyasabha.nic.in/rsnew/publication_electronic/parl_procedure2009.pdf, Accessed: 19.04.2013.

Primer on the Budget Process published by PRS, Available at <http://www.prsindia.org/parliamenttrack/primers/the-budget-process-484/>, Accessed: 19.04.2013.

Background note on Financial Oversight by Parliament published by PRS, Available at <http://www.prsindia.org/administrator/uploads/media/Conference%20note/Conference%20note%20on%20financial%20oversight.pdf>, Accessed: 19.04.2013.

P. Keefer and S Khemani, (2009) 'When Do Legislators Pass On "Pork"? The Determinants of Legislator Utilization of a Constituency Development Fund in India', in *World Bank Policy Research Working Paper Series* 4929, pp. 1-45, Available at SSRN: <http://ssrn.com/abstract=1405160>, Accessed: 19.04.2013.

Parliamentary Procedures (Abstract Series), *Lok Sabha*, Available at <http://164.100.47.132/LssNew/abstract/process.htm>
Budget, Parliamentary Procedure, Ministry of Parliamentary Affairs, available at http://mpa.nic.in/Manual/Manual_English/Chapter/chapter-07.htm, Accessed: 19.04.2013. <http://mpa.nic.in/mpahandbook/parlia13.pdf>

2. Peace and Conflict Resolution

Course Objective: The objective of an undergraduate application course for common students in Peace and Conflict Studies will cover in-depth knowledge of conflict analysis, conflict resolution, conflict prevention, as well as the historical and cultural context of organized violence. Peace and Conflict Resolution addresses the sources of war, social oppression and violence and the challenges of promoting peace and justice internationally and domestically. It also introduces more equitable, cooperative and nonviolent methods that can be used to transform unjust, violent or oppressive world situations. This course provides students with an overview of the Peace and Conflict Studies discipline, including key concepts and related theories. The course is designed to familiarize students with the historical background of various peace movements, to analyze principles used to resolve conflict, and to provide a view of how peace and conflict resolution are being pursued today. The course will also cover extensive understanding of current research and development within the field of peace and conflict studies and perspective of the environment, gender, migration, and ethnicity.

Unit-1 International Peace and Conflict Resolution: Sources of War: International and Domestic Issues and Trends

Unit-2-What is Conflict: Introduction to International Conflict Resolution

Unit-3 International Conflict Resolution Theory: Models developed by Johan Galtung, Joseph Montville, Morton Deutsch, William Zartman, Levy Jack

Unit-4-Conflict resolution: Back ground of Various Peace Movements and Concepts, Principles used to resolve conflict

Unit-5-Cross-boarder relationships between the world's peaceful and war-torn zones (migration and information flows, economic transactions, international rules and regulations, normative concepts and political decisions)

Unit-6 -Conflict Transformation: is Peace Possible? Resolve problems through conflict analyses and instrumentation of peace concepts

Unit-7 -Current perspective of peace and conflict resolution: Grass-roots level perspective on war and Peace

READING LIST

Essential Readings

International Conflict Resolution: Sources of War: International and Domestic Issues and Trends

Kriesberg, Louis, *Constructive Conflicts: From Escalation to Resolution*, Rowman & Littlefield, Maryland, 1998, pp. 58-150

Starkey, Boyer, and Wilkenfield, *Negotiating a Complex World*. Rowman & Littlefield, Maryland, 1999, pp. 1-74

Desirable Readings:

Zartman, William (ed.), *Collapsed States: The Disintegration and Restoration of Legitimate Authority*, Reiner, Boulder, 1995, pp. 1-14 and 267-273

Zartman, William & Touval, Saadia "International Mediation in the Post-Cold War Era", in Crocker et al., *Managing Global Chaos*, USIP, 1996, pp. 445-461

Essential Readings

What is Conflict: Introduction to International Conflict Resolution

Zartman, William, "Dynamics and Constraints in Negotiations in Internal Conflicts", in Zartman, William (ed), *Elusive Peace: Negotiating an End to Civil Wars*, The Brookings Institution, Washington, 1995, pp. 3-29

Desirable Readings

Zartman, William (ed.), *Collapsed States: The Disintegration and Restoration of Legitimate Authority*, Reiner, Boulder, 1995, pp. 1-14 and 267-273

Zartman, William & Touval, Saadia "International Mediation in the Post-Cold War Era", in Crocker et al., *Managing Global Chaos*, USIP, 1996, pp. 445-461

Essential Readings

International Conflict Resolution Theory: Models developed by Johan Galtung, Joseph Montville, Morton Deutsch, William Zartman, Levy Jack

Levy, Jack, "Contending Theories of International Conflict: A Levels-of-Analysis Approach" in Crocker et al, *Managing Global Chaos*, USIP, 1995, pp. 3-24

Carr, Edward H., "Realism and Idealism," Richard Betts (ed), *Conflict After the Cold War*, Boston: Simon & Schuster, 1994.

Desirable Readings

Carr, Edward H., "Realism and Idealism," Richard Betts (ed), Conflict After the Cold War, Boston: Simon & Schuster, 1994.

Waltz, Kenneth N., "Structural Causes and Economic Effects," Richard Betts (ed), Conflict After the Cold War, Boston: Simon & Schuster, 1994.

Conflict resolution: Back ground of Various Peace Movements and Concepts, Principles used to resolve conflict

Essential Readings

Hampson, Fen Osler, Nurturing Peace, USIP, 1996, pp. 3-25

Galtung, Johan, There Are Alternatives: Four Roads to Peace and Security, Nottingham, Spokesman, 1984, pp. 162-205

Desirable Readings

Galtung, Johan, Peace by Peaceful Means: Peace and conflict, Development and Civilization, Sage, London, 1996, pp. 9-114

Galtung, Johan, The True Worlds: A Transnational Perspective, New York, Free Press, 1980, pp. 107-149

Cross-boarder relationships between the world's peaceful and war-torn zones (migration and information flows, economic transactions, international rules and regulations, normative concepts and political decisions)

Essential Readings

Kelman, Herbert C., "Interactive Problem Solving", in Fisher, Ronald J. (ed.) Interactive Conflict Resolution, Syracuse University Press, 1997, pp. 56-74

Kritz, Neil J., "The Rule of Law in the Post-conflict Phase: Building a Stable Peace", in Crocker et al, Managing Global Chaos, USIP, 1996, pp. 587-606

Desirable Readings

Galtung, Johan, "The Basic Need Approach", in Human Needs: a Contribution to the Current Debate, Verlag, Cambridge, 1980, pp. 55-126

Saunders, Harold H., A Public Peace Process: Sustained Dialogue to Transform Racial and Ethnic Conflicts, New York, 1999, pp. 1-80

Conflict Transformation: is Peace Possible: Resolve problems through conflict analyses and instrumentation of peace concepts

Essential Readings

Galtung, Johan, There Are Alternatives: Four Roads to Peace and Security, Nottingham, Spokesman, 1984, pp. 162-205

Galtung, Johan, "The Basic Need Approach", in Human Needs: a Contribution to the Current Debate, Verlag, Cambridge, 1980, pp. 55-126

Desirable Readings

Galtung, Johan, Peace by Peaceful Means: Peace and conflict, Development and Civilization, Sage, London, 1996, pp. 9-114

Galtung, Johan, The True Worlds: A Transnational Perspective, New York, Free Press, 1980, pp. 107-149

Current perspective of peace and conflict resolution: Grass-roots level perspective on war and Peace: Grass-roots level perspective on war and Peace

Essential Readings

Deutsch, Morton, The Resolution of Conflict: Constructive and Destructive Processes, New Haven, Yale University Press, 1973, pp. 1-123

Galtung, Johan, Peace by Peaceful Means: Peace and conflict, Development and Civilization, Sage, London, 1996, pp. 9-114

Desirable Readings

Zartman, William, "Dynamics and Constraints in Negotiations in Internal Conflicts", in Zartman, William (ed), Elusive Peace: Negotiating an End to Civil Wars, The Brookings Institution, Washington, 1995, pp. 3-29

Kelman, Herbert C., "Interactive Problem Solving", in Fisher, Ronald J. (ed.) Interactive Conflict Resolution, Syracuse University Press, 1997, pp. 56-74

Proposed Syllabus and Scheme of Examination

For

B.A.(Regular/Pass)

POLITICAL SCIENCE

Submitted

To

University Grants Commission

New Delhi

Under Choice Based Credit System

April 2016

CHOICE BASED CREDIT SYSTEM

B.A. POLITICAL SCIENCE

LIST OF PAPERS AND COURSES

A) DISCIPLINE SPECIFIC CORE COURSE (4)

- 1.Paper I- Introduction to Political Theory**
- 2.Paper-II - Indian Government and Politics**
- 3.Paper-III- Comparative Government and Politics**
- 4.Paper-IV- Introduction to International Relations**

B) CORE/ FOUNDATION (Compulsory) (4)

ENGLISH (2)

MIL (2)

C)Ability Enhancement (Compulsory) (2)

- **ENGLISH/MIL (Communication)**
- **ENVIRONMENTAL SCIENCE**

C) Ability Enhancement (Elective) Skill Based (4)

- 1) Legislative Support**
- 2) Public Opinion and Survey Research**
- 3) Democratic Awareness with Legal Literacy**
- 4) Conflict and Peace Building**

D) Discipline Specific Elective Course(2)

- 1) Themes in Comparative Political Theory**
- 2) Administration and Public Policy: Concepts and Theories**
- 3) Democracy and Governance**
- 4) Understanding Globalization**

E) Generic Elective -2 (Interdisciplinary): (2)

- 1. Reading Gandhi**
- 2. Human Rights Gender and Environment**

CHOICE BASED CREDIT SYSTEM
SYLLABI AND READING LIST
B.A. POLITICAL SCIENCE
DISCIPLINE SPECIFIC CORE COURSE(4)

Paper I- Introduction to Political Theory

Course Objective: This course aims to introduce certain key aspects of conceptual analysis in political theory and the skills required to engage in debates surrounding the application of the concepts.

1. a. What is Politics?
b. What is Political Theory and what is its relevance? (11 lectures)
2. Concepts: Democracy, Liberty, Equality, Justice, Rights, Gender, Citizenship, Civil Society and State (36 lectures)
3. Debates in Political Theory:
4. Is democracy compatible with economic growth?
5. On what grounds is censorship justified and what are its limits?
6. Does protective discrimination violate principles of fairness?
7. Should the State intervene in the institution of the family? (13 lectures)

Essential Readings:

Topic I

Bhargava, R. (2008) 'What is Political Theory', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 2-17.

Bhargava, R. (2008) 'Why Do We Need Political Theory', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 18-37.

Topic 2

Sriranjani, V. (2008) 'Liberty', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 40-57.

Acharya, A. (2008) 'Equality', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 58-73.

Menon, K. (2008) 'Justice', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 74-82.

- Talukdar, P.S. (2008) 'Rights', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 88-105.
- Srinivasan, J. (2008) 'Democracy', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 106-128.
- Roy, A. 'Citizenship', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 130-147.
- Das, S. (2008) 'State', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 170-187.
- Singh, M. (2008) 'Civil Society', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 188-205.
- Menon, N. (2008) 'Gender', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 224-235.
- Shorten, A. (2008) 'Nation and State', in McKinnon, C. (ed.) *Issues in Political Theory*, New York: Oxford University Press, pp. 33-55.
- Christiano, Thomas. (2008) 'Democracy', in McKinnon, C. (ed.) *Issues in Political Theory*, New York: Oxford University Press, pp. 80-96.
- Riley, J. (2008) 'Liberty', in McKinnon, C. (ed.) *Issues in Political Theory*, New York: Oxford University Press, pp. 103-125.
- Casal, P. & William, A. (2008) 'Equality', in McKinnon, C. (ed.) *Issues in Political Theory*. New York: Oxford University Press, pp. 149- 165.
- Wolf, J. (2008) 'Social Justice', in McKinnon, C. (ed.) *Issues in Political Theory*. New York: Oxford University Press, pp. 172-193.
- Brighouse, H. (2008) 'Citizenship', in McKinnon, C. (ed.) *Issues in Political Theory*. New York: Oxford University Press, pp. 241-259.
- Chambers, C. (2008) 'Gender', in McKinnon, C. (ed.) *Issues in Political Theory*. New York: Oxford University Press, pp. 241-288.
- Swift, A. (2001) *Political Philosophy: A Beginners Guide for Students and Politicians*. Cambridge: Polity Press.

Topic 3

- Sen, A. (2003) 'Freedom Favours Development,' in Dahl, R., Shapiro, I. and Cheibub, A. J. (eds.) *The Democracy Sourcebook*. Cambridge, Massachusetts: MIT Press, pp. 444-446.

Prezowski, A., et al. (2003) 'Political Regimes and Economic Growth,' in Dahl, R., Shapiro, I. and Cheibub, A. J. (eds.) *The Democracy Sourcebook*. Cambridge, Massachusetts: MIT Press, pp. 447-454.

Sethi, A. (2008) 'Freedom of Speech and the Question of Censorship', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 308-319.

Acharya, A. (2008) 'Affirmative Action', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction*. New Delhi: Pearson Longman, pp. 298-307.

Frances E O. (1985) 'The Myth of State Intervention in the Family', *University of Michigan Journal of Law Reform*. 18 (4), pp. 835-64.

Jha, M. (2001) 'Ramabai: Gender and Caste', in Singh, M.P. and Roy, H. (eds.) *Indian Political Thought: Themes and Thinkers*, New Delhi: Pearson.

Paper-II - Indian Government and Politics

1) Approaches to the Study of Indian Politics and Nature of the State in India: Liberal, Marxist and Gandhian (09 lectures)

2) Indian Constitution: basic features, debates on Fundamental Rights and Directive Principles (09 lectures)

3) Institutional Functioning: Prime Minister, Parliament and Judiciary (09 lectures)

4) Power Structure in India: Caste, class and patriarchy (07 lectures)

5) Religion and Politics: debates on secularism and communalism (06 lectures)

6) Parties and Party systems in India (05 lectures)

7) Social Movements : Workers, Peasants, Environmental and Women's Movement (10 lectures)

8) Strategies of Development in India since Independence: Planned Economy and Neo-liberalism (05 lectures)

READING LIST

Essential Texts.

Abbas, H., Kumar, R. & Alam, M. A. (2011) *Indian Government and Politics*. New Delhi: Pearson, 2011.

Chandhoke, N. & Priyadarshi, P. (eds.) (2009) *Contemporary India: Economy, Society, Politics*. New Delhi: Pearson.

Chakravarty, B. & Pandey, K. P. (2006) *Indian Government and Politics*. New Delhi: Sage.

Chandra, B., Mukherjee, A. & Mukherjee, M. (2010) *India After Independence*. New Delhi: Penguin.

Singh, M.P. & Saxena, R. (2008) *Indian Politics: Contemporary Issues and Concerns*. New Delhi: PHI Learning.

Vanaik, A. & Bhargava, R. (eds.) (2010) *Understanding Contemporary India: Critical Perspectives*. New Delhi: Orient Blackswan.

Menon, N. and Nigam, A. (2007) *Power and Contestation: India Since 1989*. London: Zed Book.

Austin, G. (1999) *Indian Constitution: Corner Stone of a Nation*. New Delhi: Oxford University Press.

Austin, G. (2004) *Working of a Democratic Constitution of India*. New Delhi: Oxford University Press.

Jayal, N. G. & Maheta, P. B. (eds.) (2010) *Oxford Companion to Indian Politics*. New Delhi: Oxford University Press.

Paper-III- Comparative Government and Politics

1. The nature, scope and methods of comparative political analysis (10 lectures)

2. Comparing Regimes: Authoritarian and Democratic (06 lectures)

3. Classifications of political systems:

(a)Parliamentary and Presidential: UK and USA

(b)Federal and Unitary: Canada and China (15 lectures)

4. Electoral Systems: First past the post, proportional representation, mixed systems (07lectures)

5.Party Systems: one-party, two-party and multi-party systems (09 lectures)

6.Contemporary debates on the nature of state: From state centric security to human centric security and the changing nature of nation-state in the context of globalization. (13 lectures)

READING LIST

Essential Texts

- Bara, J & Pennington, M. (eds.). (2009) *Comparative Politics*. New Delhi: Sage.
- Caramani, D. (ed.). (2008) *Comparative Politics*. Oxford: Oxford University Press.
- Hague, R. and Harrop, M. (2010) *Comparative Government and Politics: An Introduction*. (Eight Edition). London: Palgrave MacMillan.
- Ishiyama, J.T. and Breuning, M. (eds.). (2011) *21st Century Political Science: A Reference Book*. Los Angeles: Sage.
- Newton, K. and Deth, Jan W. V. (2010) *Foundations of Comparative Politics: Democracies of the Modern World*. Cambridge: Cambridge University Press.
- O'Neil, P. (2009) *Essentials of Comparative Politics*. (Third Edition). New York: WW. Norton & Company, Inc.
- Palekar, S.A. (2009) *Comparative Government and Politics*. New Delhi: PHI Learning Pvt. Ltd.

Readings

Topic 1. Caramani, D. (2008) 'Introduction to Comparative Politics', in Caramani, D. (ed.) *Comparative Politics*. Oxford: Oxford University Press, pp. 1-23.

Mohanty, M. (1975) 'Comparative Political Theory and Third World Sensitivity', in *Teaching Politics*. Nos. 1 & 2, pp. 22-38.

Topic: 2.

Webb, E. (2011) 'Totalitarianism and Authoritarianism', in Ishiyama, J. T. and Breuning, M. (eds.) *21st Century Political Science: A Reference Book*. Los Angeles: Sage, pp. 249-257.

Hague, R. and Harrop, M. (2004) *Comparative Government and Politics: An Introduction*. London: Palgrave MacMillan, pp. 36-50, 51-68.

Topic: 3.

Hague, R and Harrop, M. (2004) 'The Political Executive', in *Comparative Government and Politics: An Introduction*. London: Palgrave MacMillan, pp. 268-290.

Topic: 4.

Cameron, D. R. (2002) 'Canada', in Ann L. G. (ed.) *Handbook of Federal Countries*. Montreal & Kingston: McGill-Queen's University Press, pp. 105-119.

Peter, H. (2002) 'Canada: A Federal Society-Despite Its Constitution', in Rekha Saxena. (ed.) *Mapping Canadian Federalism for India*. New Delhi: Konark Publisher, Pvt., pp. 115-129.

Dhillon, Michael. (2009), 'Government and Politics', in *Contemporary China: An*

Introduction. London, New York: Routledge, 2009, pp. 137-160.

Topic: 5.

Evans, Jocelyn A.J. (2009) 'Electoral Systems', in Bara, J. and Pennington, M. (eds.) *Comparative Politics*. New Delhi: Sage, pp. 93-119.

Downs, W. M. (2011) 'Electoral Systems in Comparative Perspectives', in Ishiyama, J. T. and Breuning, M. (eds.) *21st Century Political Science: A Reference Book*. Los Angeles: Sage, pp. 159- 167.

Topic: 6.

Cole, A. (2011) 'Comparative Political Parties: Systems and Organizations', in Ishiyama, J.T. and Breuning, M. (eds.) *21st Century Political Science: A Reference Book*. Los Angeles: Sage, pp. 150-158.

Caramani, D. (2008) 'Party Systems', in Caramani, D. (ed.) *Comparative Politics*. Oxford: Oxford University Press, pp. 293-317, 318-347.

Topic: 7.

Poggi, Gianfranco. (2008) 'The nation-state', in Caramani, D. (ed.) *Comparative Politics*.

Oxford: Oxford University Press pp. 85-107.

Hague, R. and Harrop, M. (2004) 'The state in a global context', in *Comparative Government and Politics: An Introduction*. London: Palgrave MacMillan, pp. 17-34.

Further Readings:

Bara, J. (2009) 'Methods for Comparative Analysis', in Bara, J. & Pennington, M. (eds.) *Comparative Politics*. New Delhi: Sage, pp. 40-65.

Blondel, J. (1996) 'Then and Now: Comparative Politics', *Political Studies*. Vol. 47, Issue 1, pp. 152-160

Chandhoke, N. (1996) 'Limits of Comparative Political Analysis', *Economic and Political Weekly*. vol. 31, No. 4, (January 27), pp. PE 2-PE8.

Mair, P. (2008) 'Democracy', in Carmani, D. (ed.) *Comparative Politics*. Oxford: Oxford University Press, pp. 108-132.

Robbins, J. W. (2011) 'Presidentialism Verses Parliamentarism', in Ishiyama, J. T. and Marijke, B. (eds.) *21st Century Political Science: A Reference Book*. Los Angeles: Sage, pp. 177- 185.

Watts, D. (2003) *Understanding US/UK Government and Politics*. Manchester: Manchester University Press, pp. 1-25; 66-105; 106-138.

Paper-IV- Introduction to International Relations

Course Objective: This Course is designed to give students a sense of some important theoretical approaches to understand international relations; a history from 1945 onwards to the present; and an outline of the evolution of Indian foreign policy since independence and its possible future trajectory.

1. Approaches to International Relations

- (a) Classical Realism (Hans Morgenthau) and Neo-Realism (Kenneth Waltz)**
- (b) Neo-Liberalism: Complex Interdependence (Robert O. Keohane and Joseph Nye)**
- (c) Structural Approaches: World Systems Approach (Immanuel Wallerstein) and Dependency School (Andre Gunder Frank)**
- (d) Feminist Perspective (J. Ann Tickner) (27 lectures)**

2. Cold War & Post-Cold War Era

- (a) Second World War & Origins of Cold War**
- (b) Phases of Cold War: First Cold War
Rise and Fall of
Detente Second
Cold War
End of Cold War and Collapse of the Soviet Union**
- (c) Post Cold- War Era and Emerging Centers of Power (European Union, China, Russia and Japan) (20 lectures)**

3. India's Foreign Policy

- (a) Basic Determinants (Historical, Geo-Political, Economic, Domestic and Strategic)**
- (b) India's Policy of Non-alignment**
- (c) India: An Emerging Power (13 lectures)**

READING LIST

Essential Readings

William, P., Goldstein, D. M. and Shafritz, J. M. (eds.) (1999) *Classic Readings of International Relations*. Belmont: Wadsworth Publishing Co, pp. 30-58; 92-126.

Art, R. J. and Jervis, R. (eds.) (1999) *International Political Enduring: Concepts and Contemporary Issues*. 5th Edition. New York: Longman, pp. 7-14; 29-49; 119-126.

Jackson, R. and Sorenson, G. (2008) *Introduction to International Relations: Theories and Approaches*. New York: Oxford University Press, pp. 59-96.

Goldstein, J. and Pevehouse, J.C. (2009) *International Relations*. New Delhi: Pearson, pp. 81-111.

Tickner, J. A. (2001) *Gendering World Politics: Issues and Approaches in the Post-Cold War Era*. Columbia University Press.

Baylis, J. and Smith, S. (eds.) (2011) *The Globalization of World Politics: An Introduction to International Relations*. Fifth Edition. Oxford: Oxford University Press, pp. 90-123; 142-159; 262-277.

Wenger, A. and Zimmermann, D. (eds.) (2003) *International Relations: From the Cold War to the Globalized World*. London: Lynne Rienner, pp. 54-89.

Appadorai and Rajan, M. S. (eds.) (1985) *India's Foreign Policy and Relations*. New Delhi: South Asian Publishers.

Mewmillians, W.C. and Piotrowski, H. (2001) *The World Since 1945: A History of International Relations*. Fifth edition. London: Lynne Rienner Publishers.

Smith, M., Little, R. and Shackleton, M. (eds.) (1981) *Perspectives on World Politics*. London: Croom Helm.

Indian Foreign Service Institute. (1997, 1998) *India's Foreign Policy: An Agenda for the 21st Century* Vols. 1 & 2, New Delhi: Konark Publishers, pp. 3-41; 102-119.

Ganguly, S. (ed.) (2009) *India's Foreign Policy: Retrospect and Prospect*. New Delhi: Oxford University Press.

Vanaik, A. (1995) *India in a Changing World: Problems, Limits and Successes of Its Foreign Policy*. New Delhi: Orient Longman. pp. 19-41; 63-67; 102-114; 118-124; 132-134.

Basu, Rumki (ed) (2012) *International Politics: Concepts theories and Issues*, New Delhi, Sage Publications India Pvt Ltd.

Ability Enhancement (Elective) Skill Based (4)

1.Legislative Support

Aim of the course: To acquaint the student broadly with the legislative process in India at various levels, introduce them to the requirements of peoples' representatives and provide elementary skills to be part of a legislative support team.

Rationale:

Peoples' representatives need support for the multiple tasks they are supposed to undertake. The need to understand complex policy issues, draft new legislation, track and analyse ongoing bills, make speeches and floor statements, write articles and press releases, attend legislative meetings, conduct meetings with various stakeholders, monitor media and public developments, manage constituent relations and handle inter-office communications. All over the world, elected representatives have an office with specialised support team to carry out these tasks.

In India this has just begun. With about 5000 MPs and MLAs, and more than 30 lakhs representatives at the Panchayati Raj level, there is a vast need that needs to be responded to. This course will equip the students with basic skills for this task and expose them to real life legislative work. It will build their skills and deepen their understanding of the political process

Course outline:

1.Powers and functions of people's representatives at different tiers of governance

Members of Parliament, State Legislative Assemblies, functionaries of rural and urban local self government from Zila Parishads/Municipal Corporation to Panchayat/Ward. **(Weeks 1-3)**

2.Supporting the legislative process:How a Bill becomes a Law, Role of the Standing Committee in reviewing a Bill, Legislative Consultations, amendments to a Bill, the framing of Rules and Regulations. **(Week 4)**

3. Supporting the legislative committees

Types of committees, Role of committees in reviewing government finances, policy, programmes, and legislation.**(Weeks 5-7)**

4. Reading the budget document:

Overview of Budget Process, Role of Parliament in reviewing the Union Budget, Railway Budget, Examination of Demands for Grants of Ministries, Working of Ministries. **(Weeks 8-10)**

5.Support in media monitoring and communication: Types of media and their significance for legislators. Basics of communication in print and electronic media. **.(Weeks 11-12)**

Suggested Readings:

Madhavan, M.R. & N.Wahi *Financing of Election Campaigns* PRS, Centre for Policy Research, New Delh, 2008:

http://www.prsindia.org/uploads/media/conference/Campaign_finance_brief.pdf

Vanka, S. *Primer on MPLADS* Centre for Policy Research, New Delhi, 2008. can be accessed on:

<http://www.prsindia.org/parliamenttrack/primers/mplads-487/>

Kalra, H. *Public Engagement with the Legislative Process* PRS, Centre for Policy Research, New Delhi, 2011. can be accessed on:

<http://www.prsindia.org/administrator/uploads/media/Conference%202011/Public%20Engagement%20with%20the%20Legislative%20Process.pdf>

Government of India (Lok Sabha Secretariat) *Parliamentary Procedures(Abstract Series)*, 2009. Can be accessed on:

<http://164.100.47.132/LssNew/abstract/index.aspx>

Government of India, (Ministry of Parliamentary Affairs) *Legislation,Parliamentary Procedure*, 2009. Can be accessed on:http://mpa.nic.in/Manual/Manual_English/Chapter/chapter-09.htm

Government of India, (Ministry of Parliamentary Affairs) *SubordinateLegislation, Parliamentary Procedure*, 2009. Can be accessed on:http://mpa.nic.in/Manual/Manual_English/Chapter/chapter-11.htm

Kapur, Devesh and Pratap Banu Mehta, “The Indian Parliament as an Institution of Accountability,” *Democracy, Governance and Human Rights*, Programme Paper Number 23, United Nations Research Institute for Social Development, January 2006. Can be accessed on:

[http://www.unrisd.org/UNRISD/website/document.nsf/240da49ca467a53f80256b4f005ef245/8e6fc72d6b546696c1257123002fcceb/\\$FILE/KapMeht.pdf](http://www.unrisd.org/UNRISD/website/document.nsf/240da49ca467a53f80256b4f005ef245/8e6fc72d6b546696c1257123002fcceb/$FILE/KapMeht.pdf)

Agarwal, O.P. and T.V. Somanathan, “Public Policy Making in India: Issues and Remedies,” February, 2005. Can be accessed on:

http://www.cprindia.org/admin/paper/Public_Policy_Making_in_India_14205_TV_SOMANATHAN.pdf.

Debroy, Bibek, “Why we need law reform,” *Seminar* January 2001.

Mehta, Pratap Bhanu, “India’s Unlikely Democracy: The Rise of Judicial Sovereignty,” *Journal of Democracy* Vol.18, No.2, pp.70-83.

Government links:

<http://loksabha.nic.in/>;<http://rajyasabha.nic.in/>;<http://mpa.nic.in/>

Sanyal, K. *Strengthening Parliamentary Committees* PRS, Centre for Policy Research, New Delhi, 2011. can be accessed on:
<http://www.prsindia.org/administrator/uploads/media/Conference%202011/Strengthening%20Parliamentary%20Committees.pdf>

Celestine, A. *How to read the Union Budget* PRS, Centre for Policy Research, New Delhi, 2011. can be accessed on:
<http://www.prsindia.org/parliamenttrack/primers/how-to-read-the-union-budget-1023/>

2.Public Opinion and Survey Research

Course Objective: This course will introduce the students to the debates, principles and practices of public opinion polling in the context of democracies, with special reference to India. It will familiarise the students with how to conceptualize and measure public opinion using quantitative methods, with particular attention being paid to developing basic skills pertaining to the collection, analysis and utilisation of quantitative data.

I. Introduction to the course (6 lectures)

Definition and characteristics of public opinion, conceptions and characteristics, debates about its role in a democratic political system, uses for opinion poll

II. Measuring Public Opinion with Surveys: Representation and sampling (6 lectures)

1. What is sampling? Why do we need to sample? Sample design.
2. Sampling error and non-response
3. Types of sampling: Non random sampling (quota, purposive and snowball sampling); random sampling: simple and stratified

III. Survey Research (2 lectures)

1. Interviewing: Interview techniques pitfalls, different types of and forms of interview
2. Questionnaire: Question wording; fairness and clarity.

IV. Quantitative Data Analysis (4 lectures)

1. Introduction to quantitative data analysis
2. Basic concepts: correlational research, causation and prediction, descriptive and inferential Statistics

V. Interpreting polls (6 lectures)

Prediction in polling research: possibilities and pitfalls
Politics of interpreting polling

READING LIST

I. Introduction to the course

Essential Readings:

R. Erikson and K. Tedin, (2011) *American Public Opinion*, 8th edition, New York: Pearson Longman Publishers,. pp. 40-46.

G. Gallup, (1948) *A guide to public opinion polls* Princeton, Princeton University Press, 1948. Pp. 3-13.

II. Measuring Public Opinion with Surveys: Representation and sampling

Essential Readings:

G. Kalton, (1983) *Introduction to Survey Sampling* Beverly Hills, Sage Publication.

Lokniti Team (2009) 'National Election Study 2009: A Methodological Note', *Economic and Political Weekly*, Vol. XLIV (39)

Lokniti Team, (2004) 'National Election Study 2004', *Economic and Political Weekly*, Vol. XXXIX (51).

'Asking About Numbers: Why and How', *Political Analysis* (2013), Vol. 21(1): 48-69, (first published online November 21, 2012)

III. Survey Research

Essential Readings:

H. Asher, (2001) 'Chapters 3 and 5', in *Polling and the Public: What Every Citizen Should Know*, Washington DC: Congressional Quarterly Press.

R. Erikson and K. Tedin, (2011) *American Public Opinion*, 8th edition, New York, Pearson Longman Publishers, pp. 40-46.

IV. Quantitative Data Analysis

Essential Readings:

A. Agresti and B. Finlay, (2009) *Statistical methods for the Social Sciences*, 4th edition, Upper saddle river, NJ: Pearson-Prentice Hall,

S. Kumar and P. Rai, (2013) 'Chapter 1', in *Measuring Voting Behaviour in India*, New Delhi: Sage.

V. Interpreting polls

Essential Readings:

R. Karandikar, C. Pyne and Y. Yadav, (2002) 'Predicting the 1998 Indian Parliamentary Elections', *Electoral Studies*, Vol. 21, pp.69-89.

M. McDermott and K. A. Frankovic, (2003) 'Horserace Polling and Survey Methods Effects: An Analysis of the 2000 Campaign', *Public Opinion Quarterly* 67, pp. 244-264.

Additional Readings:

K. Warren, (2001) 'Chapter 2', in *In Defense of Public Opinion Polling*, Boulder: Westview Press, pp. 45-80.

W. Cochran, (2007) 'Chapter 1', *Sampling Techniques*, John Wiley & Sons.

G. Gallup, (1948) *A Guide to Public Opinion Polls*. Princeton: Princeton University Press, pp. 14-20; 73-75.

D. Rowntree (2000) *Statistics Without Tears: an Introduction for Non Mathematicians*, Harmondsworth: Penguin.

Suggested Student Exercises:

1. Discussion of readings and Indian examples.
2. Groups of students to collect examples of and discuss various sample based studies across many fields: e.g. consumer behaviour, unemployment rates, educational standards, elections, medicinal trials etc.
3. Non-random sampling: The students have to identify one group of people or behaviour that is unique or rare and for which snowball sampling might be needed. They have to identify how they might make the initial contact with this group to start snowball rolling.
4. Give the students the electoral list of an area in Delhi (<http://ceodelhi.gov.in>). The students have to draw a random sample of n number of respondents.
5. For this activity, working with a partner will be helpful. The class should first decide on a topic of interest. Then each pair should construct a five-item self report questionnaire. Of the five items, there should be at least one nominal response, one ordinal response and one interval. After the common questionnaire is constructed putting together the questions from everyone, working in pairs, the questionnaire should be administered on 10 different individuals.
6. Give the students a questionnaire from any public opinion survey and ask them to identify the type of variables.

3. Democratic Awareness with Legal Literacy

Course Objective: The Proposed course aims to acquaint student with the structure and manner of functioning of the legal system in India.

Expected Learning Outcome: The student should be aware of the institutions that comprise the legal system - the courts, police, jails and the system of criminal justice administration. Have a brief knowledge of the Constitution and laws of India, an understanding of the formal and alternate dispute redressal (ADR) mechanisms that exist in India, public interest litigation. Have some working knowledge of how to affirm one's rights and be aware of one's duties within the legal framework; and the opportunities and challenges posed by the legal system for different sections of persons.

This course consists of 100 marks - comprising 25 marks for evaluation of the practical/ project work and a written paper of 75 marks.

Course Content:

Unit I

1. Outline of the Legal system in India
2. System of courts/tribunals and their jurisdiction in India - criminal and civil courts, writ jurisdiction, specialized courts such as juvenile courts, Mahila courts and tribunals.
3. Role of the police and executive in criminal law administration.
4. Alternate dispute mechanisms such as lok adalats, non - formal mechanisms.

Unit II

1. Brief understanding of the laws applicable in India
2. Constitution - fundamental rights, fundamental duties, other constitutional rights and their manner of enforcement, with emphasis on public interest litigation and the expansion of certain rights under Article 21 of the Constitution.
3. Laws relating to criminal jurisdiction - provision relating to filing an FIR, arrest, bail search and seizure and some understanding of the questions of evidence and procedure in Cr. P.C. and related laws, important offences under the Indian Penal Code, offences against women, juvenile justice, prevention of atrocities on Scheduled Castes and Scheduled Tribes.
4. Concepts like Burden of Proof, Presumption of Innocence, Principles of Natural Justice, Fair comment under Contempt laws.
5. Personal laws in India : Pluralism and Democracy
6. Laws relating to contract, property and tenancy laws.

7. Laws relating to dowry, sexual harassment and violence against women
8. Laws relating to consumer rights
9. Laws relating to cyber crimes
10. Anti-terrorist laws: implications for security and human rights
11. Practical application: Visit to either a (i) court or (ii) a legal aid centre set up by the
12. Legal Services Authority or an NGO or (iii) a Lok Adalat, and to interview a litigant or person being counselled. Preparation of a case history.

Unit III

Access to courts and enforcement of rights

1. Critical Understanding of the Functioning of the Legal System
2. Legal Services Authorities Act and right to legal aid, ADR systems
3. **Practical application :**
4. What to do if you are arrested ; if you are a consumer with a grievance; if you are a victim of sexual harassment; domestic violence, child abuse, caste, ethnic and religious discrimination; filing a public interest litigation. How can you challenge administrative orders that violate rights, judicial and administrative remedies
5. Using a hypothetical case of (for example) child abuse or sexual harassment or any other violation of a right, preparation of an FIR or writing a complaint addressed to the appropriate authority.

Essential Reading

Creating Legal Awareness, edited by Kamala Sankaran and Ujjwal Singh (Delhi: OUP, 2007)

Legal literacy: available amongst interdisciplinary courses on Institute of Life Long Learning (Delhi University) Virtual Learning Portal namely vle.du.ac.in

Reading list for course on Legal Literacy

1. Multiple Action Research Group, *Our Laws Vols 1-10*, Delhi. Available in Hindi also.
2. Indian Social Institute, New Delhi, *Legal Literacy Series Booklets*. Available in Hindi also.
3. S.K. Agarwala, *Public Interest Litigation in India*, K.M. Munshi Memorial Lecture, Second Series, Indian Law Institute, Delhi, 1985.
5. S.P. Sathe, *Towards Gender Justice*, Research Centre for Womens' Studies, SNDT Women's University, Bombay, 1993.
6. Asha Bajpai, *Child Rights in India : Law, Policy, and Practice*, Oxford University Press, New Delhi, 2003
7. Agnes, Flavia *Law and Gender Equality*, OUP, 1997.
8. Sagade, Jaga, *Law of Maintenance: An Empirical Study*, ILS Law College, Pune 1996.

9. B.L. Wadhera, *Public Interest Litigation -A Handbook*, Universal, Delhi, 2003.
10. Nomita Aggarwal, *Women and Law in India*, New Century, Delhi, 2002.
11. P.C. Rao and William Sheffiled *Alternate Dispute Resolution: What it is and How it Works*, , Universal Law Books and Publishers, Delhi, 2002
12. V.N. Shukla's *Constitution of India* by Mahendra P. Singh, Eastern Book Co. 10th edition 2001.
13. Parmanand Singh, '*Access to Justice and the Indian Supreme Court*', 10 & 11 Delhi Law Review 156, 1981-82.

4. Conflict and Peace Building

Course Objectives: This course is designed to help build an understanding of a variety of conflict situations among students in a way that they can relate to them through their lived experiences. It's an interdisciplinary course that draws its insights from various branches of social sciences and seeks to provide a lively learning environment for teaching and training students how to bring about political and social transformations at the local, national and international levels. The course encourages the use of new information technologies and innovative ways of understanding these issues by teaching students skills of managing and resolving conflicts and building peace through techniques such as role-play, simulations, street theatre, cinema and music on the one hand and by undertaking field visits, interacting with different segments of the civil society including those affected by conflicts as well as diplomats, journalists and experts, on the other.

Unit I. Concepts (6 Lectures)

1. Understanding Conflict (Week 1)
2. Conflict Management, Conflict Resolution and Conflict Transformation (Week 2)
3. Peace Building (Week 3)

Unit II: Dimensions of Conflict (6 Lectures)

1. Ideology (Week 4)
2. Economic/Resource Sharing Conflicts (Week 5)
3. Socio-Cultural Conflicts (Ethnic, Religious, Gender-based) (Week 6)

Unit III: Sites of Conflict (6 Lectures)

1. Local (Week 7)
2. Sub-National (Week 7)
3. International (Week 8)

Unit IV: Conflict Responses: Skills And Techniques (6 Lectures)

1. Negotiations: Trust Building (Week 9)
2. Mediation: Skill Building; Active Listening (Week 10)
3. Track I, Track II & Multi Track Diplomacy (Week 11)
4. Gandhian Methods (Week 12)

Unit I. Concepts

a. Understanding Conflict

Essential Readings:

O. Ramsbotham, T. Woodhouse and H. Miall, (2011) 'Understanding Contemporary Conflict', in *Contemporary Conflict Resolution*, (Third Edition), Cambridge: Polity Press, pp. 94-122. W. Zartman, (1995) 'Dynamics and Constraints In Negotiations In Internal Conflicts', in William Zartman (ed.), *Elusive Peace: Negotiating an End to Civil Wars*, Washington: The Brookings Institute, pp. 3-29.

Additional Readings:

P. Wallensteen, (2012) 'Armed Conflicts', in *Understanding Conflict Resolution*, (Third Edition), London: Sage, pp. 13-28.

b. Conflict Management, Conflict Resolution and Conflict Transformation

Essential Readings:

C. Mitchell, (2002) 'Beyond Resolution: What Does Conflict Transformation Actually Transform?', in *Peace and Conflict Studies*, 9:1, May, pp.1-23.

S. Ryan, (1990) 'Conflict Management and Conflict Resolution', in *Terrorism and Political Violence*, 2:1, pp. 54-71.

Additional Reading:

J. Lederach, (2003) *The Little Book Of a Conflict Transformation*, London: Good Books.

I. Doucet, (1996) *Thinking About Conflict*, Resource Pack For Conflict Transformation: International Alert.

c. Peace Building

Essential Readings:

M. Lund, (2001) 'A Toolbox for Responding to Conflicts and Building Peace', in L. Reyhler and T. Paffenholz, eds., *Peace-Building: A Field Guide*, Boulder: Lynne Rienner, pp. 16-20. L. Schirch, (2004) *The Little Book Of Strategic Peacebuilding*, London: Good Books.

Unit II: Dimensions of Conflict

Essential Readings:

R. Rubenstein, (2003) 'Sources', in S. Cheldelin, D. Druckman and L. Fast (eds.) *Conflict: From Analysis to Intervention*, London: Continuum, pp.55-67.

P. Le Billon, (2009) 'Economic and Resource Causes of Conflicts', in J. Bercovitch, V. Kremenyuk and I. Zartman (eds.) *The Sage Hand Book of Conflict Resolution*, London: Sage Publications, pp. 210-224.

S. Ayse Kadayifci-Orellana, (2009) 'Ethno-Religious Conflicts: Exploring the Role of Religion in Conflict Resolution', in J. Bercovitch, V. Kremenyuk and I. Zartman (eds.) *The Sage Hand Book of Conflict Resolution*, London: Sage Publications, pp. 264-284.

Unit III: Sites of Conflict

Essential Readings:

D. Barash and C. Webel, (2009) *Peace and Conflict Studies*, London: Sage Publication, pp. 91- 117.

D. Sandole, (2003) 'Typology' in S. Cheldelin, D. Druckman and L. Fast (eds.) *Conflict: From Analysis to Intervention*, London: Continuum, pp.39-54.

P. Wallenstein, (2007) *Understanding Conflict Resolution* (2nd ed.), London: Sage Publications.

Unit IV: Conflict Response: Skills And Techniques Essential Readings:

H. Saunders, (1999) *A Public Peace Process: Sustained Dialogue To Transform Racial and Ethnic Conflicts*, Palgrave Macmillan: New York, pp. 1-30.

N. Behera, 'Forging New Solidarities: Non-official Dialogues', in M. Mekenkamp, P. Tongeren and H. Van De Veen (eds.), *Searching For Peace In Central And South Asia*, London: Lynne Rienner Publishers, pp. 210-236.

J Bercovitch, V. Kremenyuk, and I. Zartman (eds.), (2009) *The Sage Hand Book of Conflict Resolution*, London: Sage Publications.

M. Steger , (2001) 'Peacebuilding and Non-Violence: Gandhi's Perspective on Power', in D. Christie, R. Wagner and D. Winter, (eds.), *Peace, Conflict, and Violence: Peace Psychology for the 21st Century Englewood Cliffs*, New Jersey: Prentice-Hall.

Additional Readings:

J. Davies and E. Kaufman (eds.), (2003) *Second Track/Citizens' Diplomacy: Concepts and Techniques for Conflict Transformation*, Rowman & Littlefield: Maryland.

C. Webel and J. Galtung (eds.), (2007) *The Handbook of Peace and Conflict Studies*, London: Routledge.

Toolkits by United States Institute of Peace

S. Mason and M. Siegfried, (2010) *Debriefing Mediators To Learn Their Experiences*, Washington D.C: United States Institute Of Peace.

I. Zartman and A. De Soto, (2010) *Timing Mediation Initiatives*, Washington D.C: United States Institute Of Peace.

A. Smith and D. Smock, (2010) *Managing A Mediation Process*, Washington D.C: United States Institute Of Peace.

H. Burgess and G. Burgess, (2010) *Conducting Track II*, Washington D.C: United States Institute Of Peace.

Online Resources Conflict Resolution in Popular Art and Culture:

The International Network of Peace Museums, at www.museumsforpeace.org/, contains links to visit the websites of many of the world's peace museums.

Theatre, peace and conflict at Theatre Without Borders, www.theatrewithoutborders.com/peacebuilding

Global Peace Film Festival, www.peacefilmfest.org/

Football for Peace International, www.football4peace.eu/contact.html

Dialogue:

http://www.pgexchange.org/images/toolkits/PGX_D_Sustained%20Dialogue.pdf

Mediation:

http://www.initiativeforpeacebuilding.eu/resources/A_guide_to_Mediation_HDC.pdf

<http://www.pgexchange.org/images/toolkits/civics%20mediation%20tool.pdf>

<http://www.beyondintractability.org/bi-essay/mediation>

Facilitation:

http://www.pgexchange.org/images/toolkits/pgx_facilitation_tool.pdf

<http://www.beyondintractability.org/bi-essay/facilitation>

Negotiation:

Roger Fisher et al, *Getting to Yes: Negotiating Agreement without Giving In*, New York: Penguin, 1991.

http://peacebuilding.caritas.org/index.php/Introduction_to_Principled_Negotiation

Reconciliation: <http://www.peacebuildinginitiative.org/index.cfm?pageId=1975> John Paul Lederach, *The Journey Toward Reconciliation*, London: Herald Press, 1999.

Charles Lerche, "Peace Building Through Reconciliation," *International Journal of PeaceStudies*, Vol. 5. No. 2,

2000. http://www.gmu.edu/programs/icar/ijps/vol5_2/lerche.htm

Crossword Puzzle:

[http://www.cengage.com/cgi-](http://www.cengage.com/cgi-wadsworth/course_products_wp.pl?fid=M20bI&product_isbn_issn=9781133602101)

[wadsworth/course_products_wp.pl?fid=M20bI&product_isbn_issn=9781133602101](http://www.cengage.com/cgi-wadsworth/course_products_wp.pl?fid=M20bI&product_isbn_issn=9781133602101)

[http://www.cengage.com/cgi-](http://www.cengage.com/cgi-wadsworth/course_products_wp.pl?fid=M20bI&product_isbn_issn=9781111344238)

[wadsworth/course_products_wp.pl?fid=M20bI&product_isbn_issn=9781111344238](http://www.cengage.com/cgi-wadsworth/course_products_wp.pl?fid=M20bI&product_isbn_issn=9781111344238)

Suggested Classroom Exercises/ Activities:

1. Map the ethnic composition of your classroom and examine the prevailing prejudices and stereotyping practices and their manifestations and then suggest a strategy for trust building.
2. Identify a group of immigrants/ refugees from the South Asian region (Afghans, Bangladeshis, Sri Lankans, Tibetans, Rohingya Muslims from Myanmar) and based on your interactions with them, write a report explaining their respective experiences of conflicts are amenable to what kind of solution?
3. Identify musical bands and other such endeavours in the South Asian region which have used music as a peace building measure for promoting understanding among different communities.

- 4) Sports is a means or a barrier to promoting inter community understanding. Have a debate in the class arguing for and against this proposition.
- 5) Conduct a case study of resource allocation of water and electricity by the Government of Delhi. Identify, if any, elements of institutional discrimination has taken place.
- 6) Follow a conflict from any level (local/sub-national/national) covered in the news for a month and prepare a report on its causes, the parties and the dynamics of the conflict.
- 7) Identify protests over sharing of environmental resources and study their modus operandi for seeking redressal (for example, Narmada Bachao Andolan, Protests against the Nuclear Plant in Kondakulm, Movements against POSCO and Vedanta in Orissa)
- 8) Organize a peace film festival in your college.
- 9) Follow any track-two initiative between India and any of its neighbours (for example, Neemrana Initiative, The Pakistan India Peoples forum for Peace and Democracy , RIMC Old Boys Network, Women's Initiative for Peace in South Asia, Committee for Sane Nuclear Policy, Peace Pals) and, write a report on its activities and the impact factor.

Discipline Specific Elective Course (2)

1.Themes in Comparative Political Theory

Course Objective: This course aims to familiarize students with the need to recognize how conceptual resources in political theory draw from plural traditions. By chiefly exploring the Indian and Western traditions of political theory through some select themes, the overall objective is to appreciate the value and distinctiveness of comparative political theory.

1. Distinctive features of Indian and Western political thought (08 lectures)

2. Western Thought: Thinkers and Themes

- Aristotle on Citizenship
- Locke on Rights
- Rousseau on inequality
- J. S. Mill on liberty and democracy
- Marx and Bakunin on State (26 lectures)

3. Indian Thought: Thinkers and Themes

- Kautilya on State
- Tilak and Gandhi on Swaraj
- Ambedkar and Lohia on Social Justice
- Nehru and Jayaprakash Narayan on Democracy
- Pandita Ramabai on Patriarchy (26 lectures)

Readings:

Topic 1.

Dallmayr, F. (2009) 'Comparative Political Theory: What is it good for?', in Shogimen, T. and Nederman, C. J. (eds.) *Western Political Thought in Dialogue with Asia*. Plymouth, United Kingdom: Lexington, pp. 13-24.

Parel, A. J. (2009) 'From Political Thought in India to Indian Political Thought', in Shogiman, T. and Nederman, C. J. (eds.) *Western Political Thought in Dialogue with Asia*. Plymouth, United Kingdom: Lexington, pp. 187-208.

Pantham, Th. (1986) 'Introduction: For the Study of Modern Indian Political Thought', in Pantham, Th. & Deutch, K. L. (eds.) *Political Thought in Modern India*. New Delhi: Sage, pp. 9-16.

Topic 2.

Burns, T. (2003) 'Aristotle', in Boucher, D and Kelly, P. (eds.) *Political Thinkers: From Socrates to the Present*. New York: Oxford University Press, pp. 73-91.

Waldron, J. (2003) 'Locke', in Boucher, D. and Kelly, P. (eds.) *Political Thinkers: From Socrates to the Present*, New York: Oxford University Press, pp. 181-197.

Boucher, D. (2003) 'Rousseau', in Boucher, D. and Kelly, P. (eds.) *Political Thinkers: From Socrates to the Present*. New York: Oxford University Press, pp. 235-252.

Kelly, P. (2003) 'J.S. Mill on Liberty', in Boucher, D. and Kelly, P. (eds.) *Political Thinkers: From Socrates to the Present*. New York: Oxford University Press, pp. 324-359.

Wilde, L. (2003) 'Early Marx', in Boucher, D. and Kelly, P. (eds.) *Political Thinkers: From Socrates to the Present*. New York: Oxford University Press, pp. 404-435.

Sparks, Ch. and Isaacs, S. (2004) *Political Theorists in Context*. London: Routledge, pp. 237-255.

Topic 3.

Mehta, V. R. (1992) *Foundations of Indian Political Thought*. New Delhi: Manohar Publishers, pp. 88-109.

Inamdar, N.R. (1986) 'The Political Ideas of Lokmanya Tilak', in Panthan, Th. & Deutsch, K. L. (eds.) *Political Thought in Modern India*. New Delhi: Sage, pp. 110-121.

Patham, Th. (1986) 'Beyond Liberal Democracy: Thinking With Democracy', in Panthan, Th. & Deutsch, K.L. (eds.) *Political Thought in Modern India*. New Delhi: Sage, pp. 325-46.

Zelliot, E. (1986). 'The Social and Political Thought of B.R. Ambedkar', in Panthan, Th. & Deutsch, K. L.(eds.) *Political Thought in Modern India*. New Delhi: Sage, pp. 161-75.

Anand Kumar, 'Understanding Lohia's Political Sociology: Intersectionality of Caste, Class, Gender and Language Issue' *Economic and Political Weekly*. Vol. XLV: 40, October 2008, pp. 64-70.

Pillai, R.C. (1986) 'The Political thought of Jawaharlal Nehru', in Panthan, T. & Deutsch, K. L. (eds.) *Political Thought in Modern India*. New Delhi: Sage pp. 260-74.

Jha, M. (2001) 'Ramabai: Gender and Caste', in Singh, M.P. and Roy, H. (eds.) *Indian Political Thought: Themes and Thinkers*, New Delhi: Pearson.

2. Administration and Public Policy: Concepts and Theories

Topics:

- **Public administration as a discipline: Meaning, scope and significance of the subject, public and private administration, brief evolution and major approaches, and comparative approaches to public administration. (16 lectures)**
- **Administrative theories: the classical theory, scientific management, the human - relation theory, and rational decision-making. (16 lectures)**
- **Understanding public policy: concept and theories, relevance of policy making in public administration and process of policy formulation and implementation and evaluation. (14 lectures)**

4. From Development Administration to New Public Management. Elements and politics of development administration, the New Public Management paradigm – a critical perspective in the post globalized era.

Readings:

Topic 1. Public administration as a discipline

Awasthi, A. and Maheshwari, S. (2003) *Public Administration*. Agra: Laxmi Narain Agarwal, pp. 3-12.

Basu, Rumki, (2014) *Public Administration, Concepts and Theories*, Delhi Sterling Publishers

Henry, N. (2003) *Public Administration and Public Affairs*. New Delhi: Prentice Hall, pp. 1- 52.

Topic 2. Administrative theories

Bhattacharya, M. and Chakrabarty, B. (2005) 'Introduction: Public Administration: Theory and Practice', in Bhattacharya, M. and Chakrabarty, B. (eds.) *Public Administration: A Reader*. Delhi: Oxford University Press, pp. 1-50.

Henry, N. (2003) *Public Administration and Public Affairs*. New Delhi: Prentice Hall, pp. 53-74.

Mouzelis, N.P. (2005) 'The Ideal Type of Bureaucracy', in Bhattacharya, M. and Chakrabarty, B. (eds.) *Public Administration: A Reader*. Delhi: Oxford University Press, pp. 88-100.

Hyderbrand, W. (1980) 'A Marxist Critique of Organization Theory', in Evan, W (ed.) *Frontiers in Organization & Management*. New York: Praeger, pp. 123-150.

Hyderbrand, W. (1977) 'Organizational Contradictions in Public Bureaucracies: Towards a Marxian Theory of Organizations', in Benson, J. K. (ed.) *Organizational Analysis: Critique and Innovation*. Beverly Hills: Sage, pp. 85-109.

Topic 3. Development administration

Bhattacharya, M. (1999) *Restructuring Public Administration: Essays in Rehabilitation*. New Delhi: Jawahar, pp. 29-70, 85-98.

Bhattacharya, M. (2001) *New Horizons in Public Administration*. New Delhi: Jawahar, pp. 248-272, 301-323.

Topic 4. Understanding public policy

Dye, T.R. (1975) *Understanding Public Policy*. New Jersey: Prentice Hall, pp. 1-38, 265- 299.

Dror, Y. (1983) *Public Policy Making Reexamined*. Oxford: Transaction Publication, pp. 129-216.

Additional Readings:

Bernard, C. (1938) *The Functions of Executive*. Cambridge: Harvard University Press.

Esman, M.J. (1986) 'Politics of Development Administration', in Montgomery, J.D. and

Siffin, W. (eds.), *Approaches to Development Politics*. New York: McGraw-Hill.

Gant, G.F. (1979) *Development Administration: Concepts, Goals, Methods*. Madison: University of Wisconsin Press.

Kamenka, E. & Krygier, M. (eds.) (1979) *Bureaucracy*. London: Edward Arnold.

Lee, H.B. (ed.) (1953) *Korea: Time, Change and Administration*. Hawai'i: University of Hawai'i Press.

Leftwich, A. (1994) 'Governance, the State and the Politics of Development', *Development and Change*, 25.

March, J. and Simon, H. (1958) *Organization*. New York: Wiley.

Mooney, J. (1954) *The Principles of Organization*. New York: Harper & Row.

Simon, H. (1967) *Administrative Behavior: A Study of Decision Making Process in Administrative Organization*. New York: Macmillan.

Wiedner, E. (ed.) (1970) *Development Administration in Asia*. Durham: Duke University Press.

3. Democracy and Governance

Lectures: 60

Course Objective: This Paper tries to explain the institutional aspects of democracy and how institutions function within a constitutional framework. It further delves into how democracy as a model of governance can be complimented by institution building.

1. Structure and Process of Governance: Indian Model of Democracy, Parliament, Party Politics and Electoral behaviour, Federalism, The Supreme Court and Judicial Activism, Units of Local Governance (Grassroots Democracy)

Political Communication -Nature, Forms and Importance

Lectures 15

2. Ideas, Interests and Institutions in Public Policy:

- Contextual Orientation of Policy Design
- Institutions of Policy Making

Lectures 15

a. Regulatory Institutions – SEBI, TRAI, Competition Commission Of India,
Lectures 05

b. Lobbying Institutions: Chambers of Commerce and Industries, Trade Unions, Farmers Associations, etc.

Lectures 05

3. Contemporary Political Economy of Development in India: Policy Debates over Models of Development in India, Recent trends of Liberalisation of Indian Economy in different sectors, E-governance.

Lectures 10

4. Dynamics of Civil Society: New Social Movements and Various interests, Role of NGO's, Understanding the political significance of Media and Popular Culture.

Lectures 10

Essential Readings:

Agarwal B, Environmental Management, Equity and Ecofeminism: Debating India's Experience, Journal of Pesant Studies, Vol. 25, No. 4, pp. 55-95.

Atul Kohli (ed.), The Success of India's Democracy, Cambridge University Press, 2001.

- Corbridge, Stuart and John Harris, *Reinventing India: Liberalisation, Hindu Nationalism and Popular Democracy* OUP, 2000.
- J.Dreze and A.Sen, *India: Economic Development and Social Opportunity*, Clarendon, 1995
- Saima Saeed, *Screening the Public Sphere: Media and Democracy in India*, 2013 Nick Stevenson, *Understanding Media Cultures*, 2002
- Fuller, C.J. (ed.) *Caste Today*, Oxford University Press, 1997
- Himat Singh, *Green Revolution Reconsidered: The Rural World of Punjab*, OUP, 2001.
- Jagdish Bhagwati, *India in Transition: Freeing The Economy*, 1993.
- Joseph E. Stiglitz, *Globalisation and its Discontents*, WW Norton, 2003.
- Patel, I.G., *Glimpses of Indian Economic Policy: An Insider View*, OUP, 2002.
- Rajni Kothari and Clude Alvares, (eds.) *Another Revolution Fails: an investigation of how and why India's Operation Flood Project Touted as the World's Largest Dairy*
- Development Program Funded by the EEC went off the Rails, Ajanta, New Delhi, 1985.
- Smitu Kothari, *Social Movements and the Redefinition of Democracy*, Boulder, Westview, 1993.
- Qah, John S.T., *Curbing Corruption in Asia: A Comparative Study of Six Countries*, Eastern University Press, 2003.
- Vasu Deva, *E-Governance In India : A Reality*, Commonwealth Publishers, 2005
- M.J.Moon, *The Evolution of Electronic Government Among Municipalities: Rheoteric or Reality*, American Society For Public Administration, *Public Administration Review*, Vol 62, Issue 4, July –August 2002
- Pankaj Sharma, *E-Governance: The New Age Governance*, APH Publishers, 2004
- Pippa Norris, *Digital Divide: Civic Engagement, Information Poverty and the Internet in Democratic Societies*, Cambridge: Cambridge University Press, 2001.
- Ghanshyam Shah [ed.], *Social Movements and The State*, Sage Publication, 2002
- Su H. Lee, *Debating New Social Movements: Culture, Identity, and Social Fragmentation*, Rawat Publishers, 2010
- S. Laurel Weldon, *When Protest Makes Policy : How Social Movements Represent Disadvantaged Groups*, Michigan Publishers, 2011

Richard Cox, Production, Power and World Order, New York, Columbia University Press, 1987

Additional Readings

Baxi, Upendra and Bhikhu Parekh, (ed.) Crisis and Change in Contemporary India, New Delhi, Sage, 1994.

Bidyut Chakrabarty, Public Administration: A Reader, Delhi Oxford University Press, 2003.

Elaine Kamarck, Government Innovation Around the World: Occasional Paper Series, John F Kennedy School of Government, 2003

Kothari, Rajini, Politics in India, Delhi, Orient Longman, 1970.

Mackie, Gerry, Democracy Defended, New York, Cambridge University Press, 2003.

Mahajan, Gurpreet (ed.), Democracy, Difference and Social Justice, New Delhi, Oxford University Press, 2000.

Menon, Nivedita, (ed.), Gender and Politics in India, New Delhi, Oxford University Press, 2001.

Mohanty, Manoranjan, Peoples Rights: Social Movements and the State in the Third World, Sage, New Delhi, 1998.

Paul Brass, Politics in India Since Independence, Hyderabad, Orient Longman, 1990.

Rob Jenkins – Regional Reflections: Comparative Politics Across India's States, New Delhi, OUP, 2004.

Sury, M.M, India : A Decade of Economic Reforms : 1991 –2001, New Delhi, New Century Publication, 2003.

Thomas R. Dye., Understating Public Policy, Prentice Hall NJ, 1984.

Y. Dror, Public Policy Making Reexamined, Leonard Hill Books, Bedfordshire, 1974.

Basu Rumki et, al(ed) Democracy and good governance: Reinventing the Public service Delivery System in India, New Delhi, Bloomsbury India, 2015

4. Understanding Globalization

Course Objective: The Purpose of this course is to give students a basic understanding of what is meant by the phenomenon of globalization, its sources and forms. In addition, students will obtain a familiarity with both key global actors and certain urgent problems that require solutions at global level.

1. Globalization

a) What is it?

b) Economic, Political, Technological and Cultural Dimensions (09 Lectures)

2. Contemporary World Actors

a) United Nations

b) World Trade Organisation (WTO)

c) Group of 77 Countries (G-77) (25 Lectures)

3. Contemporary World Issues

a) Global Environmental Issues (Global Warming, Bio-diversity, Resource Scarcities)

b) Poverty and Inequality

c) International Terrorism (26 Lectures)

Reading List

Essential Readings

Lechner, F. J. and Boli, J. (eds.) (2004) *The Globalization Reader*. 2nd Edition. Oxford: Blackwell.

Held, D., Mc Grew, A. et al. (eds.) (1999) *Global Transformations Reader. Politics, Economics and Culture*, Stanford: Stanford University Press, pp. 1-50.

Viotti, P. R. and Kauppi, M. V. (2007) *International Relations and World Politics-Security, Economy, Identity*. Third Edition. Delhi: Pearson Education, pp. 430-450.

Baylis, J. and Smith, S. (eds.) (2011) *The Globalization of World Politics: An Introduction to International Relations*. Fourth Edition. Oxford: Oxford University Press, pp. 312-329; 50-385; 468-489.

Tickner, J.A. (2008) 'Gender in World Politics', in Baylis, J. and Smith, S. (eds.) *The Globalization of World Politics: An Introduction to International Relations*. 4th Edition. Oxford: Oxford University Press.

Taylor, P. and Grom, A.J.R. (eds.) (2000) *The United Nations at the Millennium*. London: Continuum. pp. 1-20.

- Ravenhill, J. (2008) 'The Study of Global Political Economy', in Ravenhill, John (ed.) *Global Political Economy*. Second Edition. New York: Oxford University Press, pp.18-24.
- Sauvant, K. (1981) *Group of 77: Evolution, Structure and Organisation*, New York: Oceana Publications.
- Chasek, P. S., Downie, D. L. and Brown, J. W. (eds.) *Global Environmental Politics*. Fourth Edition. Boulder: Colorado: Westview Press.
- Roberts, J.M. (1999) *The Penguin History of the 20th Century*. London: Penguin.
- Smith, M., Little, R. and Shackleton, M. (eds.) (1981) *Perspectives on World Politics*. London: Croom Helm.
- White, B. et al. (eds.) (2005) *Issues in World Politics*. Third Edition, New York: Macmillan, pp. 74-92; 191-211.
- Halliday, F. (2004) 'Terrorism in Historical Perspective', *Open Democracy*. 22 April, available at:
http://www.opendemocracy.net/conflict/article_1865.jsp
- Thomas, C. (2005) 'Poverty, Development, and Hunger', in Baylis, J. and Smith, S. (eds.) *The Globalization of World Politics*. Third Edition. New Delhi: Oxford University Press, pp.645-668.
- Vanaik, A. (2007) 'Political Terrorism and the US Imperial Project', in *Masks of Empire*. New Delhi: Tulika Books, pp. 103-128.
- Art, R.J. and Jervis, R. (eds.) (1999) *International Politics: Enduring Concepts and Contemporary Issues*. 5th Edition. New York: Longman, pp. 495-500; pp.508-516.

Generic Elective -2 (Interdisciplinary): (2)

1) Reading Gandhi

Course Objective: The course seeks to meet two essential objectives: one, to acquaint the students with the art of reading texts, to enable them to grasp its conceptual and argumentative structure and to help them acquire the skills to locate the texts in a broader intellectual and socio-historical context. Second, it aims to acquaint the students with the social and political thought of Gandhi. The themes in Gandhian thought that are chosen for a close reading are particularly relevant to our times.

A). Ways to read a text:

a. textual

b. contextual

- Terence Ball, *Reappraising Political Theory*, Ch. 1, OUP, 1995
- “Meaning and Interpretation in the History of Ideas” in *Visions of Politics*, Quentin Skinner (ed.), Vol. 1, CUP, Cambridge, 2002.

B) Hind Swaraj:

1. **Gandhi in his own words: A close reading of Hind Swaraj.**

2. **Commentaries on Hind Swaraj and Gandhian thought:**

“Introduction”, M.K.Gandhi, Hind Swaraj and other writings ed. A.J.Parel (1997).

B.Parekh, Gandhi (1997), chs. 4 (“Satyagraha”) and 5 (“The critique of modernity”).

D.Hardiman, Gandhi in his time and ours (2003), ch.4 (“An alternative modernity”)

C) Gandhi and modern India.

- a. Nationalism.
- b. Communal unity
- c. Women’s Question
- d. Untouchability.

This component will contain the following selections from Gandhi’s India of my Dreams (compiled R.K.Prabhu): “The meaning of Swaraj” (no.2); “In defence of Nationalism” (no.3); “India’s cultural heritage” (no.45); “Regeneration of Indian women” (no.54); “Women’s education” (no.55); “Communal unity” (no.59); “The curse of untouchability” (no.61); “Religious tolerance in India” (no.62); “The problem of minorities” (no.66)

2) Human Rights Gender and Environment

Course Objective: This course aims at enabling the students to understand the issues concerning the rights of citizens in general and the marginalized groups in particular, and assess the institutional and policy measures which have been taken in response to the demands of various movements. Conceptual dimensions, international trends and the Indian experience form the contents of the course.

Expected Learning Outcome: The study of the course will equip the students with theoretical and conceptual understanding of socio – economic and political problems of marginalized groups in society such as women, dalits, minorities and adivasis and repercussions of contemporary developments on globalization on them.

I Understanding Social Inequality

- Caste, Gender, Ethnicity and Class as distinct categories and their interconnection.
- Globalisation and its impact on workers, peasants, dalits, adivasis and women.

II Human Rights

- Human Rights: Various Meanings
- UN Declarations and Covenants
- Human Rights and Citizenship Rights
- Human Rights and the Indian Constitution
- Human Rights, Laws and Institutions in India; the role of the National Human Rights Commission.
- Human Rights of Marginalized Groups: Dalits, Adivasis, Women, Minorities and Unorganized Workers.
- Consumer Rights: The Consumer Protection Act and grievance redressal mechanisms.
- Human Rights Movement in India.

9. Gender

- Analysing Structures of Patriarchy
- Gender, Culture and History
- Economic Development and Women
- The issue of Women's Political Participation and Representation in India
- Laws, Institutions and Women's Rights in India
- Women's Movements in India

IV Environment

- Environmental and Sustainable Development
- UN Environment Programme: Rio, Johannesburg and after.
- Issues of Industrial Pollution, Global Warming and threats to Bio – diversity
- Environment Policy in India
- Environmental Movement in India

Essential Readings

Agarwal, Anil and Sunita Narain (1991), *Global Warming and Unequal World: A Case of Environmental Colonialism*, Centre for Science and Environment, Delhi.

Baxi, Upendra (2002), *The Future of Human Rights*, Oxford University Press, Delhi.

Beteille, Andre (2003), *Antinomies of Society: Essays on Ideology and Institutions*, Oxford University Press, Delhi.

Geetha, V. (2002) *Gender*, Stree Publications, Kolkata.

Ghanshyam Shah, (1991) *Social Movements in India*, Sage Publications, Delhi.

Guha, Ramachandra and Madhav Gadgil, (1993) *Environmental History of India*, University of California Press, Berkeley.

Haragopal, G. (1997) *The Political Economy of Human Rights*, Himachal Publishing House, Mumbai.

Menon, Nivedita (ed) (2000) *Gender and Politics in India*, Oxford University Press, Delhi.

Patel, Sujata et al (eds) (2003) *Gender and Caste: Issues in Contemporary Indian Feminism*, Kali for Women, Delhi.

Shah, Nandita and Nandita Gandhi (1992) *Issues at Stake: Theory and Practice in the Contemporary Women's Movement in India*, Kali for Women, Delhi.

Gonsalves, Colin (2011) *Kaliyug: The decline of human rights law in the period of globalization* Human Rights Law Network, New Delhi.

Sen, Amartya, *Development as Freedom* (1999) New Delhi, OUP.



UTKAL UNIVERSITY

Ability Enhancement Compulsory Course-I (AECC-I)

ENVIRONMENTAL SCIENCE

SEMESTER – I

FOR +3 ARTS, SCIENCE & COMMERCE - 2016

FULL MARKS: 100

TIME: 3 HOURS
TIME: 1 HOUR

END SEMESTER: 80
MID SEMESTER: 20

Unit - I

The Environment: The Atmosphere, Hydrosphere, Lithosphere, Biosphere, Ecology, Ecosystem, Biogeochemical Cycle (Carbon Cycle, Nitrogen Cycle).

Unit – II

Environment Pollution: Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution, Radiation Pollution, Natural Disasters and their Management.

Unit – III

Population Ecology: Individuals, Species, Pollution, Community, Control Methods of Population, Urbanization and its effects on Society, Communicable Diseases and its Transmission, Non-Communicable Diseases.

Unit- IV

Environmental Movements in India: Grassroot Environmental movements in India, Role of women, Environmental Movements in Odisha, State Pollution Control Board, Central Pollution Control Board.

Unit – V

Natural Resources: Conservation of Natural Resources, Management and Conservation of Wildlife, Soil Erosion and Conservation, Environmental Laws: Water Act, 1974, Air Act, 1981, The Wildlife (Protection) Act, 1972, Environment Protection, 1986.

Ability Enhancement Course HINDI

Ability Enhancement Course for 3yr. Degree Programme

B.A./B.com/ B.Sc.

Credit-04, Marks-100

Number of Teaching Hours-40

व्यवहारिक हिंदी (Communicative Hindi)

भाग-क	Marks Alloted
1. व्यवहारिक हिंदी का स्वरूप और क्षेत्र	10 marks
2. कार्यालयी व्यवस्था और पत्राचार	10 marks
3. टिप्पण, पारुपण	10 marks
4. संक्षेपण, पल्लवन	10 marks
5. अनुवाद: हिंदी से ओड़िया/ओड़िया से हिंदी	10 marks
हिंदी से अंग्रजी/अंग्रजी/अंग्रेजी से हिंदी	10 marks
6. अशुद्धि शोधन	10 marks
7. बायोडाटा/नौकरी के लिए आवेदन पत्र	10 marks
8. कलात्मक सिनेमा विवेचन	10 marks

भाग-ख(प्रेक्टिकल)

1. समूह चर्चा	5 marks
2. व्यक्तिगत साक्षात्कार	5 marks
3. रोल-प्ले	5 marks
4. हाव-भाव की भाषा/ शारीरिक भाषा	5 marks

संदर्भ ग्रंथ सूची:

1. प्रायोगिक हिंदी-डॉ. गुलाम मोईनुद्दीन खान, तबनम पुस्तक महल
2. हिंदी भाषा-डॉ. भोलानाथ तिवारी, किताब महल, इलाहाबाद
3. पत्रकारिता: नया दौर, नये प्रतिमान-सन्तोष भारतीय
4. मिडिया और बाजारबाद-सं. रामशरण जोशी
5. जनसंचार और हिंदी- डॉ. गुलाम मोईनुद्दीन खान, शबनम पुस्तक महल, कटक
6. हिंदी व्याकरण और रचना-वासुदेव नन्दन प्रसाद, भारती भवन, इलाहाबाद

CBCS – BA/B.SC (Hons) Geography

Structure of the Syllabus.

First year

Semester –I

Course	Paper Codes	Title of the paper	Total Marks	Credits
Core – I	GEOGC-1	Geomorphology	70	4
	GEOGC-1	Practical	30	2
Core – 2	GEOGC – 2	Economic Geography	70	4
	GEOGC – 2	Practical	30	2
AECC -1	-	English/ M.I.L/ EVSC	50	2
GE-1	GEOGGE – 1	Indian Geography	70	4
	GEOGGE – 1	Practical	30	2
Total			350	20

Semester –II

Course	Paper Codes	Title of the paper	Total Marks	Credits
Core – 3	GEOGC-3	Climatology	70	4
	GEOGC-3	Practical	30	2
Core – 4	GEOGC – 4	Hydrology and oceanography	70	4
	GEOGC – 4	Practical	30	2
AECC -2	-	English/ M.I.L/ EVSC	50	2
GE-2	GEOGGE – 2	Disasters management	70	4
	GEOGGE – 2	Practical	30	2
Total			350	20

CBCS – BA/B.SC (Hons)Geography**Structure of the Syllabus.****Second year****Semester –III**

Course	Paper Codes	Title of the paper	Total Marks	Credits
Core – 5	GEOGC-5	Environment and Ecosystem.	70	4
	GEOGC-5	Practical	30	2
Core – 6	GEOGC – 6	Applied Geomorphology	70	4
	GEOGC – 6	Practical	30	2
Core - 7	GEOGC – 7	Regional Geography of India	70	4
	GEOGC – 7	Practical	30	2
SEC -1	GOGSEC-1	Remote sensing (Practical)	50	2
GE-3	GEOGGE – 2	Disasters management	70	4
	GEOGGE – 2	Practical	20	2
Total			450	26

Semester –IV

Course	Paper Codes	Title of the paper	Total Marks	Credits
Core – 8	GEOGC-8	Regional planning of development	70	4
	GEOGC-8	Practical	30	2
Core – 9	GEOGC – 9	Settlement and population Geography	70	4
	GEOGC – 9	Practical	30	2
Core - 10	GEOGC –10	Regional Geography of Odisha	70	4
	GEOGC – 10	Practical	30	2
SEC -2	GOGSEC-2	Geographical Information System (GIS) (Practical)	50	2
GE-4	GEOGGE – 4	Natural Resources management studies.	70	4
	GEOGGE – 4	Practical	30	2
Total			450	26

CBCS – BA/B.SC (Hons) Geography**Structure of the Syllabus.****Third year****Semester –V**

Course	Paper Codes	Title of the paper	Total Marks	Credits
Core – 11	GEOGC-11	Advanced cartography	70	4
	GEOGC-11	Practical	30	2
Core – 12	GEOGC – 12	Human Geography	70	4
	GEOGC – 12	Practical	30	2
DSE-1	GEOGDSE – 1	Population Geography	70	4
	GEOGDSE-1	Practical	30	2
DSE-2	GEOGGDSE – 2	Urban Geography	70	4
	GEOGGDSE – 2	Practical	30	2
Total			400	24

Semester –VI

Course	Paper Codes	Title of the paper	Total Marks	Credits
Core – 13	GEOGC-13	Evolution of Geographical thoughts	70	4
	GEOGC-13	Practical	30	2
Core – 14	GEOGC – 14	Disasters Management	70	4
	GEOGC – 14	Practical	30	2
DSE-3	GEOGDSE – 3	Regional development	70	4
	GEOGDSE-3	Practical	30	2
DSE-4	GEOGGDSE – 4	Project report	70	4
	GEOGGDSE – 4	Viva-Voce	30	2
Total			400	24

Semester-1

Core Course - 1

Geomorphology

Mark - 70

Unit - I

- a. Nature, objective and relevance of Geomorphology.
- b. Geological time scale.
- c. Internal structure of the earth – evidences & zoning.

Unit-II

- a. Constituents of earth surface- rock forming minerals & rocks.
- b. Origin of continents and ocean basin
- c. Tetrahedral Hypothesis

Unit - III

- a. Forces affecting earth crust
- b. Orogenic & Epeorogenic earth movements – fold, fault.
- c. Earthquake & it's world distribution.

Unit - IV

- a. Volcanoes and volcanic land forms.
- b. Geomorphic processes – weathering and mass wasting.
- c. Soil forming processes & major soil groups of the world.

Unit -V

Evolution of land form – Erosional & Depositional:-

- a. Fluvial.
- b. Karst & Aeolian.
- c. Glacial & coastal.

Practical Core Course – I

F.M. - 30

Core-1 Geomorphology

- A. Study of symbols and techniques of representation of relief features and Geomorphic Interpretation of topographic Maps.
 1. Representation of Relief features: Hill. Plateau, Valley, Col, Knoll, Ridge, Escarpment
 2. Drawing of Serial, superimposed, composite and projected profiles.
 3. Drawing long profile and cross profile of a river
 4. Study of drainage pattern; dendritic, trellised, radial using stream order and bifurcation ratio.
 5. Measurement of drainage density and texture of topography
 6. Use of Rotameter and planimeter and graphic methods in measurement of area and length from maps

Core Course – 2

Economic Geography

Mark-70

Unit - I

- a. Meaning & concept of economic Geography.
- b. Concept of Resource, Resource classification and resource conservation policy.
- c. Types of human activities – primary secondary & tertiary.

Unit – II

- a. Types & Problems of Agriculture
- b. Von Thunens theory of Agriculture
- c. Tea plantation in Srilanka.

Unit –III

World Distribution & mode of occurrence

- a. Mineral resource – Iron ore and bauxite
- b. Energy Resource – coal, petroleum & nuclear
- c. Conventional energy resource – Hydel Power & solar energy

Unit – IV

- a. Factor affecting location of industry
- b. Industrial location theory by Weber
- c. World distribution of Iron & steel Industry

Unit – V

- a. Major industrial regions of the world
- b. Ship building Industry in Japan
- c. Utility of transport in trade & services, break point theory of trade

Practical Core Course – II

F.M. – 30

Core-2- Economic Geography

Representation of economic data through following diagrams

- a. Simple and compound bars
 - b. Simple and divided Pie/ Wheel diagrams
 - c. Uniform and proportional circles
 - d. Block and Sphere Diagrams
 - e. Depiction of data through Choropleth and Isopleths diagrams
1. Preparation of Maps to show distribution and production of Minerals, goods and resources
 2. Preparation of Maps to show distribution of Crops in Odisha : Rice, Sugarcane
 3. Line graphs, Time series Graphs

Semester – 2
Core Course – 3

Climatology

Mark - 70

Unit - I

- a. Atmospheric structure & composition
- b. Factors affecting weather & climate
- c. Insolation, global energy budget, vertical & horizontal distribution of temperature

Unit- II

- a. Atmospheric pressure belts of the earth
- b. Planetary wind system
- c. Periodical & local wind system

Unit – III

Atmospheric moisture

- a. Humidity, evaporation, condensation
- b. Types of clouds and fog
- c. Types of precipitation & world pattern of rain fall

Unit – IV

- a. Air mass, concept classification & properties
- b. Atmospheric disturbance – tropical cyclones & extra tropical cyclones
- c. Origin & mechanism of Indian monsoon

Unit – V

- a. Koppen's climatic classification
- b. Thornthwaits climatic classification
- c. Atmospheric pollution & Global warming.

Practical Core Course – III

F.M. – 30

Core Course – 3 Climatology

- 1. Use and interpretation of weather Maps
- 2. Use of symbols of various weather parameters in Indian weather maps
- 3. Interpretation of Weather map for understanding weather conditions
- 4. Distribution of temperature/ pressure/ humidity on maps by isopleth techniques
- 5. Distribution of rainfall on maps by choropleth/ Isopleth techniques
- 6. Distribution of monthly variation of temperature/ rainfall on maps by bars and graphs
- 7. Graphical methods of presentation of Temperature, rainfall, Humidity
- 8. Construction of wind Rose for displaying wind direction and wind velocity of a place
- 9. Construction of Climographs
- 10. Construction of Hythergraphs & Ergographs
- 11. Practical record and viva.

Core Course – 4

Hydrology & Oceanography

F.M- 70

Unit – I

- a. Hydrological cycle & global water balance
- b. Characteristics of river basin, drainage pattern, river discharge
- c. Hydrological input – output precipitation, evaporation, evapotranspiration, infiltration, ground water, surface run off & over flow.

Unit – II

- a. Surface configuration of ocean floor – continental shelf, continental slope, abyssal plain, mid oceanic ridges, oceanic trench
- b. Relief of Atlantic, Indian & Pacific ocean

Unit – III

- a. Ocean water salinity and temperature – distribution & determinants
- b. Oceanic movements – wave, currents & tides
- c. Circulation of Atlantic, Indian & Pacific ocean

Unit – IV

- a. Coral reef & atolls
- b. Theories of origin of coral reef & atolls
- c. Marine deposits and its Classification

Unit – V

- a. Coastal environment
- b. Sea is store house of resources
- c. Coastal emergence & submergence

Practical Core Course – IV

F.M. – 30

Statistical techniques.

1. Exercises on mean deviation and standard deviation for both un-group data and group data.
2. Exercise on co-efficient of variability.
3. Correlation–product moment correlation and Spearman's rank correlation.
4. Regression analyses.
Drawing of scatter graphs & regression line
i.e. y on x and x on y.
5. Practical record & viva.

Semester- 3
Core course- 5
Environment & Eco System

F.M- 70

Unit-I

- a. Meaning and concept of environment
- b. Environment changes- short term , medium term , long term
- c. Environmental tolerance - light , temperature , water & wind

Unit-II

Major environmental zones

- a. Forested—equatorial, boreal, coniferous
- b. Intermediate – savanna & steppes & tundra
- c. Barren-arid , tundra & polar

Unit-III

Structure & function

- a. Concept of ecology & ecosystem
- b. Energy conversion & photosynthesis , food chain, food web, energy flow
- c. Man's place in ecosystem

Unit-IV

Environmental cycle & environment protection act

- a. Nutrient cycle-phosphorous cycle
- b. Gaseous cycle - Nitrogen & carbon cycle
- c. Environmental protection acts

Unit-V

Waste & pollution

- a. Solid waste & its management
- b. Water pollution & air pollution
- c. Global ecological imbalance
- d. Global warming & green house effects

Practical Core Course – V

F.M. - 30

Core Course – 5 Environmental Geography

- 1. Calculation of PE, TE & Evaporation Rates based on Thornthwaite' method
- 2. Water Surplus and deficit diagrams
- 3. Graphical and Spatial presentation of different environmental / pollution parameters
- 4. Biomass estimation of an area / forest patch
- 5. Use of various weather instruments- Thermometer, Torricelli and Aneroid Barometer, Wind Vane, Hygrometer, Anemometer, Dry Bulb- Wet bulb thermometer
- 6. . Practical record & viva.

Core Course – 6

Applied Geomorphology

F.M- 70

Unit – I

- a. continental drift theory of Wegener
- b. concept of Isostasy Airy & Pratt
- c. Drift & orogenesis

Unit – II

- a. Plate tectonic
- b. Paleomagnetism
- c. Sea floor – spreading

Unit -III

Mountain building theory by

- a. Kober
- b. Holmes
- c. Joly

Unit-IV

Cycle of erosion

- a. Concept of W. M. Davis
- b. Concept of Penck
- c. Interpretation of cycle erosion

Unit- V

- a. Applied Geomorphology
- b. Geomorphic Hazards
- c. Assessment and management of Geomorphic Hazards

Practical Core Course – VI

F.M. – 30

Core Course – 6 Applied Geomorphology

- 1: Identification and characterization of common rocks and rock forming minerals, Ores
 - a. Sandstone, slate, shale, limestone, Breccia, granite, Basalt, Khondalite, Gneiss, Schist, Marble
 - b. Quartzite, Calcite, Bauxite, Haematite, Chromite
1. Understanding of Dip, Strike, bedding plain, unconformity, disconformity, outcrop, geological structure (Fold & Fault), dyke, sills, geological history and stratigraphic succession.
2. Geomorphological interpretation of an area from toposheet
3. Determination of Slope and Relative Relief (Wentworth & Smith)
4. Interpretation of Geological Maps
5. Practical record & viva.

Core Course – 7

Regional Geography of India

F.M- 70

Unit- I

Physical Aspects

- a. Physiographic division of India
- b. Drainage, Climate, Soil & Vegetation,

Unit- II

Economic Aspects

- a. Types of Characteristic of Indian Agriculture, production and distribution of Major crops- Rice, Wheat & Sugar Cane.
- b. Production and distribution of Mineral Resource Iron ore, Bauxite & Coal.
- c. Production and distribution Iron & Steel Industry, fertilizer Industry, information & technology.

Unit- III

Population & Settlement

- a. Distribution, Density & Growth of Population in India, rural & urban Population & Population Problems
- b. Caste, Religion, Language, Tribes and their correlates
- c. Settlement- Rural & Urban

Unit- IV

Selected Natural regions of India

- a. Ganga Plain
- b. Chhotnagpur Plateau
- c. Odisha Coastal Plain

Unit- V

Transport & Trade of India

- a. Road transport
- b. Rail transport
- c. Water Transport

Core Course – 7 Regional Geography of India

- A. Concept of Spheroid and Geoid: Coordinate and grid reference system
1. Location of place on grid reference system using 8 digit, 12 digit and 16 digit system
 2. Drawing of:
 - i) Simple Cylindrical Projection:
 - ii) Cylindrical Equal Area
 - iii) Simple conical projection with one and Two standard parallel
 - iv) Bonne's Projection
 - v) Polyconic projection..
 - vi) Stereographic Projection
 - vii) Mercator's Projection.
 - viii) . Practical record & viva.

Semester – 4

Core Course – 8

Regional Planning of Development

F.M- 70

Unit- I

- a. Definition of region, Evolution & types of regional planning
- b. Types of Region- formal & functional, Uniform & nodal, Single purpose & composite purpose
- c. Hierarchy & region

Unit- II

- a. Delineation of Planning region
- b. Utility of regions & regional planning
- c. Multi level planning & planning problem

Unit- III

Choice of region for regional planning

- a. Physical region
- b. River valley region
- c. Metropolitan or city region

Unit – IV

Economic Base & regional multiplier

- a. Concept of Growth included models & growth pole theory
- b. Measurement of level of development
- c. Regional disparities In India.

Unit – V

- a. World policy for urbanization
- b. Metropolitan planning and vision planning in India
- c. Integrated rural development planning

Core Course – 8 Regional Planning & Development

1. Mapping Regional / spatial variation of developmental parameters(Choropleth Method)
2. Calculation of levels of Regional development by scores/ ranks/ weightages
3. Mapping Levels of Development by choropleth /chorochromatic maps .
4. Practical record & viva.

CORE COURSE – 9

Settlement and Population Geography

F.M - 70

Unit - I

Settlement Geography

- a. Meaning nature & Scope of Settlement Geography
- b. Factors controlling growth and development of settlement
- c. Types of Settlement – Internal morphology of Rural Settlement, Functional Classification of Settlement.

Unit - II

- a. Evaluation of Settlement – Central place theory of Christaller
- b. Trends of urbanisation in India
- c. Settlement and Environment Relationship
- d. Concept of urban settlement – Urban hierarchy, Run-Urban-Tension, Hinterland, Umland, Conurbation and Satellite town

Unit – III

- a. Scope, objective and nature of Population Geography
- b. Source of population data
- c. Problems of population mapping

Unit – IV

- a. Population distribution and growth – Determinants and patterns in the world
- b. Population composition – Over population, Under population, density, age and sex, Castes and Tribes
- c. Population dynamics – Measurement of fertility, mortality and migration

Unit – V

- a. Population and resource relationship
- b. Human development – Index and its Components
- c. Population theory – Malthusian and Neo Malthusian

Practical Core Course – IX

F.M. – 30

Core Course – 9 Settlement and Population Geography

1. Study of different settlement patterns from toposheets – Random, Cluster, systematic
2. Nearest Neighbour Analysis of settlement pattern
3. Population Distribution Maps by Uniform dots, multiple dots, proportionate circles and spheres
4. Population Pyramid for Odisha/ India/ other geographical units
5. Population Projection/estimation by different methods- Arithmetic, harmonic, geometric, R. G. India method (calculation and graphical display)
6. Practical record & viva.

CORE COURSE – 10

Regional Geography of Odisha

F.M 70

Unit – I

- a. Geographical evolution and structural division of Odisha
- b. Physiography of Odisha
- c. Drainage and Climate
- d. Soil and natural vegetation of Odisha

Unit – II

- a. Types and Characteristics Agriculture of Odisha
- b. Rice, Pulses and Commercial Crops of Odisha
- c. Irrigation Projects of Odisha

Unit – III

Economic Base

- a. Mineral resource – Iron Ore, Bauxite

Power resource – Coal and Hydel Power

- b. Industries:–

Iron and steel Industries
Aluminium Industries
Cotton textile Industries
Cement Industries

Unit – IV

- a. Population distribution and density
- b. Trends of Population growth in Odisha
- c. Road and Rail transport

Unit – V

Ecological Regions

- a. Northern Plateau
- b. The Easternghat Zone
- c. Central table Land

Practical Core Course – X

F.M. – 30

Core Course – 10 Regional Geography of Odisha

1. Exercises on mean deviation and standard deviation for both un-group data and group data.
 2. Exercise on co-efficient of variability.
 3. Correlation–product movement correlation and sphere man’s rank correlation.
 4. Regression analysis.
5. Drawing of scatter grams & regression line i.e. y on x and x on y.
6. . Practical record & viva.

Semester – 5

CORE COURSE – 11 Advanced Cartography

F.M -70

Unit – I

- a. Nature, Scope and Status of Cartography.
- b. Development of Cartographic techniques in recent period with changing technology
- c. Geodesy – Mapping Science

Unit – II

- a. Maps – Their needs and characteristic, and types
- b. Geographical Co-ordinates – Latitude-authalic, geodetic and Longitude
- c. Co-ordinates – Cartesian Co-ordinates - X and Y axis
- d. Rectangular Co-ordinate- Easting and Northing

Unit – III

Map Projection

- a. Scale factors, trans formation of angles, area and direction
- b. Types of Map projection – Cylindrical, Conical, Zenithal, conformal, Equal Area
- c. Principles of Surveying – Horizontal Survey – Traversing, Triangulation, Trilateration. Vertical Survey- Height and Level
- d. Techniques of analysis of Socio economic data

Unit – IV

Remote Sensing

- a. Concept of Remote Sensing
- b. Source of energy in remote sensing – Radiant energy, electromagnetic radiation
- c. Aerial Photography and satellite remote sensing

Unit – V

- a. Utility of GIS to Cartography
- b. Geo-Referencing and image rectification, Raster, and vector data structure
- c. Application of GIS in Land use mapping.

Practical Core Course – XI

F.M. – 30

Core Course – 11 Advanced Cartography

- T. Scale- Graphical construction of plain scale, diagonal scale, comparative scale.
 - U. Earth – shape, size, area.
 - V. Latitude – definition & determination of latitude from pole star & sun.
 Longitude-Definition & determination of longitude with the help of Sun.
 - W. Map design & layout
 - X. Geographical data representation through colour, shading, layer and tint method.
 - Y. Network system of road and river.
 - Z. Drawing of thematic, complex thematic and chorochromatic maps.
 - AA. Thematic map interpretation.
9. Practical record & viva.

Core Course – 12 Human Geography

F.M- 70

Unit – I

Cultural Geography

- a. Cultural evolution of man
- b. Emergence of man & Races of mankind
- c. Major cultural realms of the world
- d. Cultural elements and their changes in recent times

Unit – II

Political Geography

- a. Concepts , nature & scope of political geography
- b. Concept of nation, state, frontiers, boundaries
- c. Heart land theory , Rim land theory & Buffer zones.

Unit-III

- a. Geopolitics of Middle East
- b. Geopolitics of South Asia
- c. Geopolitics of Indian Ocean

Unit – IV

Electoral Geography & resource conflict

- a. Geography of voting
- b. Geographic influence on voting pattern
- c. Water sharing disputes, conflicts related to forest & minerals

Unit – V

Environmental emerging issues

- a. Population explosion & food problem
- b. Deforestation & environmental hazards
- c. Global warming
- d. Biodiversities

Practical Core Course - XII

F.M. – 30

Core Course – 12 Human Geography

1. Continuity & smoothness of data.
2. Probability & normal curve.
3. Histogram, frequency curve & frequency polygon.
4. Measures of central tendency – mean, median, mode for group & un group data.

Determination of median & quartiles from cumulative frequency curve & ogive.

5. Proportionate symbols – dots, circle and sphere.
6. Segmented bar and wheel diagram.
7. Traffic flow cartograms.
8. Climograph , Hythergraph & Ergograph.
9. Practical record & viva.

Semester - 6

Core Course – 13

Evolution of geographical thoughts

F.M- 70

Unit – I

Debates on geographical thought

- a. Environmental determination
- b. Possibilism
- c. Neo- determinism
- d. Systematic and regional

Unit – II

- a. Pre historical ideas in geography
- b. Ancient Indian Geographical concept
- c. Impact of Exploration & discoveries and scientific invention on geography

Unit – III

Modern themes in Geographical thought

- a. Behaviouralism
- b. Humanism
- c. Radicalism

Unit- IV

- a. Contribution of Modern Geographers-
Alexander von Humboldt
Carl Ritter
- b. School of Geographical thought –
Friedrich Ratzel
Vidal de la Blache
Taylor

Unit- V

Models in Geography

- a. Meaning & need of models in Geography
- b. Classification of models in Geography
- c. Dichotomy in Geography

Practical Core Course – XIII

F.M. – 30

Core Course – 13 Evolution of geographical thoughts

1. Plane table survey – radiation, intersection, resection method.
2. Prismatic compass survey – close traverse & open traverse.
3. Dumpy level survey – contouring & levelling.
4. Theodolite survey – non transit – triangulation, Transit – height determination through accessible, inaccessible method.
5. Practical record & viva.

Core Course – 14

Disasters Management

F.M- 70

Unit – I

- a. Definition & concept of disasters
- b. Hazards, disasters, risk & vulnerability
- c. Classification of disasters

Unit – II

Disaster in India

- a. Flood – Causes, impact, distribution & mapping
- b. Cyclone - Causes, impact, distribution & mapping
- c. Draught - Causes, impact, distribution & mapping

Unit – III

Geomorphic hazards in India – causes, impact, mapping

- a. Earth quake
- b. Tsunami
- c. Land slide

Unit- IV

Man made disaster – causes, impact, distribution & mapping

- a. Fire Hazards
- b. Chemical Hazards
- c. Industrial accident

Unit- V

Response & mitigation to disaster

- a. Mitigation and preparedness
- b. Function of NDMA, NIDM & NDRF
- c. Indigenous community based disaster management.

Practical Core Course – XIV

F.M. – 25

Core Course – 14 Disasters Management

Field Work And Research Methodology

- a) Preparation of:
 - i) Observation Schedule (Participant / Non Participant),
 - ii) Questionnaires (Open/ Closed / Structured / Non-Structured);
 - iii) Guide line for Focused Group Discussions;
- b) Preparation of Questionnaires for Socio-Economic survey

Note:

- i) Each student will prepare an individual report based on primary and secondary data collected during field work.
- ii) The students / teachers can opt to take students in or outside the NCR, depending upon, problem to be studied.
- iii) The duration of the field work should not exceed 10 days.
- iv) The word count of the report should be about 8000 to 12,000 excluding figures, tables, photographs, maps, references and appendices.
- v) One copy of the report on A 4 size paper should be submitted in soft binding.

Elective – Generic – GE – 1
(Optional)

Geography of India

F.M-70

Unit – 1 Physical aspects

- (a). Location, Physiographic divisions.
- (b) Drainage, system – The Indus system, The Ganga system, The Brahmaputra system.
- (c) Evolution of drainage systems.

Unit – II Climate, soil and natural vegetation.

- (a) The mechanism of Indian Monsoon, The season's of India.
- (b) Soils of India-Classification, Characteristics.
- (c) Natural vegetation of India – Classification, Characteristics.

Unit –III Agriculture, Mineral and power Resources.

- (a) Agriculture types, distribution of major crops. (Rice, Wheat, Cotton)
- (b) Mineral resources – Iron ores, Manganese, Bauxite,
- (c) Power resources – Coal, Petroleum, Natural gas.

Unit – IV Population and Settlement.

- (a) Distribution, Density and Growth of population in India.
- (b) Caste, Religion, Language, Tribes.
- (c) Settlement – Rural and Urban.

Unit – V Industries & Transport.

- (a) Types and distribution (Iron and steel, Textiles)
- (b) Road transports, Rail transport and water transport

GE – 1 (Practical)

F.M – 30

- B. Concept of Spheroid and Geoid: Coordinate and grid reference system
 - 3. Location of place on grid reference system using 8 digit, 12 digit and 16 digit system
 - 4. Drawing of:
 - ix) Simple Cylindrical Projection:
 - x) Cylindrical Equal Area
 - xi) Simple conical projection with one and Two standard parallel
 - xii) Bonne's Projection
 - xiii) Polyconic projection
 - xiv) Gnomonic projection
 - xv) . Practical record & viva.

**Optional
Disaster Management**

F.M – 70

Unit-I

- (a) Definition and concept of disasters.
- (b) Hazards, disasters, risk and vulnerability.
- (c) Classification of disasters.

Unit –II Disaster in India

- (a) Flood – causes, impact, distribution and mapping.
- (b) Cyclone – causes, impact, distribution and mapping.
- (c) Draught – causes, impact, distribution and mapping.

Unit – III Geomorphic hazards in India – causes, impact, mapping.

- (a) Earth quake.
- (b) Tsunami.
- (c) Land slide.

Unit – IV Man made disaster – causes, impact, distribution and mapping.

- (a) Fire Hazards.
- (b) Chemical Hazards.
- (c) Industrial Hazards.

Unit – V Response and mitigation to disaster.

- (a) Mitigation and preparedness.
- (b) Function of NDMA, NIDM & NDRF
- (c) Indigenous community based disaster management.

GE – 2 (Practical)

F.M- 30

Disasters Management

Field Work And Research Methodology

- c) Preparation of:
 - iv) Observation Schedule (Participant / Non Participant),
 - v) Questionnaires (Open/ Closed / Structured / Non-Structured);
 - vi) Guide line for Focused Group Discussions;
- d) Preparation of Questionnaires for Socio-Economic survey

Note:

- vi) Each student will prepare an individual report based on primary and secondary data collected during field work.
- vii) The students / teachers can opt to take students in or outside the NCR, depending upon, problem to be studied.
- viii) The duration of the field work should not exceed 10 days.
- ix) The word count of the report should be about 8000 to 12,000 excluding figures, tables, photographs, maps, references and appendices.
- x) One copy of the report on A 4 size paper should be submitted in soft binding.

Elective – Generic –GE-3
Optional
Environmental Geography

F.M-70

Unit – I

- (a) Meaning and types of environment.
- (b) Environmental changes – Long term, Medium and short term.
- (c) Environmental tolerance – light, temperature, water and wind.

Unit – II

Major environmental zones.

- (a) Forested – Equatorial, Boreal, Coniferous.
- (b) Intermediate – Savanna and steppes and tundra.
- (c) Barren – arid, Tundra and polar.

Unit – III

Structure and function.

- (a) Concept of ecology and ecosystem.
- (b) Energy conversion and photosynthesis, food web, energy flow.
- (c) Man's place on ecosystem.

Unit – IV

Environmental cycle and environmental protection act.

- (a) Nutrient cycle – Phosphorous cycle.
- (b) Gaseous cycle – Nitrogen and carbon cycle.
- (c) Environmental protection acts.

Unit – V

Waste and pollution.

- (a) Solid waste and its management.
- (b) Water pollution and air pollution.
- (c) Global ecological imbalance.
- (d) Global warming and green house effects.

GE- 3 (Practical)

F.M-30

1. Calculation of PE, TE & Evaporation Rates based on Thornthwaite' method
2. Water Surplus and deficit diagrams
3. Graphical and Spatial presentation of different environmental / pollution parameters
4. Biomass estimation of an area / forest patch
5. Use of various weather instruments- Thermometer, Torricelli and Aneroid Barometer, Wind Vane, Hygrometer, Anemometer, Dry Bulb- Wet bulb thermometer.
6. . Practical record & viva.

Elective – Generic –GE – 4
Optional
Natural Resource Management Studies

F.M-70

Unit – I

- (a) Concepts & types of Resources.
- (b) Problems of resource utilization.
- (c) Population pressure, development and resource use.

Unit – II

- (a) Use and misuse of resource.
- (b) Distribution of resource and global problems.
- (c) Types of human occupation, primary, secondary, Tertiary.

Unit – III

- (a) Agriculture – types and problems.
- (b) Mineral resources – distribution of Iron ore and bauxite.
- (c) Power resources – Distribution of coal and petroleum.

Unit – IV

- (a) Natural hazards and risk management.
- (b) Global resource crisis.
- (c) Historical and future prospects of various resources like (i) soil (ii) water

Unit – V

- (a) Resource conservation and conservation policy.
- (b) Resource management concepts – methods and dimension.
- (c) Integrated resource development and its application.

GE – 4 (Practical)

F.M-30

1. Depiction of data through Choropleth and Isopleth diagrams
2. Preparation of Maps to show distribution and production of Minerals, goods and resources
3. Preparation of Maps to show distribution of Crops in Odisha : Rice, Sugarcane
4. Line graphs, Time series Graphs
5. Practical record and Viva.

Elective
Discipline specific elective – DSE-1
Population Geography

F.M-70

Unit – I

- (a) Scope, objective and nature of population Geography.
- (b) Source of population data.
- (c) Problems of mapping of population.

Unit – II

- (a) Factors controlling distribution of world population.
- (b) Growth of population and their determinants.
- (c) Population density and distribution

Unit – III

- (a) Population composition- Age and sex, Religion and caste.
- (b) Population dynamics – Measurement of fertility, mortality and migration.
- (c) Human development – Index and its components.

Unit –IV

- (a) Population and resource relationship.
- (b) Population – Resource regions.
- (c) Population and Environment.

Unit – V Population theories.

- (a) Malthasian theory.
- (b) Neo- Malthusian theory.
- (c) Demographic transition theory.

DSE – 1 (Practical)

F.M-30

1. Construction of population pyramids.
2. Population projection.
3. Drawing of triangular diagram and lorenge curve.
4. Practical record and Viva.

Elective
Discipline Specific Elective – DSE -2
Urban Geography

F.M-70

Unit – I

Nature and scope, origin and growth of urban settlement.

Unit - II

- (a) Factors affecting growth and distribution of Urban settlement.
- (b) Trend of Urbanization.

Unit – III

- (a) Classification of Town.
- (b) Concept of the following urban elements.
 - (i) Rural – urban fringe.
 - (ii) Urban – Hierarchy
 - (iii) Conurbation.

Unit-IV

Urban issues – Problems of housing, slums, civic amenities (water and transport)

Unit – V

Case studies of Delhi, Mumbai and Kolkatta with reference to urban issues.

DSE -2 (Practical)

F.M-30

1. Exercises on point symbol – Uniform and multiple dot.
2. Segmented, wheel and bar diagram.
3. Traffic flow diagram.
4. Practical record and Viva.

Elective
Discipline Specific Elective – DSE -3
Regional Development

F.M-70

Unit – I

Historical development of Regional Planning.

- (a) Meaning, scope and content of Regional planning.
- (b) Regional planning in developed and developing countries.
- (c) Regional planning in India.

Unit – II

- (a) Definition of Region
- (b) Types of region – formal, functional and planning regions.
- (c) Regional development.
- (d) Methods and techniques of regional planning.

Unit – III

- (a) Concepts of planning region.
- (b) Methods of delineation of planning region.
- (c) Problems of regional planning.

Unit – IV

- (a) Regional imbalances in India.
- (b) Regional disparity in India.
- (c) Indicators and methods of study of disparities.

Unit – V

- (a) Planning for backward regions in India.
- (b) Multi-level planning in India.
- (c) Integrated rural development planning (IRDP)

DSE – 3 (Practical)

F.M-30

1. Transport net work analysis.
2. Nearest neighbor analysis.
3. Determination of service center.
4. Practical Record and Viva.

Elective
Discipline Specific Elective – DSE-4
Project Report

F.M-70

Project work / Dissertation is considered as a special course involving application of knowledge in solving / analyzing / exploring a real life situation / difficult problems. A project / Dissertation work may be given in lieu of a discipline specific elective paper.

Viva-Voce – F.M-30

Skill Enhancement course –SEC -1
Remote sensing (Practical)

F.M-50

Unit – I

Remote sensing – Definition and development, platforms and types.

Unit – II

Satellite remote sensing – Principles, EMR interactions with atmosphere and earth surface.

Unit – III

Image processing – Digital and manual.

Unit – IV

Satellite image interpretation.

Unit – V

Application of remote sensing land use and land cover.

Practical record – A project file consisting of 5 exercises on using any method on above mentioned themes.

Skill Enhancement course –SEC-2
Geographical Information system – (GIS) (Practical)

F.M-50

Unit – I

GIS – Definition and components.

Unit –II

Global positioning system (GPS) – Principles and uses, DGPS.

Unit – III

GIS Data structures – Types (spatial & non spatial) Raster and vector data structure.

Unit – IV

GIS Data analysis – Input, Geo-Referencing, Editing, Output and Query, Overlays.

Unit – V

Application of GIS – Land use mapping, urban sprawl analysis, Forests monitoring

Practical Record – A project file consisting of 5 exercises on using any GIS software on above mentioned themes.

**CBCS- B.A (Pass) Geography
Structure of the Syllabus**

First Year.

SEMESTER -I

Course	Paper Code	Title of the Paper	Total Marks	Credits
Core – 1A		English / M.I.L	100	6
DSC-1A	GEOGDSC-1A	Physical Geography	70	4
	GEOGDSC-1A	Practical	30	2
DSC-2A		Other Discipline	100	6
AECC-1		English / M.I.L /Env.Sc	50	2
Total			350	20

SEMESTER -II

Course	Paper Code	Title of the Paper	Total Marks	Credits
Core – 1B		English / M.I.L	100	6
DSC-1B	GEOGDSC-1B	Economic Geography	70	4
	GEOGDSC-1B	Practical	30	2
DSC-2B		Other Discipline	100	6
AECC-2		English / M.I.L /Env.Sc	50	2
Total			350	20

**CBCS- B.A (Pass) Geography
Structure of the Syllabus**

Second Year.

SEMESTER -III

Course	Paper Code	Title of the Paper	Total Marks	Credits
Core – 2C		English / M.I.L	100	6
DSC-1C	GEOGDSC-1C	Regional Geography of India	70	4
	GEOGDSC-1C	Practical	30	2
DSC-2C		Other Discipline	100	6
SEC-1	GOGSEC-1	Remote sensing (Practical)	50	2
Total			350	20

SEMESTER -IV

Course	Paper Code	Title of the Paper	Total Marks	Credits
Core – 2D		English / M.I.L	100	6
DSC-1D	GEOGDSC-1D	Regional Geography of Odisha	70	4
	GEOGDSC-1D	Practical	30	2
DSC-2D		Other Discipline	100	6
SEC-2	GEOGSEC-2	Geographical information system (GIS) (Practical)	50	2
Total			350	20

3rd Year SEMESTER -V

Course	Paper Code	Title of the Paper	Total Marks	Credits
SEC-3	GEOGSEC-3	Statistical method in Geography (Practical)	50	2
DSE-1A	GEOGDSE-1A	Population Geography	70	4
	GEOGDSE-1A	Practical	30	2
DSE-2A		Other Discipline	100	6
GE-1	GEOGGE-1	Indian Geography	70	4
		Practical	30	2
Total			350	20

SEMESTER -VI

Course	Paper Code	Title of the Paper	Total Marks	Credits
SEC-4	GEOGSEC-4	Disaster management based project work (Practical)	50	2
DSE-1B	GEOGDSE-1B	Urban Geography	70	4
	GEOGDSE-1B	Practical	30	2
DSE-2B		Other Discipline	100	6
GE-2	GEOGGE-2	Disasters Management	70	4
		Practical	30	2
Total			350	20

B.A (Pass) Geography
Discipline Specific(Centric) Elective
DSC-1A, GEOGDSC-1A Physical Geography

1st year

F.M-70

Unit – I Geomorphology

- (a) Nature, objectives, relevance of studies of Geomorphology.
- (b) Origin of the universe – Nebular Hypothesis of Kant and Laplace. Tidal Hypothesis of Jean, Jeffery Big-Bang theory.
- (c) Geological time scale.
- (d) Continental drift theory of Wegener, internal structure of the earth.
- (e) Organic and Epirogenic Earth movements folds, faults, Earthquakes and volcanoes
- (f) Rocks – origin, composition and types.

Unit – II

- (a) Mass wasting – weathering (Physical and chemical), Geomorphic agents and process of erosion, transportation and deposition.
- (b) The concept of Normal cycle of erosion syndesis.
- (c) Land forms produced by the running water, underground water, Glacier, wind and sea-waves.

Unit – III Climatology.

- (a) Composition and structure of the atmosphere.
- (b) Atmospheric temperature – vertical, horizontal and seasonal distribution.
- (c) Atmospheric pressure and winds – vertical, horizontal distribution of pressure planetary, periodical and local winds.
- (d) Atmospheric moisture – Humidity, Hydrological types of rainfall.
- (e) Elements and factors of weather and climate.

Unit – IV

- (a) Surface configuration of the ocean floor, continental shelf, continental slope, abyssal plain, and oceanic trenches. Relief of Atlantic, Pacific and Indian oceans floor.
- (b) Distribution of temperature and salinity of ocean water.
- (c) Circulation of oceanic water – Tides and currents, currents of the Atlantic, Pacific and Indian oceans.
- (d) Marine deposits – Types and distribution.

Unit – V Soil and Bio-Geography

- (a) Soils – Constituents, characteristics and profiles, soil forming processes.
- (b) Major soil groups of the world.
- (c) Concept and structure of Ecosystem.
- (d) Energy flow in ecosystem, food chain, food web.

DSC-1A (Practical)

F.M-30

1. Types of Data.

- (a) Methods of collection of data.
- (b) Classes of phenomena – Positional, linear and Areal data.
- (c) Measurement of phenomena – Nominal, ordinal, Interval, Ratio.
- (d) Frequency distribution – Histogram and frequency polygon, cumulative frequency curve.

2. Measures of central tendency and Dispersion.

- (a) Computation of mean, median and mode.
 - (b) Computation of mean deviation and standard deviation.
3. Practical Record and Viva.

SEMESTER – II
GEOGDSC – 1B
Discipline specific(Centric) Elective
DSC- 1B, Economic Geography

F.M-70

Unit – I Concept of Resources.

- (a) Meaning and concepts of resources, types
- (b) Distribution of forest, mineral and power resources.
- (c) Resource conservation and conservation policy

Unit – II Agriculture.

- (a) Types and problems of Agriculture.
- (b) World distribution of the following crops- Rice, wheat, cotton.
- (c) Agricultural regions of the world.

Unit – III Industries

- (a) Factors affecting the location of industries.
- (b) Major industrial regions of the world.
- (c) World distribution of major industries, iron and steel, Textile.

Unit – IV Transport and Trade.

- (a) Types of transport – Roads, railways, Airways and waterways.
- (b) Problems and utilizes of transport.
- (c) Role of transport in trade (National and International)

Unit – V Some related economic activities of Asia

- (a) Rice cultivation in China.
- (b) Tea plantation in Srilanka.
- (c) Oil resources in Middle- East.
- (d) Ship building industry of Japan.

DSC – 1B (Practical)

F.M-30

- Representation of economic data through following diagrams
- f. Simple and compound bars
 - g. Simple and divided Pie/ Wheel diagrams
 - h. Uniform and proportional circles
 - i. Block and Sphere Diagrams
 - j. Depiction of data through Choropleth and Isopleth diagrams
 - 4. Preparation of Maps to show distribution and production of Minerals, goods and resources
 - 5. Preparation of Maps to show distribution of Crops in Odisha : Rice, Sugarcane
 - 6. Line graphs, Time series Graphs

SEMESTER – III
Discipline specific(Centric) Elective
DSC-1C GEOGDSC – 1C

F.M-70

2nd Year

Regional Geography of India

Unit – I Physical

- (a) Physiographic division of India.
- (b) Drainage, climate, soil and vegetation.

Unit – II Economic

- (a) Types of characteristics of India Agriculture, production and distribution of major crops- rice, wheat and sugar cane.
- (b) Production and distribution of mineral resource- Iron ore, Bauxite and coal.
- (c) Production and distribution – Iron and steel industry, fertilizer industry, information and technology.

Unit – III Population and settlement.

- (a) Distribution, density and growth of population in India, rural and urban population and population problems.
- (b) Caste, religion, language, tribes and their correlates.
- (c) Settlement – Rural and Urban.

Unit – IV Selected Natural regions of India.

- (a) Ganga plain
- (b) Chhota Nagpur plateau.
- (c) Odisha coastal plain.

Unit – V Transport and Trade.

- (a) Road transport.
- (b) Rail transport.
- (c) Water transport.

DSC- 1C (Practical)

F.M-30

1. Types of maps and map works
 - (a) Choropleth Maps- colour and shading.
 - (b) Isopleth maps – Isotherm and Isohyet.
 - (c) Enlargement and reduction by square method.
2. Map interpretation.
 - (a) Interpretation of Indian- Toposheets.
 - (b) Interpretation of Indian weather map.
3. Practical record and Viva.

SEMESTER –IV
DSC-1D GEOGDSC -1D
Discipline specific(Centric) Elective
Regional Geography of Odisha

F.M-70

Unit – I

- e. Geographical evolution and structural division of Odisha
- f. Physiographic of Odisha
- g. Drainage and Climate
- h. Soil and natural vegetation of Odisha

Unit – II

- d. Types of Characteristics of Odisha Agriculture
- e. Rice, Pulses and Commercial Crops of Odisha
- f. Irrigation Projects of Odisha

Unit – III

Economic Base

- c. Mineral resource – Iron Ore, Bauxite

Power resource – Coal and Hydel Power

- d. Industries:–
 - Iron and steel Industries
 - Aluminium Industries
 - Cotton textile Industries
 - Cement Industries

Unit – IV

- d. Population distribution and density
- e. Trends of Population growth in Odisha
- f. Road and Rail transport

Unit – V

Ecological Regions

- d. Northern Plateau
- e. The Easternghat Zone
- f. Central table Land

DSC – 1D (Practical)

F.M-30

1. Exercises on mean deviation and standard deviation for both un-group data and group data.
 2. Exercise on co-efficient of variability.
 3. Correlation–product movement correlation and sphere man’s rank correlation.
 4. Regression analysis.
 5. Drawing of scatter grams & regression line i.e. y on x and x on y.

Skill Enhancement course –SEC -1

Remote sensing (Practical)

F.M-50

Unit – I

Remote sensing – Definition and development, platforms and types.

Unit – II

Satellite remote sensing – Principles, EMR interactions with atmosphere and earth surface.

Unit – III

Image processing – Digital and manual.

Unit – IV

Satellite image interpretation.

Unit – V

Application of remote sensing land use and land cover.

Practical record – A project file consisting of 5 exercises on using any method on above mentioned themes.

Skill Enhancement course –SEC-2
Geographical Information system – (GIS) (Practical)

F.M-50

Unit – I

GIS – Definition and components.

Unit –II

Global positioning system (GPS) – Principles and uses, DGPS.

Unit – III

GIS Data structures – Types (spatial & non spatial) Raster and vector data structure.

Unit – IV

GIS Data analysis – Input, Geo-Referencing, Editing, Output and Query, Overlays.

Unit – V

Application of GIS – Land use mapping, urban sprawl analysis, Forests monitoring

Practical Record – A project file consisting of 5 exercises on using any GIS software on above mentioned themes.

Statistical Methods in Geography (Practical)

1. Use of Data in Geography: Geographical Data Matrix, Significance of Statistical Methods in

Geography; Sources of Data, Scales of Measurement (Nominal, Ordinal, Interval, Ratio).

2. Tabulation and Descriptive Statistics: Frequencies (Deciles, Quartiles), Cross Tabulation, Central Tendency (Mean, Median and Mode, Centro-graphic Techniques, Dispersion (Standard Deviation, Variance and Coefficient of Variation).

3. Sampling: Purposive, Random, Systematic and Stratified.

4. Theoretical Distribution: Probability and Normal Distribution.

5. Association and Correlation: Rank Correlation, Product Moment Correlation, and Simple Regression,

Residuals from regression

Class Record:

Each student will submit a record containing five exercises:

1. Construct a data matrix of about (10 x 10) with each row representing an areal unit (districts or villages or towns) and about 10 columns of relevant attributes of the areal units.

2. Based on the above table, a frequency table, measures of central tendency and dispersion would be computed and interpreted for any two attributes.

3. Histograms and frequency curve would be prepared on the entire data set and attempt to fit a normal curve and interpreted for one or two variables.

4. From the data matrix a sample set (20 Percent) would be drawn using, random - systematic and stratified methods of sampling and locate the samples on a map with a short note on methods used.

5. Based on of the sample set and using two relevant attributes, a scatter and regression line would be plotted and residual from regression would be mapped with a short interpretation.

Skill Enhancement Course –SEC-4

F.M-50

Disaster Management based Project Work (Practical)

The Project Report based on any two field based case studies among following disasters and one disaster

Preparedness plan of respective college or locality:

1. Flood
2. Drought
3. Cyclone and Hailstorms
4. Earthquake
5. Landslides
6. Human Induced Disasters: Fire Hazards, Chemical, Industrial accidents

Discipline specific elective – DSE-1A

Population Geography

F.M-70

Unit – I

- (d) Scope, objective and nature of population Geography.
- (e) Source of population data.
- (f) Problems of mapping of population.

Unit – II

- (d) Factors controlling distribution of world population.
- (e) Growth of population and their determinants.
- (f) Population density and distribution

Unit – III

- (d) Population composition- Age and sex, Religion and caste.
- (e) Population dynamics – Measurement of fertility, mortality and migration.
- (f) Human development – Index and its components.

Unit –IV

- (d) Population and resource relationship.
- (e) Population – Resource regions.
- (f) Population and Environment.

Unit – V Population theories.

- (d) Malthasian theory.
- (e) Neo- Malthusian theory.
- (f) Demographic transition theory.

DSE – 1 (Practical)

F.M-30

1. Construction of population pyramids.
2. Population projection.
3. Drawing of triangular diagram and lorenge curve.
4. Practical record and Viva.

Discipline specific Elective – DSE -1B

Urban Geography

F.M-70

Unit – I

Nature and scope, origin and growth of urban settlement.

Unit - II

- (c) Factors affecting growth and distribution of Urban settlement.
- (d) Trend of Urbanization.

Unit – III

- (c) Classification of Town.
- (d) Concept of the following urban elements.
 - (iv) Rural – urban fringe.
 - (v) Urban – Hierarchy
 - (vi) Conurbation.

Unit-IV

Urban issues – Problems of housing, slums, civic amenities (water and transport)

Unit – V

Case studies of Delhi, Mumbai and Kolkatta with reference to urban issues.

DSE -2 (Practical)

F.M-30

1. Exercises on point symbol – Uniform and multiple dot.
2. Segmented, wheel and bar diagram.
3. Trafic flow diagram.
4. Practical record and Viva.

Elective – Generic – GE – 1

Optional

Indian Geography –

F.M-70

Unit – 1 Physical

- (a). Location, Physiographic divisions.
- (b) Drainage, system – The Indus system, The Ganga system, The Brahmaputra system.
- (c) Evolution of drainage systems.

Unit – II Climate, soil and natural vegetation.

- (d) The mechanism of Indian Monsoon, The season's of India.
- (e) Soils of India-Classification, Characteristics.
- (f) Natural vegetation of India – Classification, Characteristics.

Unit –III Agriculture, Mineral and power Resources.

- (d) Agriculture types, distribution of major crops. (Rice, Wheat, Cotton)
- (e) Mineral resources – Iron ores, Manganese, Bauxite,
- (f) Power resources – Coal, Petroleum, Natural gas.

Unit – IV Population and Settlement.

- (d) Distribution, Density and Growth of population in India.
- (e) Caste, Religion, Language, Tribes.
- (f) Settlement – Rural and Urban.

Unit – V Industries & Transport.

- (c) Types and distribution (Iron and steel, Textiles)
- (d) Road transports, Rail transport and water transport.

GE – 1 (Practical)

F.M – 30

- C. . Concept of Spheroid and Geoid: Coordinate and grid reference system
- 5. Location of place on grid reference system using 8 digit, 12 digit and 16 digit system
- 6. Drawing of:
 - xvi) Simple Cylindrical Projection:
 - xvii) Cylindrical Equal Area
 - xviii) Simple conical projection with one and Two standard parallel
 - xix) Bonne's Projection

Elective – Generic – GE-2

Optional

Disasters Management

F.M – 70

Unit-I

- (d) Definition and concept of disasters.
- (e) Hazards, disasters, risk and vulnerability.
- (f) Classification of disasters.

Unit –II Disaster in India

- (d) Flood – causes, impact, distribution and mapping.
- (e) Cyclone – causes, impact, distribution and mapping.
- (f) Draught – causes, impact, distribution and mapping.

Unit – III Geomorphic hazards in India – causes, impact, mapping.

- (d) Earth quake.
- (e) Tsunami.
- (f) Land slide.

Unit – IV Man made disaster – causes, impact, distribution and mapping.

- (d) Fire Hazards.
- (e) Chemical Hazards.
- (f) Industrial Hazards.

Unit – V Response and mitigation to disaster.

- (d) Mitigation and preparedness.
- (e) Function of NDMA, NIDM & NDRF
- (f) Indigenous community based disaster management.

GE – 2 (Practical)

Field Work And Research Methodology

- e) Preparation of:
 - vii) Observation Schedule (Participant / Non Participant),
 - viii) Questionnaires (Open/ Closed / Structured / Non-Structured);
 - ix) Guide line for Focused Group Discussions;
- f) Preparation of Questionnaires for Socio-Economic survey

Note:

- xi) Each student will prepare an individual report based on primary and secondary data collected during field work.
- xii) The students / teachers can opt to take students in or outside the NCR, depending upon, problem to be studied.
- xiii) The duration of the field work should not exceed 10 days.
- xiv) The word count of the report should be about 8000 to 12,000 words excluding figures, tables, photographs, maps, references and appendices.
- xv) One copy of the report on A 4 size paper should be submitted in soft binding.

SYLLABUS FOR B.COM HONS.						
B.Com. Hons. (CBCS) for the Academic Year 2016-17						
	Course Structure	Category	Marks			Credits
	Semester I		Theory	Practical /Internal	Total	
BCH-1.1	Environmental Science	AECC-1	80	20 (I)	100	4
BCH-1.2	Financial Accounting	Core -1	80	20 (I)	100	6
BCH-1.3	Business Law	Core -2	80	20 (I)	100	6
BCH-1.4	Micro Economics	GE-1	80	20 (I)	100	6
Total			320	80	400	22
	Semester-II					
BCH-2.1	English Communication	AECC-2	80	20 (I)	100	4
BCH-2.2	Corporate Accounting	Core -3	80	20 (I)	100	6
BCH-2.3	Corporate Laws	Core -4	80	20 (I)	100	6
BCH-2.4	Macro Economics	GE-2	80	20 (I)	100	6
Total			400	100	400	26
	Semester III					
BCH-3.1	Human Resource Management	Core-5	80	20 (I)	100	6
BCH-3.2	Income-tax Law and Practice	Core -6	80	20 (I)	100	6
BCH-3.3	Management Principles and Application	Core -7	80	20 (I)	100	6
BCH-3.4	Business Statistics	GE-3	80	20 (I)	100	6
BCH-3.5	E-Commerce(Compulsory)	SEC-2	80	20 (I)	100	4
Total			400	100	500	28
	Semester IV					
BCH-4.1	Cost and Management Accounting	Core -8	80	20 (I)	100	6
BCH-4.2	Business Mathematics	Core -9	80	20 (I)	100	6
BCH-4.3	Computer Applications in Business	Core -10	80	20 (I)	100	6
BCH-4.4	Indian Economy - Performance and Policies	GE-4	80	20 (I)	100	6
BCH-4.5	Entrepreneurship(Compulsory)	SEC-3	80	20 (I)	100	4
Total			400	100	500	28

- The Colleges may or may not opt for the optional papers

	Course Structure	Category	Theory	Practical / Internal	Total	Credits
	Semester V					
BCH-5.1	Principles of Marketing	Core -11	80	20 (I)	100	6
BCH-5.2	Fundamentals of Financial Management	Core -12	80	20 (I)	100	6
BCH-5.3	DSE-1 (Any one of the following)	DSE-1	80	20 (I)	100	6
	A. Accounting and Finance	Financial Markets , Institution and Services				
	B. Banking and Insurance	Indian Banking and Insurance System				
	C. Financial Markets	Indian Financial System				
BCH-5.4	DSE-2 (Any one of the following)	DSE-2	80	20 (I)	100	6
	A. Accounting and Finance	Financial Statement Analysis and Reporting				
	B. Banking and Insurance	Merchant Banking and Financial Services				
	C. Financial Markets	Financial Institutions and Services				
	Total		320	80	400	24
	Semester VI					
BCH-6.1	Auditing and Corporate Governance	Core -13	80	20 (I)	100	6
BCH-6.2	Indirect Tax Law	Core-14	80	20 (I)	100	6
BCH-6.3	DSE-3 (Any one of the following)	DSE-3	80	20 (I)	100	6
	A. Accounting and Finance	Corporate Tax Planning				
	B. Banking and Insurance	Fundamentals of Investment				
	C. Financial Markets	Financial Market Operations				
BCH-6.4	Business Research Methods and Project Work*	DSE-4	50	50(I)	100	6
	Total		290	110	400	24
Grand Total					2600 (Min)	148 (Min)

Notes:

- AECC- Ability Enhancement Compulsory Course
- GE- Generic Elective Course

B.Com (Hons.) CBCS

- **DSE- Discipline Specific Elective Course**
- **SEC- Skill Enhancement Course**
- *Paper No. BCH-2.5 (Computerized Accounting) and Paper No.BCH-4.6 (Personal Selling and Salesmanship) are SEC papers for the students those are availing the maximum credit.*
- *Paper No.BCH-6.4 (Business Research Methods & Project Work) will have 50 marks written examination and 50 marks project report.*

B.Com. (Hons.): Semester - I
Paper BCH-1.1: Environmental Science

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objectives: To provide information on environmental science, its resources and Management.

Contents:

Unit - I

The Environment: The Atmosphere, Hydrosphere, Lithosphere, Biosphere, Ecology, Ecosystem, Biogeochemical Cycle (Carbon Cycle, Nitrogen Cycle).

Unit – II

Environment Pollution: Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution, Radiation Pollution, Natural Disasters and their Management.

Unit – III

Population Ecology: Individuals, Species, Pollution, Community, Control Methods of Population, Urbanization and its effects on Society, Communicable Diseases and its Transmission, Non-Communicable Diseases.

Unit- IV

Environmental Movements in India: Grass root Environmental movements in India, Role of women, Environmental Movements in Odisha, State Pollution Control Board, Central Pollution Control Board.

Unit – V

Natural Resources: Conservation of Natural Resources, Management and Conservation of Wildlife, Soil Erosion and Conservation, Environmental Laws: Water Act, 1974, Air Act, 1981, The Wildlife (Protection) Act, 1972, Environment Protection, 1986.

Learning Outcomes: After completion of this paper, students would be able to analyze the ways in which the natural environment and the society impact the establishment and continuation of business. Along with that, they would also gain knowledge about the ways and means of managing the natural resources for the benefit of both i.e. the business and the society thereby creating a win-win situation.

BOOKS FOR REFERENCE:

- ✓ *Text Book of Environmental Studies*, D.K.Asthana, DrMeeraAsthana, S.Chand
- ✓ *Environmental Studies – Sanjay Ku. Batra / KanchanBatra/ H.K.Kaur / Parul Pant – Taxmann Pub.*
- ✓ *Principles of Environmental Studies–P. C. Manoharachary & P. J. Reddy B. S. Pub., 2004*
- ✓ *Introduction to an Environmental Science–Y. Anjaneyulu, B. S. Pub. 2004.*
- ✓ *Ecology–Subramanyam & Sambamurty, Narosa Pub. House, 2000.*
- ✓ *A Text Book in Environmental Science–V. Subramaniam, Narosa Pub. House, 2000*
- ✓ *Managing Industrial Pollution –S. C. Bhatia, Mac Millan, 2003.*
- ✓ *Man and Environment–Dash and Mishra, Mac Millan*
- ✓ *Environment and Society–Mishra and Dash, Mac Millan*
- ✓ *Text Book of Environmental Science–Panigrahi and Sahu, Sadgranth Mandir.*
- ✓ *Environment and Ecology, De and De, S.Chand*
- ✓ *Environmental Management, G.N.Pandey, Vikash Publishing*

B.Com. (Hons.): Semester - I Paper BCH 1.2: Financial Accounting

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objectives: The objective of this paper is to help students to acquire conceptual knowledge of financial accounting and to impart skills for recording various kinds of business transactions.

Contents

Unit 1. (a) Theoretical Framework

- i. Accounting as the language of business and an information system, the users of financial accounting information and their needs. Qualitative characteristics of accounting information. Functions, advantages and limitations of accounting. Branches of accounting. Bases of accounting; cash basis and accrual basis.
- ii. The nature of financial accounting principles – Basic concepts and conventions: entity, money measurement, going concern, cost, realization, accruals, periodicity, consistency, prudence (conservatism), materiality and full disclosures and Accounting Equation.

(b)Accounting Process

From recording of business transactions to the preparation of trial balance including adjustments: journal, sub-division of journal, ledger accounts, trial balance

Unit 2. Business Income

- i. Measurement of business income-Net income: the accounting period, the continuity doctrine and matching concept. Objectives of measurement and revenue recognition.
- ii. Depreciation Accounting: The accounting concept of depreciation. Factors in the measurement of depreciation. Methods of computing depreciation: straight line method and

diminishing balance method; Disposal of depreciable assets-change of method. Salient features of Accounting Standard 6 (AS- 6) issued by ICAI

- iii. Inventory Accounting: Meaning. Significance of inventory valuation. Inventory Record Systems: periodic and perpetual. Methods: FIFO, LIFO and Weighted Average. Salient features of Accounting Standard 2 (AS- 2) issued by ICAI

Unit 3. Final Accounts

Capital and revenue expenditures and receipts: general introduction only. Preparation of financial statements of Sole Trade and Partnership Business with adjustments

Unit 4. Hire Purchase and Installment Systems and Accounting for Branch & Department

- i. Concepts of operating and financial lease (theory only)
- ii. Departmental Accounting and Branch Accounting including foreign branch (Theory and Problem)

Unit 5. Accounting for Partnership Firm

Accounting of Admission of partner, Retirement and Death of partner and Dissolution of the Partnership Firm Including Insolvency of partners

Learning Outcomes: The course structure of this paper would equip the students to get in-depth knowledge of financial accounting along with its practical application thereby giving an opportunity to gain easy access to this competitive business world.

Suggested Readings:

1. Anthony, R.N. Hawkins, and Merchant, *Accounting: Text and Cases*. McGraw-Hill Education.
2. Bal Ranjan Kumar, *Financial Accounting* – S. Chand
3. Bansal.K.M - *Financial Accounting* – Taxman Publication
4. Deepak Sehgal, *Financial Accounting* – Vikash Publication
5. Horngren, *Introduction to Financial Accounting*, Pearson Education.
6. Monga, J.R. *Financial Accounting: Concepts and Applications*. Mayoor Paper Backs, New Delhi.
7. Shukla, M.C., T.S. Grewal and S.C.Gupta. *Advanced Accounts. Vol.-I*. S. Chand & Co., New Delhi.
8. Maheshwari, S.N. and S. K. Maheshwari. *Financial Accounting*. Vikas Publishing House, New Delhi.
9. Sehgal, Ashok, and Deepak Sehgal. *Advanced Accounting. Part –I*.Taxmann Applied Services, New Delhi.
10. Bhushan Kumar Goyal and HN Tiwari, *Financial Accounting*, International Book House
11. Goldwin, Alderman and Sanyal, *Financial Accounting*, Cengage Learning.
12. Tulsian, P.C. *Financial Accounting*, **S. Chand**.
8. Jain, S.P. and K.L. Narang. *Financial Accounting*, Kalyani Publishers, New Delhi
9. Gupta, Nirmal. *Financial Accounting*, SahityaBhawan, Agra.

B.Com. (Hons.): Semester - I
Paper BCH 1.3: Business Law

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objective: The objective of the course is to impart basic knowledge of the important business laws along with relevant case laws.

Contents:

Unit I: The Indian Contract Act, 1872: General Principle of Law of Contract

- a) Contract – meaning, characteristics and kinds
- b) Essentials of valid contract - Offer and acceptance, consideration, contractual capacity, free consent, legality of objects.
- c) Void agreements
- d) Discharge of contract – modes of discharge including breach and its remedies.
- e) Contingent contracts
- f) Quasi - contracts

Unit II: The Indian Contract Act, 1872: Specific Contracts

- a) Contract of Indemnity and Guarantee
- b) Contract of Bailment
- c) Contract of Agency

Unit III: The Sale of Goods Act, 1930

- a) Contract of sale, meaning and difference between sale and agreement to sell.
- b) Conditions and warranties
- c) Transfer of ownership in goods including sale by non-owners
- d) Performance of contract of sale
- e) Unpaid seller – meaning and rights of an unpaid seller against the goods and the buyer.

Unit IV: Partnership Laws

The Partnership Act, 1932

- a. Nature and Characteristics of Partnership
- b. Registration of Firms
- c. Types of Partners
- d. Rights and Duties of Partners
- e. Implied Authority of a Partner
- f. Incoming and outgoing Partners
- g. Mode of Dissolution of Partnership

Unit V: The Negotiable Instruments Act 1881

- a) Meaning and Characteristics of Negotiable Instruments : Promissory Note, Bill of Exchange, Cheque
- b) Holder and Holder in due Course, Privileges of Holder in Due Course.
- c) Negotiation: Types of Endorsements

- d) Crossing of Cheque
- e) Bouncing of Cheque

Learning Outcomes: The students would be able to deal with the legal aspect of different business situations.

Suggested Readings:

1. Arora Sushma – Business Law – Taxmann Publication
2. Kuchhal, M.C. and Vivek Kuchhal, *Business Law*, Vikas Publishing House, New Delhi.
3. Tulsian, P.C, Business Law, S.Chand
4. Gogna P.P.S, Business & Industrial Law, S.Chand
5. Singh, Avtar, *Business Law*, Eastern Book Company, Lucknow.
6. Maheshwari & Maheshwari, *Business Law*, National Publishing House, New Delhi.
7. Chadha, P. R., *Business Law* Galgotia Publishing Company, New Delhi.
8. Aggarwal S K, Business Law, Galgotia Publishers Company, New Delhi.
9. Goyal Bhushan Kumar and Jain Kinneri, Business Laws, International Book House
10. Ravinder Kumar, Legal Aspects of Business, Cengage Learning

B.Com. (Hons.): Semester - I
Paper BCH-1.4: Micro Economics

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objective: Objective of the course is to acquaint the students with the concepts of micro-economics dealing with consumer behaviour. The course also makes the student understand the supply side of the market through the production and cost behaviour of firms.

Contents:

Unit I: Demand and Consumer Behaviour

Concepts of revenue: Marginal and Average: Revenue under conditions of Perfect and imperfect competition, Elasticity of demand: price, income and cross. Consumer Behaviour: Indifference curve analysis of consumer behavior; Consumer's equilibrium, Price elasticity and price consumption curve, income consumption curve and Engel curve, price change and income and substitution effects.

Unit II: Production and Cost

Production iso-quants, marginal rate of technical substitution, economic region of production, optimal combination of resources, the expansion path, returns to scale using iso-quants
Cost of Production: Social and private costs of production, long run and short run costs of production.

Unit III: Perfect Competition

Perfect competition: Assumptions, Equilibrium of the firm and the industry in the short and the long-runs, including industry's long run supply curve. Measuring producer surplus under perfect competition

Unit IV: Monopoly

Monopoly: Monopoly short run and long run equilibrium. Shifts in demand curve and the absence of the supply curve. Measurement of monopoly power and the rule of thumb for pricing, Horizontal and vertical integration of firms

Unit V: Imperfect Competition

Monopolistic Competition and Oligopoly: Monopolistic competition price and output decision-equilibrium. Monopolistic Competition and economic efficiency Oligopoly and Interdependence

Learning Outcomes: The students would be able to apply tools of consumer behaviour and firm theory to business situations.

Suggested Readings:

1. Ahuja, H.L, Micro Economics, S.Chand
2. Dwivedi, D.N. Micro Economics, Vikash Publication
3. Mehta P.K, Singh M. – Micro Economics – Taxmann Publication
4. Pindyck, R.S., D. L. Rubinfeld and P. L. Mehta; *Microeconomics*, Pearson Education.
5. N. Gregory Mankiw, Principles of Micro Economics, Cengage Learning
6. Browning, E.K. and J.M. Browning; *Microeconomic Theory and Applications*, Kalyani Publishers, New Delhi.
7. Gould, J.P. and E.P. Lazear; *Microeconomic Theory*, All India Traveller Bookseller, New Delhi.
8. Lipsey, R.G. and K.A. Chrystal; *Economics*, Oxford University Press.
9. Maddala G.S. and E. Miller; *Microeconomics: Theory and Applications*, McGraw-Hill International.
10. Salvatore, D. *Schaum's Outline of Theory and Problems of Microeconomic Theory*, McGraw-Hill, International Edition.
11. Bilas, Richard A. *Microeconomic Theory: A Graphical Analysis*, McGraw-Hill Book Co. Kogakusha Co. Ltd.
12. Amit Sachdeva, *Micro Economics*, KusumLata Publishers.

B.Com. (Hons.): Semester - II
Paper BCH-2.1: English Communication
Skill Enhancement Compulsory Course for Commerce

Duration: 3hrs.

Marks: 100 (80+20)

Lectures: 65

Paper: 1

The purpose of this course is twofold: to train students in communication skills and to help develop in them a facility for communicative English.

Since language is which binds society together and serves as a crucial medium of interaction as well as interchange of ideas and thoughts, it is important that students develop a capacity for clear and effective communication, spoken and written, at a relatively young age. The need has become even more urgent in an era of globalization and the increasing social and cultural diversity that comes with it.

English, being a global language par excellence, it is important that any course in communication is tied to an English proficiency programme. The present course will seek to create academic and social English competencies in speaking, listening, arguing, enunciation, reading, writing and interpreting, grammar and usage, vocabulary, syntax, and rhetorical patterns.

Students, at the end of the course, should be able to unlock the communicator in them by using English appropriately and with confidence for further studies or in professional spheres where English is the indispensable tool of communication.

Unit 1

[20]

Introduction

1. What is communication?
2. Types of communication
 - Horizontal
 - Vertical
 - Interpersonal
 - Grapevine
 -
3. Uses of Communication

Prescribed Reading: Chapter 1 *Applying Communication Theory for Professional Life: A Practical Introduction* by Dainton and Zelle

<http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmljYXRpb25fVGh3J5LnBkZg%3D%3D&cidReset=true&cidReq=MBA563>

Unit-2

[20]

Language of Communication

1. Verbal: spoken and written
2. Non-verbal
 - Proxemics
 - Kinesics
 - Haptics
 - Chronemics
 - Paralinguistics
3. Barriers to communication
4. Communicative English

Unit-3

[20]

Reading Comprehension

- Locate and remember the most important points in the reading
- Interpret and evaluate events, ideas, and information
- Read “between the lines” to understand underlying meanings
- Connect information to what they already know

Unit 4

Writing

[20]

1. Expanding an Idea
2. Writing a Memo
3. Report Writing
4. Creative Writing
5. News Story
6. Setting in Creative Writing
7. Writing a Business Letter
8. Letters to the Editor
9. Précis Writing
10. CV & Resume Writing
11. Dialog writing
12. Covering Letter
13. Writing Formal Email
14. Elements of Story Writing
15. Note Making
16. Information Transfer
17. Interviewing for news papers

Unit-5

[20]

Language functions in listening and conversation

1. Discussion on a given topic in pairs
2. Speaking on a given topic individually
3. Group Discussion
4. Interview
5. Dialogue

(Practice to be given using speaking activities from the prescribed textbook)

Grammar and Usage

1. Simple and Compound Sentences
2. Complex Sentences
3. Noun Clause
4. Adjective Clause
5. Adverb Clause
6. The Conditionals in English
7. The Second Conditional
8. The Third Conditional
9. Words and their features
10. Phrasal Verbs
11. Collocation
12. Using Modals
13. Use of Passives
14. Use of Prepositions
15. Subject-verb Agreement
16. Sentence as a system
17. Common Errors in English Usage

Examination pattern

Each reading and writing question will invite a 200 word response.

Midterm test

[20 marks]

Unit 1 (preferably short questions on types and uses of communication)

Total

20 marks

Final Semester Examination

Unit 2	One long question with choice Two short notes with choice	01x 10 qns= 10 marks 02x 05 qns= 10 marks
Unit 3	Reading: 04 questions (2 prose and 2 poetry questions)	04 x 05 qns= 20 marks
Unit 4	Writing: 02 questions	02x 10 qns = 20 marks
Unit 5	Grammar & Usage	02x10 qns = 20 marks
Total		= 80 marks

Grammar questions must be set in contexts; not as isolated sentences as used for practice in the prescribed textbook.

Book Prescribed:

Vistas and Visions: An Anthology of Prose and Poetry. (Ed.) Kalyani Samantray, Himansu S. Mohapatra, Jatindra K. Nayak, Gopa Ranjan Mishra, Arun Kumar Mohanty. OBS

Texts to be studied

Prose

- The Last Leaf
- Ecology and Society
- How Wealth Accumulates and Men Decay
- The Open Window

B.Com. (Hons.): Semester - II
Paper BCH-2.2: Corporate Accounting

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objectives: *To help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniques of preparing the financial statements.*

Contents:

Unit 1. Accounting for Share Capital & Debentures

Issue of shares, forfeiture and reissue of forfeited shares- concept & process of book building, Issue of rights and bonus shares; Buy back of shares, Redemption of preference shares. Issue and Redemption of Debentures

Unit 2 Final Accounts

Preparation of profit and loss account and balance sheet of corporate entities (excluding calculation of managerial remuneration) Disposal of company profits

Unit 3. Valuation of Goodwill and Valuation of Shares

Concepts and calculation - simple problem only

Unit 4 Amalgamation of Companies

Concepts and accounting treatment as per Accounting Standard: 14 (ICAI) (excluding intercompany holdings). Internal reconstruction: concepts and Accounting treatment excluding scheme of reconstruction

Unit 5 Liquidation of Company

Meaning of liquidation, modes of winding up, consequences of winding up, statement of affairs, liquidator's final statement of account, list 'B' contributories

Learning Outcomes: *This paper can provide conceptual clarity about the techniques to prepare financial statements of companies along with accounting treatment of various situations viz. floating of shares, amalgamation and liquidation of companies.*

Suggested Readings:

1. Monga, J.R. *Fundamentals of Corporate Accounting*. Mayur Paper Backs, New Delhi.
2. Tulsian, P.C, *Corporate Accounting*, S. Chand
3. Shukla, M.C., T.S. Grewal, and S.C. Gupta. *Advanced Accounts*. Vol.-II. S. Chand & Co., New Delhi.
4. Maheshwari, S.N. and S. K. Maheshwari. *Corporate Accounting*. Vikas Publishing House, New Delhi.
5. Sehgal, Ashok and Deepak Sehgal. *Corporate Accounting*. Taxman Publication, New Delhi.
6. Gupta, Nirmal. *Corporate Accounting*. Sahitya Bhawan, Agra.
7. Jain, S.P. and K.L. Narang. *Corporate Accounting*. Kalyani Publishers, New Delhi.
8. Compendium of Statements and Standards of Accounting. The Institute of Chartered Accountants of India, New Delhi.
9. Bhushan Kumar Goyal, *Fundamentals of Corporate Accounting*, International Book House

B.Com. (Hons.): Semester - II
Paper BCH-2.3: Corporate Laws

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objectives: *The objective of the course is to impart basic knowledge of the provisions of the Companies Act, 2013 and the Depositories Act, 1996. Case studies involving issues in corporate laws are required to be discussed.*

Contents:

UNIT I Introduction

Administration of Company Law [including National Company Law Tribunal (NCLT), National Company Law Appellate Tribunal (NCLAT), Special Courts]; Characteristics of a company; types of companies including one person company, small company, dormant company and producer company; association not for profit; formation of company, on-line filing of documents, promoters, their legal position. **(As per companies Act, 2013)**

UNIT II Documents

Memorandum of association, articles of association, GDR; book building; issue, allotment and forfeiture of share, transmission of shares, buyback and provisions regarding buyback; issue of bonus shares **(As per companies Act, 2013)**

UNIT III Management

Classification of directors, women directors, independent director, disqualifications, director identity number (DIN); appointment; Legal positions, powers and duties; removal of directors; managing director, meetings of shareholders and board; types of meeting, meeting through video conferencing, e-voting. Audit Committee, Nomination and Remuneration Committee, Stakeholders Relationship Committee, Corporate Social Responsibility Committee. **(As per companies Act, 2013)**

UNIT IV Dividends, Accounts, Audit–

Provisions relating to payment of Dividend, Provisions relating to Books of Account, Provisions relating to Audit, Auditors' Appointment, Rotation of Auditors, Auditors' Report.

Winding Up - Concept and modes of Winding Up.

Insider Trading, Whistle Blowing – Insider trading; meaning & legal provisions; Whistle blowing: Concept and Mechanism.

UNIT V Depositories Law:

The Depositories Act 1996 – Definitions; rights and obligations of depositories; participants issuers and beneficial owners; inquiry and inspections, penalty

Learning Outcomes: *Students would acquire knowledge about the legal framework and the ways and means to deal with the legal aspect of different situations of corporate sector.*

Suggested Readings:

1. Arora & Banshal, Corporate Law – Vikash Publication
2. Gogna, P.P.S – Company Law, S. Chand
3. MC Kuchhal *Corporate Laws*, Shri Mahaveer Book Depot. (Publishers).
4. GK Kapoor & Sanjay Dhamija, *Company Law*, Bharat Law House.
5. Reena Chadha and Sumant Chadha, *Corporate Laws*, Scholar Tech Press.
6. Gower, LCB, *Principles of Modern company Law*, Stevens & Sons, London.
7. Ramaiya, *A Guide to Companies Act*, LexisNexis, Wadhwa and Butters worth.
8. *A Compendium of Companies Act 2013, along with Rules*, by Taxmann Publications.
9. Avtar Singh, *Introduction to company Law*, Eastern Book Company

B.Com. (Hons.): Semester - II
Paper BCH-2.4: Macro Economics

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objectives: *The course aims at providing the student with knowledge of basic concepts of the macro economics. The modern tools of macro-economic analysis are discussed and the policy framework is elaborated, including the open economy.*

Contents:

Unit I

Introduction – concepts and variables of macro-economics, income, expenditure and the circular flow, components of expenditure. Static macro economic analysis short and the long run – determination of supply, determination of demand, and conditions of equilibrium

Unit II

Economy in the short run – IS–LM framework, fiscal and monetary policy, determination of aggregate demand, shifts in aggregate demand, aggregate supply in the short and long run, and aggregate demand- aggregate supply analysis.

Unit III

Inflation, causes of rising and falling inflation, inflation and interest rates, social costs of inflation. Unemployment – natural rate of unemployment, frictional and wait unemployment. The trade-off between inflation and unemployment

Unit IV

Open economy – flows of goods and capital, saving and investment in a small and a large open economy, exchange rates, Mundell – Fleming model with fixed and flexible prices in a small open economy with fixed and with flexible exchange rates, interest-rate differentials case of a large economy.

Unit V

Behavioral Foundations - Investment –determinants of business fixed investment, effect of tax, determinants of residential investment and inventory investment. Demand for Money – Portfolio and transactions theories of demand for real balances, interest and income elasticity of demand for real balances, Supply of money.

Learning Outcomes: *Students would be able to apply the modern tools of macro-economic analysis so as to minimize the adverse impact of macro-economic factors on business.*

Suggested Readings

1. Ahuja H.L – Macro Economics – S.Chand
2. Mankiw, N. Gregory. *Principles Macroeconomics*. Cengage Learning
3. Dornbusch, Rudiger, and Stanley. Fischer, *Macroeconomics*. McGraw-Hill.
4. Dornbusch, Rudiger., Stanley. Fischer and Richard Startz, *Macroeconomics*. Irwin/McGraw-Hill.
5. Deepashree, *Macro Economics*, Scholar Tech. New Delhi.
6. Barro, Robert, J. *Macroeconomics*, MIT Press, Cambridge MA.
7. Burda, Michael, and Wyplosz. *Macroeconomics A European Text*. Oxford University Press, Oxford.
8. Vaish – Macro Economics – Vikash Publication
9. Salvatore, Dominick. *International Economics*. John Wiley & Sons Singapore.
8. Branson, William H. *Macroeconomic Theory and Policy*. HarperCollins India Pvt. Ltd.

B.Com. (Hons.): Semester - II **Paper BCH-2.5: Computerized Accounting**

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objectives: *To help the students to understand accounting as an information system for the generation of accounting information and preparation of accounting reports.*

Contents:

Unit I – Introduction to Computer and Accounting Information System

Introduction to Computer (Elements, Capabilities, Limitations of Computer System), Introduction to Operating software, utility software and application software, Introduction to Accounting Information System (AIS) as a part of MIS

Unit II Overview of Computerized Accounting System

Introduction: Application in Accounting; Features of Computerized Accounting System, Structure of CAS, Software Packages: Generic, Specific; Tailored.

Unit III Accounting Application of Electronic Spreadsheet

Concept of electronic Spread-sheet, Features offered by electronic spread-sheet; Application in generating accounting information – Bank reconciliation statement; asset accounting; loan, repayment of loan schedule, ratio analysis, Data representation – graphs, charts and diagrams.

Unit IV Using Computerized Accounting System

Computerised Accounting Systems: Computerized Accounts by using any popular accounting software: Creating a Company; Configure and Features settings; Creating Accounting Ledgers and Groups; Creating Stock Items and Groups; Vouchers Entry; Generating Reports - Cash Book, Ledger Accounts, Trial Balance, Profit and Loss Account, Balance Sheet, Funds Flow Statement, Cash Flow Statement Selecting and shutting a Company; Backup and Restore data of a Company

Unit V Database Management System (DBMS)

Concept and features of DBMS; DBMS in Business Application; Generating Accounting Information – Payroll.

Learning Outcome: After reading this subject the students will be able to define a computerized accounting system; distinguish between a manual and computerized accounting system; highlight the advantages and limitations of computerized accounting system and state the sourcing of a computerized accounting system.

Suggested Readings

1. Nanda Dhameja, Financial Accounting for Managerial Competitiveness – S.Chand
2. Maheswari S.N. - Introduction to Accounting – Vikash Publication

B.Com. (Hons.): Semester - III Paper BCH-3.1: Human Resource Management

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objective: The objective of the course is to acquaint students with the techniques and principles to manage human resource of an organization.

Contents:

Unit I:

Human Resource Management: Concept and Functions, Role, Status and competencies of HR Manager, HR Policies, Evolution of HRM. Emerging Challenges of Human Resource Management; workforce diversity, empowerment, Downsizing; VRS; Human Resource Information System;

Unit II

Acquisition of Human Resource: Human Resource Planning- Quantitative and Qualitative dimensions; job analysis – job description and job specification; Recruitment – Concept and sources; Selection – Concept and process; test and interview; placement induction.

Unit III

Training and Development; Concept and Importance; Identifying Training and Development Needs; Designing Training Programmes; Role Specific and Competency Based Training; Evaluating Training Effectiveness; Training Process Outsourcing; Management Development; Career Development.

Unit IV

Performance appraisal; nature and objectives; Modern Techniques of performance appraisal; potential appraisal and employee counseling; job changes - transfers and promotions. Compensation: concept and policies; job evaluation; methods of wage payments and incentive plans; fringe benefits; performance linked compensation.

Unit V

Maintenance: employee health and safety; employee welfare; social security; Employer Employee relations- an overview. Grievance handling and redressal Industrial Disputes causes and settlement machinery..

Learning Outcomes: This paper can enhance the capability of the students to manage the most important assets of organization i.e. human beings which is much needed to ensure growth of that organization.

Suggested Readings:

1. Bohlendar and Snell, *Principles of Human Resource Management*, Cengage Learning
2. Chhabra, T.N. *Essentials of Human Resource Management*. Sun India Publication New Delhi.
3. DeCenzo, D.A. and S.P. Robbins, “*Personnel/Human Resource Management*”, Prentice Hall of India, New Delhi.
4. Khanka S.S. *Human Resource Management*. S Chand.
5. Rao V.S.P - *Human Resource Management*. Vikash Publication
6. SanghiSeema, *Human Resource Management* – Vikash Publication
7. Ivancevich, John M. *Human Resource Management*. McGraw Hill.
8. Wreather and Davis. *Human Resource Management*. Pearson Education.
9. Robert L. Mathis and John H. Jackson. *Human Resource Management*. Cengage Learning.

B.Com. (Hons.): Semester - III
Paper BCH-3.2: Income Tax Law and Practice

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objective: *To provide basic knowledge and equip students with the application of principles and provisions of Income Tax Act 1961.*

Contents:

Unit I

Basic concept: Income, agricultural income, person, assessee, assessment year, previous year, gross total income, total income, Maximum marginal rate of tax. Permanent Account Number (PAN), Residential status; Scope of total income on the basis of residential Status Exempted income under section 10

Unit II Computation of income under different heads

- Salaries
- Income from house property

Unit III Computation of income under different heads

- Profits and gains of business or profession
- Capital gains
- Income from other sources

Unit IV Total income and tax computation

Income of other persons included in assessee's total income- Aggregation of income and set-off and carry forward of losses Deductions from gross total income, Rebates and reliefs

- Computation of total income of individuals and firms
- Tax liability of an individual and firm
- Five leading cases of Supreme Court

Unit V Preparation of return of income:

- Manually On-line filing of Returns of Income & TDS.
- Provision & Procedures of Compulsory On-Line filing of returns for specified assesses.

Learning Outcomes: *This paper would provide the understanding of various provisions of Income Tax Act as well as equip the students to make practical applications of the provisions for taxation purpose.*

Suggested readings:

1. Singhania, Vinod K. and Monica Singhania. *Students' Guide to Income Tax, University Edition*. Taxmann Publications Pvt. Ltd., New Delhi.
2. Ahuja, Girish and Ravi Gupta. *Systematic Approach to Income Tax*. Bharat Law House, Delhi.
3. Pagare, Dinkar. *Law and Practice of Income Tax*. Sultan Chand and Sons, New Delhi.
4. Lal, B.B. *Income Tax Law and Practice*. Konark Publications, New Delhi.

Journals

1. *Income Tax Reports*. Company Law Institute of India Pvt. Ltd., Chennai.
2. *Taxman*. Taxman Allied Services Pvt. Ltd., New Delhi.
3. *Current Tax Reporter*. Current Tax Reporter, Jodhpur.

Software

1. Dr. Vinod Kumar Singhania, *e-filing of Income Tax Returns and Computation of Tax*, Taxmann Publication Pvt. Ltd, New Delhi. Latest version
2. Excel Utility available at incometaxindiaefiling.gov.in

B.Com. (Hons.): Semester - III
Paper BCH-3.3: Management Principles & Applications

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objective: *The objective of the course is to provide the student with an understanding of basic management concepts, principles and practices.*

Unit 1: Introduction

Concept: Need for Study, Managerial Functions – An overview; Co-ordination: Essence of Managership, Evolution of the Management Thought, Classical Approach – Taylor, Fayol, Neo-Classical and Human Relations Approaches – Mayo, Hawthorne Experiments, Behavioural Approach, Systems Approach, Contingency Approach – Lawrence & Lorsch, MBO - Peter F. Drucker

Unit 2: Planning

- a. Types of Plan – An overview to highlight the differences
- b. Strategic planning – Concept, process, Importance and limitations
- c. Environmental Analysis and diagnosis (Internal and external environment) – Definition, Importance and Techniques (SWOT/TOWS/WOTS-UP, BCG Matrix, Competitor Analysis), Business environment; Concept and Components
- d. Decision-making – concept, importance

Unit 3: Organising

Concept and process of organising – An overview, Span of management, Different types of authority (line, staff and functional), Decentralisation, Delegation of authority Formal and Informal Structure; Principles of Organising; Network Organisation Structure

Unit 4: Staffing and Leading

a. *Staffing*: Concept of staffing, staffing process b. *Motivation*: Concept, Importance, extrinsic and intrinsic motivation; Major Motivation theories - Maslow's Need-Hierarchy Theory; Herzberg's Two-factor Theory, Vroom's Expectation Theory. c. *Leadership*: Concept, Importance, Major theories of Leadership (Likert's scale theory, Blake and Mouten's Managerial Grid theory) d. *Communication*: Concept, purpose, process; Oral and written communication; Formal and informal communication networks, Barriers to communication, Overcoming barriers to communication.

Unit 5: Control

a. *Control*: Concept, Process, Limitations, Principles of Effective Control, Major Techniques of control - Ratio Analysis, ROI, Budgetary Control, EVA, PERT/CPM.
b. Emerging issues in Management

Learning Outcomes: *Students would be able to make use of different management principles in the course of decision making in different forms of business organizations.*

Suggested Readings:

1. Chandan J.S – *Management Concepts of Strategy* – Vikash Publication
2. Pillai RSN – *Principles & Practice of Management* – S. Chand
3. Harold Koontz and Heinz Weihrich, *Essentials of Management: An International and*
4. *Leadership Perspective*, McGraw Hill Education.
5. Stephen P Robbins and Madhushree Nanda Agrawal, *Fundamentals of Management: Essential*
6. *Concepts and Applications*, Pearson Education.
7. George Terry, *Principles of Management*, Richard D. Irwin
8. Newman, Summer, and Gilbert, *Management*, PHI
9. James H. Donnelly, *Fundamentals of Management*, Pearson Education.
10. B.P. Singh and A.K.Singh, *Essentials of Management*, Excel Books
11. Griffin, *Management Principles and Application*, Cengage Learning
12. Robert Kreitner, *Management Theory and Application*, Cengage Learning
13. TN Chhabra, *Management Concepts and Practice*, DhanpatRai& Co. (Pvt. Ltd.), New Delhi
14. Peter F Drucker, *Practice of Management*, Mercury Books, London
15. Gupta R.N - *Principles & Practice of Management* – S. Chand

B.Com. (Hons.): Semester - III
Paper 3.4: Business Statistics

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objective: *The objective of this course is to familiarize students with the basic statistical tools used for managerial decision-making.*

Contents:

Unit 1 Statistical Data and Descriptive Statistics

Nature and Classification of data: univariate, bivariate and multivariate data; time-series and cross-sectional data

Measures of Central Tendency

- a) Mathematical averages including arithmetic mean, geometric mean and harmonic mean. Properties and applications.
- b) Positional Averages
Mode and Median (and other partition values including quartiles, deciles, and percentiles) (including graphic determination)

Unit 2

Measures of Variation: absolute and relative. Range, quartile deviation, mean deviation, standard deviation, and their coefficients, Properties of standard deviation/variance Skewness: Meaning, Measurement using Karl Pearson and Bowley's measures; Concept of Kurtosis

Probability and Probability Distributions

Theory of Probability: Approaches to the calculation of probability, Calculation of event probabilities. Addition and multiplication laws of probability (Proof not required) Conditional probability and Bayes' Theorem (Proof not required)

Unit 3 Simple Correlation and Regression Analysis

Correlation Analysis: Meaning of Correlation: simple, multiple and partial; linear and non-linear, Correlation and Causation, Scatter diagram, Pearson's co-efficient of correlation; calculation and properties (proofs not required). Correlation and Probable error; Rank Correlation

Regression Analysis: Principle of least squares and regression lines, Regression equations and estimation; Properties of regression coefficients; Relationship between Correlation and Regression coefficients; Standard Error of Estimate

Unit 4 Index Numbers

Meaning and uses of index numbers: Construction of index numbers: fixed and chain base: univariate and composite. Aggregative and average of relatives – simple and weighted

Tests of adequacy of index numbers, Base shifting, splicing and deflating. Problems in the construction of index numbers

Construction of consumer price indices, important share price indices

Unit 5 Time Series Analysis

Components of time series, Additive and multiplicative models Trend analysis, Fitting of trend line using principle of least squares – linear, second degree parabola and exponential. Conversion of annual linear trend equation to quarterly/monthly basis and vice-versa; Moving averages Seasonal variations- Calculation of Seasonal Indices using Simple averages, Ratio-to-trend, and Ratio-to-moving averages methods. Uses of Seasonal Indices

Learning Outcomes: Students would be armed with the knowledge of using different statistical tools very much required in the decision making process in any business as well as business research.

Suggested Readings:

1. Sharma J K, Fundamentals of Business Statistics – Vikash Publication
2. Levin, Richard, David S. Rubin, Rastogi, and Siddiqui. *Statistics for Management*. 7th Edition. Pearson Education.
3. Berenson and Levine. *Basic Business Statistics: Concepts and Applications*. Pearson Education.
4. Siegel Andrew F. *Practical Business Statistics*. McGraw Hill.
5. Hazarika P. Business Statistics – S. Chand
6. Vohra N. D., *Business Statistics*, McGraw Hill.
7. Spiegel M.D. *Theory and Problems of Statistics*. Schaum's Outlines Series. McGraw Hill Publishing Co.
8. Gupta, S.P., and Archana Gupta. *Statistical Methods*. Sultan Chand and Sons, New Delhi.
9. Gupta, S.C. *Fundamentals of Statistics*. Himalaya Publishing House.
10. Arora – Business Statistics – S.Chand

B.Com. (Hons.): Semester - III Paper 3.5: E-Commerce

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objectives: To enable the student to become familiar with the mechanism for conducting business transactions through electronic means.

Contents

Unit-1

Unit I: Introduction: Meaning, nature, concepts, advantages and reasons for transacting online, categories of E-Commerce, Supply Chain Management, Customer Relations Management

Unit 2:

Planning Online-Business: Nature and dynamics of the internet, pure online vs. brick and click business; assessing requirement for an online business designing, developing and deploying the system, one to one enterprise.

Unit 3 Technology for Online-Business:

Internet, IT Infrastructure, Middle ware contents: Text and Integrating E-business applications.

Unit 4: Mechanism of making payment through internet:

Online-payment mechanism; Electronic Payment systems; payment Gateways; Visitors to website; tools for promoting websites; Plastic Money: Debit Card, Credit Card;

Unit 5: Applications in E-Commerce:

E-commerce applications in manufacturing, Wholesale, retail and service sector.

Security and Legal Aspects of E-Commerce:

Threats in E-Commerce, Security of Clients and Service-Provider; Cyber Law - Information Technology Act 2000: An overview of major provisions

Learning Outcomes: This paper would enhance the technical skills of the students to get into the business ventures using electronic means thereby providing the opportunity to gain access to a larger customer base.

Suggested Readings:

1. Pandey U.S – E.Commerce& Mobile Commerce Technology – S. Chand

B.Com. (Hons.): Semester – IV
Paper BCH- 4.1: COST AND MANAGEMENT ACCOUNTING

Duration: 3 hrs.

Marks: 100 (80 + 20)

Lectures: 65

Objective: To acquaint the students with basic concepts used in cost accounting, various methods involved in cost ascertainment.

CONTENTS:

Unit 1: Introduction

Meaning, objectives and advantages of cost accounting; Difference between cost accounting and financial accounting; Cost concepts and classifications; Elements of cost

Materials: Material/inventory control- concept and techniques, Accounting and control of purchases, storage and issue of materials. Methods of pricing of materials issues – FIFO, LIFO and Average

Unit 2: Labour and Overhead

Labour: Accounting and Control of labour cost. Time keeping and time booking. Concept and treatment of idle time, over time, labour turnover and fringe benefits. Methods of wage payment and the Incentive schemes- Halsey, Rowan, Taylor's Differential piece wage.

Overhead: Classification, allocation, apportionment and absorption of overhead. Under- and over-absorption

Unit 3: Methods of Costing

Methods of Costing: Unit costing, Job costing, Contract Costing, Process costing (excluding process losses, valuation of work in progress, joint and by-products)

Unit 4: Budgeting and Standard Costing

Budgeting and budgetary control: Concept of budget and budgetary control, objectives, merits, and limitations, Budget administration, Functional budgets, Fixed and flexible budgets, Zero base budget

Standard costing and variance analysis: Meaning of standard cost and standard costing: advantages, limitations and applications, Variance analysis – material, labour and overhead

Unit 5: Marginal Costing

Absorption versus variable costing: Distinctive features and income determination. Cost-Volume-Profit Analysis: Break-even analysis-algebraic and graphic methods. Contribution, Margin of safety and Angle of incidence

Learning Outcome: After the completion of this paper, the students will be able to have confidence in managing cost issues and also to keep a check on cost control and taking managerial decisions.

Suggested Reading:

1. Horngreen, Charles T., George Foster and Srikant M. Dattar. *Cost Accounting: A Managerial Emphasis*. Prentice Hall of India Ltd., New Delhi.
2. Horngreen, Charles T., Gary L. Sundem. *Introduction to Management Accounting*. Prentice Hall.
3. Jain, S.P. and K.L. Narang. *Cost Accounting: Principles and Methods*. Kalyani Publishers, Jalandhar.
4. Lal, Jawahar. *Cost Accounting*. Tata McGraw Hill Publishing Co., New Delhi.
5. Nigam, B.M. Lall and I.C. Jain. *Cost Accounting: Principles and Practice*. Prentice Hall of India, New Delhi.
6. Arora, M.N. *Cost Accounting – Principles and Practice*. Vikas Publishing House, New Delhi.
7. Maheshwari, S.N. and S.N. Mittal. *Cost Accounting: Theory and Problems*. Shri Mahabir Book Depot, New Delhi.
8. Singh, S. K. and Gupta Lovleen. *Management Accounting – Theory and Practice*. Pinnacle Publishing House.
9. Usry, Milton E. and Lawrence H. Hammer. *Cost Accounting: Planning and Control*. South Western Publishing Co.
10. Barfield, Jesset T., Cecily A. Raibarn and Michael R. Kinney. *Cost Accounting: Traditions and Innovations*. Thomson Learning.

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11. Lucey, T. Costing. ELST, London.
12. Garrison H., Ray and Eric W. Noreen. *Managerial Accounting*. McGraw Hill.
13. Drury, Colin. *Management and Cost Accounting*. Cengage Learning.
14. Lal, Jawahar. *Advanced Management Accounting Text and Cases*. S. Chand & Co., New Delhi.
15. Khan, M.Y. and P.K. Jain. *Management Accounting*. Tata McGraw Hill, Publishing Co., New Delhi.
16. Hansen, *Managerial Accounting*, Cengage Learning

B.Com. (Hons.): Semester - IV
Paper BCH-4.2: BUSINESS MATHEMATICS

Duration: 3 hrs.

Marks: 100 (80 + 20)

(Lectures: 65)

Objective: The objective of this course is to familiarize the students with the basic mathematical tools with emphasis on applications to business and economic situations.

Contents:

Unit 1. Matrices and Determinant

Algebra of matrices, Inverse of a matrix, Matrix Operation – Business Application Solution of system of linear equations (having unique solution and involving not more than three variables) using matrix inversion Method and Cremer's Rule.

Unit 2. Calculus I

Mathematical functions and their types- linear, quadratic, polynomial, exponential, logarithmic and logistic function. Concepts of limit, and continuity of a function, Concept and rules of differentiation, Maxima and Minima involving second order

Unit 3. Calculus II

Integration: Standard forms, Methods of integration – by substitution, by parts and by use of partial fractions, definite integration, finding areas in simple cases

Unit 4. Mathematics of Finance

Compounding and discounting of a sum using different types of rates. Types of annuities, like ordinary, due, deferred, continuous, perpetual, and their future and present values using different types of rates of interest, Depreciation of Assets. (*General annuities to be excluded*)

Unit 5. Linear Programming

Formulation of linear programming problems (LPP): Graphical solution to LPPs. Cases of unique and multiple optimal solutions, Unbounded solutions and infeasibility, and redundant constraints, Solution to LPPs using Simplex method – maximization and minimization cases.

Learning Outcome: After reading this subject the students will be able to understand basic concepts in the areas of business calculus and financial mathematics and to connect acquired knowledge with practical problems in economic practice.

Suggested Readings:

1. Arora P.N. Business Mathematics – S.Chand
2. Anthony, M. and N. Biggs. *Mathematics for Economics and Finance*. Cambridge University Press.
3. Arora S.R & Gupta K. – Business Mathematics – Taxmann Publication
4. Ayres, Frank Jr. *Theory and Problems of Mathematics of Finance*. Schaum's Outlines Series. McGraw Hill Publishing Co.
5. Budnick, P. *Applied Mathematics*. McGraw Hill Publishing Co.
6. Dowling, E.T. *Mathematics for Economics*, Schaum's Outlines Series. McGraw Hill Publishing Co.
7. Mizrahi and John Sullivan. *Mathematics for Business and Social Sciences*. Wiley and Sons.
8. Zamirudeen & Bhambri – Business Statistics – Vikash Publication
9. Wikes, F.M. *Mathematics for Business, Finance and Economics*. Thomson Learning.
10. Prasad, Bindra and P.K. Mittal. *Fundamentals of Business Mathematics*. Har-Anand Publications.
11. Thukral, J.K. *Mathematics for Business Studies*. Mayur Publications.
12. Vohra, N.D. *Quantitative Techniques in Management*. Tata McGraw Hill Publishing Company.
13. Soni, R.S. *Business Mathematics*. Pitambar Publishing House.
14. Singh J. K. *Business Mathematics*. Himalaya Publishing House
15. Hazarika P. Business Mathematics – S.Chand

B.Com. (Hons.): Semester - IV
Paper – BCH 4.3: COMPUTER APPLICATIONS IN BUSINESS

Duration: 3 hrs.
65)

Marks: 100(80+20)

(Lectures:

Objectives: To provide computer skills and knowledge for commerce students and to enhance the student understands of usefulness of information technology tools for business operations.

Contents:

Unit 1. Word Processing

Introduction to word Processing, Word processing concepts, Use of Templates, Working with word document: (Opening an existing document/creating a new document, Saving, Selecting text, Editing text, Finding and replacing text, Closing, Formatting, Checking and correcting spellings)Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, Mail Merge including linking with Access Database, Tables: Formatting the table, Inserting filling and formatting a table Creating Documents in the areas: Mail Merge including linking with Access Database, Handling Tables, Inserting Pictures and Video

Unit 2. Preparing Presentations:

Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation; and Slideshow

Unit 3. Spreadsheet and its Business Applications

Spreadsheet concepts, Creating a work book, Saving a work book, Editing a workbook, Inserting, deleting work sheets, Entering data in a cell, Formula Copying, Moving data from selected cells, Handling operators in formula, Rearranging Worksheet, Project involving multiple spreadsheets, Organizing Charts and graphs, Printing worksheet, Generally used Spread sheet functions: Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and reference, Text functions.

Unit 4. Creating spreadsheet in the following areas:

Loan & Lease statement ;Ratio Analysis ;Payroll statements ;Capital Budgeting ;Depreciation Accounting; Graphical representation of data; Frequency distribution and its statistical parameters Correlation and Regression

Unit 5. Database Management System

Creating Data Tables, Editing a Database using Forms, Performing queries, Generating Reports Creating DBMS in the areas of Accounting, Employees, Suppliers and Customer

Learning Outcome: The completion of this paper will enhance students' computer abilities and skills to compete with the present technology driven business market.

NOTE:

- There shall be a practical examination of 100 Marks (Practical-80 Marks, Viva-10 Marks and Work Book- 10 Marks) and duration of Examination shall be 3 Hrs.
- Teaching arrangement need to be made in the computer Lab
- There shall be four lectures per class and 4 Practical Lab periods per batch to be thought in computer Lab.

Suggested Readings:

1. Saxena& Chopra – Computer Application in Management – Vikash Publication
2. Nagpal – Computer Fundamental – S.Chand

B.Com. (Hons.): Semester - IV

Paper BCH 4.4: INDIAN ECONOMY – PERFORMANCE AND POLICIES

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objective: This course seeks to enable the student to grasp the major economic problems in India and their solution.

Contents:

Unit 1: Basic Issues in Economic Development:

Concept and Measure of Development and Underdevelopment; Human Development

Unit 2: Basic Features of the Indian Economy at Independence:

Unit 3: Policy Regimes:

- a) The evolution of planning and import substituting industrialization, (b) Economic reform and liberalization

Unit 4: Growth, Development and Structural Change:

- a) The experience of Growth, Development and Structural Change in different phases of growth and policy regimes across sectors and regions.
- b) The Institutional Framework: Patterns of assets ownership in agriculture and industry; Policies for restructuring agrarian relations and for regulating concentration of economic power;
- c) Changes in policy perspectives on the role of institutional framework after 1991.
- d) Growth and Distribution; Unemployment and Poverty; Human Development; Environmental concerns.
- e) Demographic Constraints: Interaction between population change and economic development.

Unit 5: Sectoral Trends and Issues:

- a) Agriculture: Agrarian growth and performance in different phases of policy regimes i.e. pre green revolution and the two phases of green revolution; Factors influencing productivity and growth; the role of technology and institutions; price policy, the public distribution system and food security.
- b) Industry and Services: Phases of Industrializations – the rate and pattern of industrial growth across alternative policy regimes; Public sector – its role, performance and reforms; The small scale sector; Role of Foreign capital.
- c) The Financial Sector: Structure, Performance and Reforms. Foreign Trade and balance of Payments: Structural Changes and Performance of India's Foreign Trade and Balance of Payments; Trade Policy Debate; Export policies and performance; Macro Economic Stabilization and Structural Adjustment; India and the WTO.

Learning Outcome: *After the completion of this paper, the student will be able to identify the key performance indicators and policies of the present economic environment of the country.*

Readings:

1. Gaurav Dutt and KPM Sundarum, *Indian Economy*, S. Chand & Company.
2. Gopalji, Suman & Anisha Bakhri – *Indian Economy*, Vikash Publication
3. Mishra and Puri, *Indian Economics*, Himalaya Publishing House
4. Deepashree, "*Indian Economy, Performance and Policies*", Scholar Tech. New Delhi
5. Bettelheim. Charles *India Independent*. Chapters 1, 2 and 3.
6. Bhagwati, J. and Desai, P. *India: Planning for industrialization*, OUP, Ch 2.
7. Patnaik, Prabhat. *Some Indian Debates on Planning*. T. J. Byres (ed.). *The Indian Economy: Major Debates since Independence*, OUP.
8. Ahluwalia, Montek S. *State-level Performance under Economic Reforms in India* in A. O. Krueger. (ed.). *Economic Policy Reforms and the Indian Economy*, The University of Chicago Press.

9. Nagaraj, R. *Indian Economy since 1980: Vitrious Growth or Polarisation?* Economic and Political Weekly. pp. 2831-39.
10. Ray, S. K. *Land Systems and its Reforms In India. Sections II & III*, Indian Journal of Agricultural Economics. Vol. 51. Nos. 1 & 2.
11. Visaria, Pravin. *Demographic Aspects of Development: The Indian Experience*. Indian Journal of Social Sciences. Vol. 6. No. 3.
12. Dreze, Jean and Amartya Sen. *Economic Development and Social Opportunity*. Ch. 2. OUP.
13. Vaidyanathan, A. *India's Agricultural Development Policy*. Economic and Political Weekly.
14. Sawant, S. D. and C. V. Achuthan. *Agricultural Growth across Crops and Regions: Emerging Trends and Patterns*. Economic and Political Weekly. Vol. 30 A2-A13.
15. Krishnaji, N. *Agricultural Price Policy: A Survey with Reference to Indian Foodgrain Economy*. Economic and Political Weekly. Vol. 25. No. 26.
16. Chaudhuri, Sudip. *Debates on Industrialisation*. in T.J. Byres (ed.). *The Indian Economy: Major Debates since Independence*, OUP.
17. Chandra, Nirmal K. *Growth of Foreign Capital and its Importance in Indian Manufacturing*. Economic and Political Weekly. Vol. 26. No. 11.
18. Khanna, Sushil. *Financial Reforms and Industrial Sector in India*. Economic and Political Weekly. Vol. 34. No. 45.
19. Vaidyanathan, A. *Poverty and Development Policy*. Economic and Political Weekly.
20. Deaton, A and Jean Dreze. *Poverty and Inequality in India*. Economic and Political Weekly.
21. Planning Commission, *Task Force on Employment Opportunities*. Ch 1 and 2
22. Uma Kapila (ed), "*Indian Economy since Independence*", Relevant articles.
23. Rangarajan, C. and N. Jadhav. *Issues in Financial Sector Reform*. BimalJalan. (ed). *The Indian Economy*. Oxford University Press, New Delhi.
24. Chakravarty, Sukhamoy. *Development Planning – The Indian Experience*. Oxford University Press, Delhi.

B.Com. (Hons.): Semester - IV **Paper BCH 4.5: Entrepreneurship**

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objective: The purpose of the paper is to orient the learner toward entrepreneurship as a career option and creative thinking and behavior for effectiveness at work and in life.

Contents:

Unit 1

Meaning, elements, determinants and importance of entrepreneurship and creative behavior Entrepreneurship and creative response to the society's problems and at work, Dimensions of entrepreneurship: intra-preneurship, techno-preneurship, cultural entrepreneurship, international entrepreneurship, net-preneurship, eco-preneurship, and social entrepreneurship.

Unit 2

Entrepreneurship and Micro, Small and Medium Enterprises:

Concept of business groups and role of business houses and family business in India, The contemporary role models in Indian business: their values, business philosophy and behavioral orientations. Conflict in family business and its resolution

Unit 3

Public and private system of stimulation, support and sustainability of entrepreneurship, Requirement, availability and access to finance, marketing assistance, technology, and industrial accommodation, Role of industries/entrepreneur's associations and self-help groups. The concept, role and functions of business incubators, angel investors, venture capital and private equity fund.

Unit 4

Sources of business ideas and tests of feasibility:

Significance of writing the business plan/ project proposal, Contents of business plan/ project proposal. Designing business processes, location, layout, operation, planning & control; preparation of project report (various aspects of the project report such as size of investment, nature of product, market potential may be covered). Project submission/ presentation and appraisal thereof by external agencies, such as financial/non-financial institutions

Unit 5

Mobilizing resources for start-up, Accommodation and utilities, Preliminary contracts with the vendors, suppliers, bankers, principal customers; Contract management: Basic start-up problems.

Learning outcome: After the completion of this paper, student will have the entrepreneurial temper with conceptual input and practical insight as how to be an entrepreneur.

Suggested Readings:

1. SS Khanka, Entrepreneurial Development, S. Chand & Co, Delhi.
2. Kuratko and Rao, *Entrepreneurship: A South Asian Perspective*, Cengage Learning.
3. Rao, V.S.P – Business Entrepreneurship & Management – Vikash Publication
4. Desai, Vasant. *Dynamics of Entrepreneurial Development and Management*. Mumbai, Himalaya Publishing House.
5. Dollinger, Mare J. *Entrepreneurship: Strategies and Resources*. Illinois, Irwin.
6. Holt, David H. *Entrepreneurship: New Venture Creation*. Prentice-Hall of India, New Delhi.
7. Jain, Arun Kumar. *Competitive Excellence: Critical Success Factors*. New Delhi: Viva Books Limited. ISBN-81-7649-272-8.
6. Panda, ShibaCharan. *Entrepreneurship Development*. New Delhi, Anmol Publications. (Latest Editions)
7. Plsek, Paul E. *Creativity, Innovation and Quality*. (Eastern Economic Edition), New Delhi: Prentice-Hall of India. ISBN-81-203-1690-8.
8. SIDBI Reports on Small Scale Industries Sector.
9. Singh, Nagendra P. *Emerging Trends in Entrepreneurship Development*. New Delhi: ASEED.

B.Com. (Hons.): Semester - IV
Paper BCH 4.6: Personal Selling and Salesmanship (Optional-II)

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objective: The purpose of this course is to familiarize the students with the fundamentals of personal selling and the selling process. They will be able to understand selling as a career and what it takes to be a successful salesman

Unit 1:

Introduction to Personal Selling: Nature and importance of personal selling, myths of selling, Difference between Personal Selling, Salesmanship and Sales Management, Characteristics of a good salesman, types of selling situations, types of salespersons, Career opportunities in selling, Measures for making selling an attractive career.

Unit- II

Buying Motives: Concept of motivation, Maslow's theory of need hierarchy; Dynamic nature of motivation; Buying motives and their uses in personal selling

Unit- III

Selling Process: Prospecting and qualifying; Pre-approach; Approach; Presentation and demonstration; handling of objections; Closing the sale; Post sales activities.

Unit- IV

Sales Reports: reports and documents; sales manual, Order Book, Cash Memo; Tour Diary, Daily and Periodical Reports; Ethical aspects of Selling.

Unit V

Advertising: Meaning, Importance and Features, Modes of advertisements and their respective merits and demerits.

Learning outcome: After the completion of this paper, the students will be able to identify and understand the psychology of selling and different factors that shape the buying behaviour of customers.

Suggested Readings:

1. Davar R.S – Salesmanship and Publicity – Vikash Publication
2. Sahu P.K & Rout K.C – Salesmanship & Sales Management – S.Chand
3. Spiro, Stanton, and Rich, *Management of the Sales force*, McGraw Hill.
4. Russell, F. A. Beach and Richard H. Buskirk, *Selling: Principles and Practices*, McGraw Hill
5. Futrell, Charles, *Sales Management: Behaviour, Practices and Cases*, The Dryden Press.
6. Still, Richard R., Edward W. Cundiff and Norman A. P. Govoni, *Sales Management: Decision*
7. *Strategies and Cases*, Prentice Hall of India Ltd., New Delhi,
8. Johnson, Kurtz and Schueing, *Sales Management*, McGraw Hill
9. Kapoor Neeru, *Advertising and personal Selling*, Pinnacle, New Delhi.

B.Com. (Hons.): Semester – V
Paper BCH 5.1: PRINCIPLES OF MARKETING

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objective: The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of marketing.

Contents:

Unit-1

Introduction: Nature, scope and importance marketing; Evolution of marketing concepts; Marketing mix, Marketing environment.

Consumer Behavior – An Overview: Consumer buying process; Factors influencing consumer buying decisions.

Unit-2

Market Selection: Market segmentation – concept, importance and bases; Target market selection; Positioning concept, importance and bases; Product differentiation vs. market segmentation;

Product: Meaning and importance. Product classifications; Concept of product mix; Branding, packaging and labeling; Product-Support; Product life-cycle; New Product Development

Unit-3

Pricing: Significance, Factors affecting price of a product; Pricing Policies and strategies;
Promotion: Nature and importance of promotion; Communication process; Types of promotion: advertising, personal selling, public relations & sales promotion, and their distinctive characteristics; Promotion mix and factors affecting promotion mix decisions.

Unit-4

Distribution: Channels of distribution - meaning and importance; Types of distribution channels; Wholesaling and retailing; Factors affecting choice of distribution channel; Physical Distribution.

Retailing: Types of retailing – store based and non-store based retailing, chain stores, specialty stores, supermarkets, retail vending machines, mail order houses, retail cooperatives; Management of retailing operations: an overview; Retailing in India: changing scenario.

Unit-5

Rural marketing: Growing Importance; Distinguishing characteristics of rural markets; Understanding rural consumers and rural markets; Marketing mix planning for rural markets.

Recent developments in marketing: Social marketing, on line **marketing**, direct marketing, services marketing, green marketing,

Learning outcome: After the completion of this paper, the students will be able to identify marketing components and fit them in the value chain along with the various marketing strategies.

Suggested Readings:

1. Kotler, Philip, Gary Armstrong, Prafulla Agnihotri and AhsanUIHaque. *Principles of Marketing*. 13th edition. Pearson Education.
2. Mahajan & Mahajan – Principles of Marketing – Vikash Publication.
3. Michael, J. Etzel, Bruce J. Walker, William J Staton and Ajay Pandit. *Marketing Concepts and Cases*. (Special Indian Edition).
4. Rudani R.B – *Basics of Marketing Management* – S. Chand
5. McCarthy, E. Jerome., and William D. Perreault. *Basic Marketing*. Richard D. Irwin.
6. Lamb, Charles W., Joseph F. Hair, Dheeraj Sharma and Carl McDaniel. *Marketing: A South Asian Perspective*. Cengage Learning.
7. Pride, William M., and D.C. Ferrell. *Marketing: Planning, Implementation & Control*. Cengage Learning.
8. Majaro, Simon. *The Essence of Marketing*. Prentice Hall, New Delhi.
9. Zikmund William G. and Michael D'Amico. *Marketing: Creating and Keeping Customers in an E-Commerce World*. Thomson Learning.
10. Chhabra, T.N., and S. K. Grover. *Marketing Management*. Fourth Edition. Dhanpat Rai & Company.
11. The Consumer Protection Act 1986.
12. Iacobucci and Kapoor, *Marketing Management: A South Asian Perspective*. Cengage Learning.
13. Arun Kumar – Marketing management – Vikash Publication

B.Com. (Hons.): Semester – V **Paper BCH 5.2: FUNDAMENTALS OF FINANCIAL MANAGEMENT**

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objective: To familiarize the students with the principles and practices of financial management.

Contents:

Unit-1

Introduction to Financial Management: Scope and objective, Time value of money, Risk and return, Valuation of securities – Bonds and Equities

Unit-2

Long Term Investment Decisions: The Capital Budgeting Process, Cash flow Estimation, Payback Period Method, Accounting Rate of Return, Net Present Value (NPV), Net Terminal Value, Internal Rate of Return (IRR), Profitability Index

Unit-3

Financing Decisions: Sources of long-term financing, Estimation of components of cost of capital. Methods for Calculating cost of equity capital, Cost of Retained Earnings, Cost of Debt and Cost of Preference Capital, Weighted Average cost of capital (WACC) and Marginal cost of capital. Capital structure – Theories of Capital Structure (Net Income, Net Operating Income, MM Hypothesis, Traditional Approach). Operating and financial leverage, Determinants of capital

Unit-4

Dividend Decisions: Theories for Relevance and irrelevance of dividend decision for corporate valuation. Cash and stock dividends, Dividend policies in practice

Unit-5

Working Capital Decisions: Concepts of working capital, the risk-return trade off, sources of short-term finance, working capital estimation, cash management, receivables management, Inventory management and payables management

Learning Outcome: After the completion of this paper, students will be able to understand finance in a better way along with giving them insight to practical management of long and short finance for real business houses.

Suggested Readings

1. Bhalla V.K – Financial Management – S.Chand
2. Horne, J.C. Van and Wackowich. *Fundamentals of Financial Management*. 9thed. New Delhi Prentice Hall of India.
3. Johnson, R.W. *Financial Management*. Boston Allyn and Bacon.
4. Joy, O.M. *Introduction to Financial Management*. Homewood: Irwin.
5. Khan and Jain. *Financial Management text and problems*. 2nd ed. Tata McGraw Hill New Delhi.
6. Pandey, I.M. *Financial Management*. Vikas Publications.
7. Chandra, P. *Financial Management- Theory and Practice*. (Tata McGraw Hill).
8. Rustagi, R.P. *Fundamentals of Financial Management*. Taxmann Publication Pvt. Ltd.
8. Singh, J.K. *Financial Management- text and Problems*. 2nd Ed. DhanpatRai and Company, Delhi.
9. Singh, Surender and Kaur, Rajeev. *Fundamentals of Financial Management*. Book Bank International.
10. Brigham and Houston, *Fundamentals of Financial Management*, 13th Ed., Cengage Learning

B.Com. (Hons.): Semester – V
Paper BCH-DSE 5.3(A): Financial Markets, Institutions and Services

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objective: *To provide the student a basic knowledge of financial markets and institutions and to familiarize them with major financial services in India.*

Contents

Unit-1

An Introduction to Financial System, its Components – financial markets and institutions, financial intermediation, Flow of funds matrix, financial system and economic development, an overview of Indian financial system

Unit-2

Financial Markets: Money market – functions, organization and instruments. Role of central bank in money market; Indian money market – An overview

Capital Markets – functions, organization and instruments. Indian debt market; Indian equity market – primary and secondary markets; Role of stock exchanges in India

Unit-3

Financial Institutions: Commercial banking – introduction, its role in project finance and working capital finance, Development Financial institutions (DFIs) – An overview and role in Indian economy, Life and non-life insurance companies in India; Mutual Funds – Introduction and their role in capital market development. Non-banking financial companies (NBFCs)

Unit-4

Overview of financial services industry: Merchant banking – pre and post issue management, underwriting. Regulatory framework relating to merchant banking in India

Unit-5

Leasing and Hire-purchase: Consumer and housing finance; Venture capital; Factoring services, bank guarantees and letter of credit; Credit rating; Counseling.

Learning Outcome: *After the completion of this paper, the student will acquire financial literacy skill particularly by giving information about the financial system, markets, services and regulatory bodies in India.*

Suggested Readings:

1. Bhole, L.M. *Financial Markets and Institutions*. Tata McGraw-Hill Publishing Company.
2. Pandian P. – *Financial Service and Markets*. Vikas Publishing House.
3. Dhanekar. *Pricing of Securities*. New Delhi: Bharat Publishing House.
4. Nibasaiya Sapna – *Indian Financial System* – S.Chand
5. Prasanna, Chandra. *Financial Management: Theory and Practice*. Tata McGraw Hill \ Publishing Company Ltd., New Delhi.
6. Simha, S.L.N. *Development Banking in India*. Madras: Institute of Financial Management and Research
7. Khan and Jain. *Financial Services*. 2nd ed. Tata McGraw Hill
8. Singh, J.K. *Venture Capital Financing in India*. Dhanpat Rai and Company, New Delhi.
9. Annual Reports of Major Financial Institutions in India

B.Com. (Hons.): Semester – V **Paper BCH-DSE 5.3 (B): BANKING AND INSURANCE SYSTEM**

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objectives: To enable the students to acquire knowledge about basics of banking and insurance.

Unit-1

Concept of Bank and Banking: Historical Evolution of Banking: Origin and Development of Banking - Structure of Banking in India – Banks and Economic Development –Functions of Commercial banks (conventional and innovative functions) – Central Bank – RBI – functions – Emerging trends in Banking.

Unit-2

Types of Customers and Account holders: Procedure and practice in opening and operating the accounts of customers - individuals including minors - joint account holders -Partnership firms - joint stock companies - executors and trustees-clubs and associations

Unit-3

Introduction to insurance: Purpose and need of insurance, insurance as a social security tool - insurance and economic development - Principles of insurance -various kinds of insurance - life, marine, fire, medical, general insurance - features.

Unit-4

Life Insurance - Law relating to life Insurance; General Principles of Life Insurance Contract; Proposal and policy; assignment and nomination; title and claims; General Insurance - Law relating to general insurance; different types of general insurance; general insurance Vs life insurance – Insurance business in India.

Unit-5

Fundamentals of Agency Law: Definition of an agent; Agents regulations; Insurance intermediaries; Agents' compensation. Procedure for Becoming an Agent: Pre-requisite for obtaining a license; Duration of license; Cancellation of license; Revocation or suspension/termination of agent appointment; Code of conduct; Unfair practices. Functions of the Agent: Proposal form and other forms for grant of cover; Financial and medical underwriting; Material information; Nomination and assignment; Procedure regarding settlement of policy claims.

Learning Outcome: *After the completion of this paper, the student will acquired practical knowledge of working mechanism of banking and insurance industries in India.*

Reference Books:

1. Mishra S. *Banking Law and Practice* – S Chand
2. Sheldon H.P : *Practice and Law of Banking*.
3. Bedi. H.L : *Theory and Practice of Banking*.
4. Maheshwari. S.N. : *Banking Law and Practice*.
5. Shekar. K.C : *Banking Theory Law and Practice*.
6. Pannandikar&Mithami': *Banking in India*.
7. Radhaswamy&Vasudevan: *Text Book of Banking*.
8. Indian Institute of Bankers (Pub) *Commercial Banking Vol-I/Vol-II (part I&II) Vol- III*.
9. Varshaney: *Banking Law and Practice*.
10. Dr. P. Periasamy: *Principles and Practice of Insurance*
11. Himalaya Publishing House, Delhi.
12. Inderjit Singh, RakeshKatyal& Sanjay Arora: *Insurance Principles and Practices*
13. Kalyani Publishers, Chennai.
14. M.N. Mishra: *Insurance Principles and Practice*, S. Chand & Company Ltd, Delhi.
15. G. Krishnaswamy : *Principles & Practice of Life Insurance*
16. Kothari &Bahl : *Principles and Pratices of Insurance*.
17. Prasad – *Banking Insurance* – Vikash Publication

B.Com. (Hons.): Semester – V
Paper 5.3BCH-DSE 5.3 (C): INDIAN FINANCIAL SYSTEM

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objectives: *To enable the students to understand the basic knowledge about the structure, organization and working of financial system in India.*

Unit-1

Financial System: Meaning and Significance-Functions of the financial system -Financial Assets- Financial markets- Classification-Financial instruments-weakness of Indian Financial System.

Unit-2

Money market: Definition-Features-Objectives-Features of a developed money market-Importance of Money market-Composition of Money market-Operations and Participants-Money market Instruments-features of Indian money market-Recent developments.

Unit-3

Primary, Secondary and Capital Markets: New issue market-meaning-functions-methods floating new issue - intermediaries in the new issue market-merchants bankers and their functions -Recent trends in new issue market - Stock Exchanges-Functions-Structure of stock exchanges-BSE-NSE- listing of securities-Advantages of listing-methods of trading in stock exchanges-on line trading-stock indices

Unit-4

Financial Institutions: commercial banks- development financial institutions- Nonbanking financial corporation's-Mutual Funds, insurance companies – Objectives and functions (only a brief outline).

Unit-5

Regulatory Institutions: RBI – Role and Functions. The Securities and Exchange Board of India-objectives-function-powers-SEBI guidelines for primary and secondary market

Learning Outcome: *After completion of this paper, the student will be able to understand the structure and role of financial system, financial intermediaries and regulators in the Indian economy.*

Reference Books:

1. Kohn, Meir: *Financial Institutions and Markets*, Tata McGraw Hill.
2. Bhole L.M: *Financial Institutions and Markets*, Tata McGraw Hill.
3. Desai, Vasantha: *The Indian Financial System*, Himalaya Publishing House.
4. Machiraju.R.H: *Indian Financial System*, Vikas Publishing House.

B.Com (Hons.) CBCS

5. Khan M.Y: *Indian Financial System*, Tata McGraw Hill.

6. Varshney, P.N., & D K Mittal, D.K.: *Indian Financial System*, Sulthan Chand & Sons

7. Gordon E. & Natarajan K.: *Financial Markets & Services*, Himalaya Publishing House.

8. Pathak, V. Bharati: *Indian Financial System*, Pearson Education.

B.Com. (Hons.): Semester – V

Paper BCH-DSE 5.4 (A): FINANCIAL STATEMENT ANALYSIS & REPORTING

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objectives: *To enable the students to understand the basic knowledge about the financial statement analysis and reporting for economic decision making.*

Unit-1

Introduction Concepts of financial statements – Nature of financial statements – Objectives of financial statements – Different types of financial statements: income statement, balance sheet, statement of retained earnings, fund flow statement, cash flow statement, schedules – Limitations of financial statements.

Unit-2

Analysis & Interpretation of Financial Statements: Traditional Approaches Vs. Modern Approaches to financial statement analysis – Classification of financial statement analysis: based on modus operandi and based on materials used – Techniques of financial statement analysis: Comparative Statements, Common-size Statements, Trend Ratios and Ratio Analysis – Problems encountered in financial statement analysis.

Unit-3

Ratio Analysis: Classification of ratios – Ratio formation – Ratio interpretation – Practical methods of ratio analysis: Time Series (intra firm) Analysis, Cross Sectional (inter firm) Analysis, Residual Analysis and Multivariate Analysis.

Unit-4

Multivariate Ratio Analysis: Concept, objectives, uses and limitations – Univariate analysis Vs. Multivariate ratio analysis – Application of statistical tools in financial statement analysis.

Unit-5

Corporate Reporting: Cash Flow statement Analysis (AS 3) and Statutory and Non Statutory Reports, Integrated Reporting

Learning Outcome: *After the completion of this paper, the students will be able to prepare the end result of a business houses by preparation through financial statement analysis and reporting.*

Suggested Readings:

1. Foster, G.: Financial Statement Analysis, Englewood Cliffs, NJ, Prentice Hall.
2. Sahaf M.A – Management Accounting – Principles & Practice – Vikash Publication
3. Foulke, R.A.: Practical Financial Statement Analysis, New York, McGraw-Hill.
4. Hendriksen, E.S.: Accounting Theory, New Delhi, Khosla Publishing House.
5. Kaveri, V.S.: Financial Ratios as Predictors of Borrowers' Health, New Delhi, Sultan Chand.
6. Lev, B.: Financial Statement Analysis – A New Approach, Englewood Cliffs, NJ, Prentice Hall.
7. Maheswari, S.N.: Management Accounting & Financial Control, New Delhi, Sultan Chand.
8. Myer, J.N.: Financial Statement Analysis, NJ, Prentice Hall. 8. Porwal, L.S.: Accounting Theory – An Introduction, New Delhi, Tata-McGraw-Hill

B.Com. (Hons.): Semester – V

Paper 5.4 (B): MERCHANT BANKING AND FINANCIAL SERVICES

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objectives:*To enable the students to understand the basic knowledge about the financial services available in India.*

Unit-1

Merchant Banking: Nature and scope of Merchant Banking - Regulation of Merchant Banking Activity - overview of current Indian Merchant Banking scene - structure of Merchant Banking industry - primary Markets in India and Abroad - - professional Ethics and code of conduct - current Development

Unit-2

Financial Services: Meaning and Definition, Role of Financial Services in a financial system. Leasing: Meaning and features. Introduction to equipment leasing: Types of Leases, Evolution of Indian Leasing Industry. Legal Aspects of Leasing: present Legislative Framework. Hire purchase: concept and characteristics of Hire purchase. Difference between hire purchase and leasing

Unit-3

Factoring: concept, nature and scope of Factoring - Forms of Factoring - Factoring vis-à-vis Bills Discounting - Factoring vis-à-vis credit Insurance Factoring vis-à-vis Forfeiting- Evaluation of a Factor - Evaluation of Factoring - Factoring in India current Developments.

Unit-4

Securitization / Mortgages: Meaning, nature and scope of securitization, securitization as a Funding Mechanism, securitization of Residential Real Estate - whole Loans - Mortgages - Graduated-payment. Depository: Meaning, Evolution, Merits and Demerits of Depository. Process of Dematerialization and Dematerialization, Brief description of NSDL and CDSL

Unit-5

Security Brokerage: Meaning of Brokerage, types of brokers. Difference between broker and jobber, SEBI Regulations relating to brokerage business in India.

Learning Outcome: After the completion of this course, the student will be able to understand the structure and function of mercantile banking and various financial services available in the present business world.

Suggested Readings:

1. M.Y.Khan, Financial Services, Tata McGraw-Hill, 11th Edition, 2008
2. Gopal C.R – Management Financial Service – S.Chand
3. NaliniPravaTripathy, Financial Services, PHI Learning, 2008
4. Machiraju, Indian Financial System, Vikas Publishing House, 2nd Edition, 2002.
5. J.C.Verma, A Manual of Merchant Banking, Bharath Publishing House, New Delhi.
6. Varshney P.N. & Mittal D.K., Indian Financial System, Sultan Chand & Sons, New Delhi.
7. Sasidharan, Financial Services and System, Tata McGraw Hill, New Delhi, 1st Edition, 2008.
8. Website of SEBI

B.Com. (Hons.): Semester – V
Paper 5.4 (C): FINANCIAL INSTITUTIONS AND SERVICES

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objectives: *To enable the students to understand the financial institutions operating in India and services provided by them.*

Unit-1

Basic Theoretical Framework: The financial system and its technology; The factors affecting the stability of the financial system; Development finance vs. universal banking; Financial intermediaries and Financial Innovation; RBI-Central Banking.

Unit-2

Financial Institutions: A brief historical perspective. An update on the performance of IDBI, ICICI, IFCI and SFCs, LIC & GIC. The banking Institutions: Commercial banks - the public and the private sectors - structure and comparative performance. The problems of competition; interest rates, spreads, and NPAs. Bank capital - adequacy norms and capital market support.

Unit-3

Non-banking financial institutions: Evolution, control by RBI and SEBI. A perspective on future role, Unit Trust of India and Mutual Funds, Reserve bank of India Framework for/Regulation of Bank Credit . Commercial paper: Features and advantages, Framework of Indian CP Market, effective cost/interest yield.

Unit-4

Financial services: Asset/fund based Financial services - lease finance, consumer credit and hire purchase finance, factoring definition, functions, advantages, evaluation and forfeiting, bills discounting, housing finance, venture capital financing. Fee-based / Advisory services: Stock broking, credit rating.

Unit-5

Operations: Financial Assets/ Instruments Rights issues, issue of Debentures, issue of Equity shares - pre-issue activity, post-issue activities. The regulatory framework: SEBI and Regulation of Primary and Secondary Markets, Company Law provisions.

Learning Outcome: *After completion of this paper, the students will be able to understand the role and benefits of financial institution and services.*

Book References

1. M.Y.Khan, Financial Services, Tata McGraw-Hill, New Delhi, 2004.
2. Harsh V.Verma, Marketing of Services, Global Business Press, 2002
3. Sames L .Heskett, Managing In the Service Economy, Harvard Business School Press, Boston, 2001.
4. M.Y.Khan, Indian Financial System, 4/eTataMcGraw-Hill, New Delhi, 2004
5. Frank.J.Fabozzi& Franco Modigliani, Foundations of Financial Markets and Institutions, 3/e, Pearson Education Asia, 2002.
6. H.R Machiraju, Indian Financial Systems, Vikas Publishing House Pvt. Ltd.2002.
7. Meir Kohn, Financial Institutions and Markets, Tata McGraw-Hill, New Delhi, 2003.
8. Pathak: Indian Financial Systems Pearson Education
9. NibasaiyaSapna – Indian Financial System – S. Chand

B.Com. (Hons.): Semester - VI

Paper BCH 6.1: AUDITING AND CORPORATE GOVERNANCE

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objective: *To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards and to give an overview of the principles of Corporate Governance and Corporate Social Responsibility*

Unit-1

Auditing: Introduction, Meaning, Objects, Basic Principles and Techniques; Classification of Audit, Audit Planning, Internal Control – Internal Check and Internal Audit; Audit Procedure – Vouching and verification of Assets & Liabilities

Unit-2

Audit of Limited Companies: Company Auditor- Qualifications and disqualifications, Appointment, Rotation, Removal, Remuneration, Rights and Duties Auditor's Report-Contents and Types. Liabilities of Statutory Auditors under the Companies Act 2013

Unit-3

Special Areas of Audit: Special features of Cost audit, Tax audit, and Management audit; Recent Trends in Auditing: Basic considerations of audit in EDP Environment; Standard on Auditing(SA); Relevant Case Studies/Problems;

Unit-4

Corporate Governance: Conceptual framework of Corporate Governance, Corporate Governance Reforms. Major Corporate Scandals in India and Abroad: Common Governance Problems Noticed in various Corporate Failures. Codes & Standards on Corporate Governance

Unit-5

Corporate Social Responsibility (CSR): Strategic Planning and Corporate Social Responsibility; Corporate Philanthropy, Meaning of CSR, CSR and CR, CSR and Corporate Sustainability, CSR and Business Ethics, CSR and Corporate Governance, Environmental Aspect of CSR, CSR provision under the Companies Act 2013, CSR Committees

Learning Outcome: *At the end of the paper student will have detail knowledge about principles and techniques of audit in accordance with current legal requirement and as per the guidelines of different statutory authorities.*

Suggested Readings:

1. Gupta, Kamal and Ashok Arora. *Fundamentals of Auditing*. Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi.
2. Gadada Siddheswar T & Rachchh Gunvantrai – Introduction to Auditing – Vikash
3. Jha, Aruna. *Auditing*. Taxmann.
4. Tandon, B. N., S. Sudharsanam and S. Sundharabahu. *A Handbook of Practical Auditing*. S. Chand and Co. Ltd., New Delhi.
5. Ghatalia, S.V. *Practical Auditing*. Allied Publishers Private Ltd., New Delhi.
6. Singh, A. K. and Gupta Lovleen. *Auditing Theory and Practice*. Galgotia Publishing Company.
7. Alvin Arens and James Loebbecke, *Auditing: an Integrated Approach*
7. Ravinder Kumar and Virender Sharma, *Auditing Principles and Practice*, PHI Learning
- Christine A Mallin, *Corporate Governance (Indian Edition)*, Oxford University Press, New Delhi.
8. Bob Tricker, *Corporate Governance-Principles, Policies, and Practice* (Indian Edition), Oxford University Press, New Delhi.
9. The Companies Act 2013 (Relevant Sections)
10. MC Kuchhal *Corporate Laws*, Shri Mahaveer Book Depot. (Publishers). (Relevant Chapters)
11. Relevant Publications of ICAI on *Auditing* (CARO).
12. Khanka – Business Ethics & Corporate Governance – Vikash Publication

B. Com.: Semester VI
Paper BCH 6.2: INDIRECT TAXES

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objective: *To provide basic knowledge and equip students with application of principles and provisions of Service Tax, VAT, Central Excise, and Customs Laws.*

Contents:

Unit-1

Service tax – concepts and general principles, Charge of service tax and taxable services, Valuation of taxable services, Payment of service tax and filing of returns, Penalties, CENVAT Credit.

Unit-2

VAT – concepts and general principles, Calculation of VAT Liability including input Tax Credits, Small Dealers and Composition Scheme, VAT Procedures

Unit-3

Central Excise Law in brief – Goods, Excisable goods, Manufacture and Manufacturer, Valuation, CENVAT, Basic procedures, Export, SSI, Job Work

Unit-4

Basic concepts of customs law, Territorial waters, high seas, Types of custom duties – Basic, Countervailing & Anti- Dumping Duty, Safeguard Duty, Valuation, Customs Procedures, Import and Export Procedures, Baggage, Exemptions

Unit V

Emerging Issues in Indirect Taxes: Goods and Services Tax (GST) – Scope of GST, Modalities of GST

Learning outcome: *After completion of this paper, the students will have an insight to the taxation on production and distribution of goods and provision of services along taxation mechanism of international trade.*

Suggested Readings:

1. Singhanian Vinod K. and Monica Singhanian, *Students' Guide to Indirect Taxes*, Taxmann Publications Pvt. Ltd., Delhi.
2. V.S. Datey. *Indirect Tax Law and practice*, Taxmann Publications Pvt. Ltd., Delhi, Latest edition.
3. Sanjeev Kumar. *Systematic Approach to Indirect Taxes*, Latest edition.
4. S. S. Gupta. *Service Tax -How to meet your obligation* Taxmann Publications Pvt. Ltd., Delhi, Latest edition.
5. Grish Ahuja & Dr. Ravi Gupta, *Indirect Taxes*, Flair Publication Pvt. Ltd.

B.Com. (Hons.): Semester - VI
Paper BCH-DSE 6.3 (A): CORPORATE TAX PLANNING

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objective: *To provide Basic knowledge of corporate tax planning and its impact on decision-making.*

Contents:

Unit-1

Tax planning, tax management, tax evasion, tax avoidance, corporate tax in India, Types of companies, Residential status of companies and tax incidence, Tax liability and minimum alternate tax, Tax on distributed profits

Unit-2

Tax planning with reference to setting up of a new business; Locational aspect, nature of business, form of organization; Tax planning with reference to financial management decision; Capital structure, dividend including deemed dividend and bonus shares; Tax planning with reference to sale of scientific research assets

Unit-3

Tax planning with reference to specific management decisions; Make or buy; own or lease; repair or replace; Tax planning with reference to employees' remuneration; Tax planning with reference to receipt of insurance compensation; Tax planning with reference to distribution of assets at the time of liquidation.

Unit-4

Special provisions relating to non-residents; double taxation relief; Provisions regulating transfer pricing; Advance rulings; Advance pricing agreement

Unit-5

Tax planning with reference to business restructuring: - Amalgamation, Demerger, Slump sale, Conversion of sole proprietary concern/partnership firm into company, Conversion of company into LLP, Transfer of assets between holding and subsidiary companies.

Learning outcome: After learning the subject, the students will be able to understand the taxation of the corporate house.

Suggested Readings:

1. Singhania, Vinod K. and Monica Singhania. *Corporate Tax Planning*. Taxmann Publications Pvt. Ltd., New Delhi.
2. Ahuja, Girish. and Ravi Gupta. *Corporate Tax Planning and Management*. Bharat Law House, Delhi.
3. Acharya, Shuklendra and M.G. Gurha. *Tax Planning under Direct Taxes*. Modern Law Publication, Allahabad.
4. Mittal, D.P. *Law of Transfer Pricing*. Taxmann Publications Pvt. Ltd., New Delhi.
5. IAS – 12 and AS – 22.

B.Com. (Hons.): Semester - VI
Paper BCH-DSE 6.4: BUSINESS RESEARCH METHODS AND PROJECT WORK

Duration: 3 hrs.

Marks: 100(50+50)

Lectures: 65

Objective: *This course aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data.*

Section A: Business Research Methods

50 Marks

Unit-1

Introduction: Meaning of research; Scope of Business Research; Purpose of Research –Exploration, Description, Explanation; Unit of Analysis – Individual, Organization, Groups, and Data Series; Conception, Construct, Attributes, Variables, and Hypotheses.

Unit-2

Research Process: An Overview; Problem Identification and Definition; Selection of Basic Research Methods- Field Study, Laboratory Study, Survey Method, Observational Method Existing Data Based Research, Longitudinal Studies, Panel Studies

Unit-3

Measurement: Definition; Designing and writing items; Uni-dimensional and Multi-dimensional scales; Measurement Scales- Nominal, Ordinal, Interval, Ratio; Ratings and Ranking Scale, Thurstone, Likert and Semantic Differential scaling, Paired Comparison; Sampling –Steps, Types, Sample Size Decision; Secondary data sources

Hypothesis Testing: Tests concerning means and proportions; ANOVA, Chi-square test and other Non-parametric tests; Testing the assumptions of Classical Normal Linear Regression.

Section B – Project Report

Marks 50

Unit-4

Report Preparation: Meaning, types and layout of research report; Steps in report writing; Citations, Bibliography and Annexure in report; JEL Classification

Note:

1. There shall be a written examination of 50% Marks on the basis of Unit I to III.
2. The student will write a project report under the supervision of a faculty member assigned by the college/institution based on field work. The Project Report carries 50% Marks and will be evaluated by University appointed examiners.

Learning Outcome: *After completion of this paper, the students will be able to assess and apply a range of research method on a practical project.*

Suggested Readings:

1. Chawla Deepak – Research Methodology – Vikash Publication
2. Upagade&Shende – Research Methodology – S.Chand

B.Com. (Hons.): Semester - VI
Paper 6.4 (B): FUNDAMENTALS OF INVESTMENT

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objective: To familiarize the students with different investment alternatives, introduce them to the framework of their analysis and valuation and highlight the role of investor protection.

Contents

Unit-I:

The Investment Environment - The investment decision process, Types of Investments – Commodities, Real Estate and Financial Assets, the Indian securities market, the market participants and trading of securities, security market indices, sources of financial information, Concept of return and risk, Impact of Taxes and Inflation on return.

Unit-II:

Fixed Income Securities - Bond features, types of bonds, estimating bond yields, Bond Valuation types of bond risks, default risk and credit rating.

Unit-III:

Approaches to Equity Analysis: Introductions to Fundamental Analysis, Technical Analysis and Efficient Market Hypothesis, dividend capitalization models, and price-earnings multiple approach to equity valuation.

Unit-IV:

Portfolio Analysis and Financial Derivatives: (a) Portfolio and Diversification, Portfolio Risk and Return. (b) Mutual Funds. (c) Introduction to Financial Derivatives, Financial Derivatives Markets in India.

Unit-V:

Investor Protection – Role of SEBI and stock exchanges in investor protection; Investor grievances and their redressal system, insider trading, investors' awareness and activism.

Learning outcome: After completion of this paper, this paper will educate the students about various aspect of investment in detail along with understandability of stock market operation, focusing on need for common investor protection.

Suggested Readings

1. Bhalla – Fundamentals of Investment – S.Chand
2. Pandian P. – Security Analysis & Portfolio Management – Vikash Publication
3. Jones, C.P., “Investments Analysis and Management”, Wiley, 8thed.

4. Prasanna, Chandra., “*Investment Analysis and Portfolio Management*”, Tata McGraw Hill.
5. Rustogi, R.P., *Fundamentals of Investment*, Sultan Chand & Sons, New Delhi.
6. Vohra, N.D., and B.R. Bagri, “*Futures and Options*”, McGraw Hill Publishing
7. Mayo, *An Introduction to Investment*, Cengage Learning.

B.Com. (Hons.): Semester - VI
Paper 6.4 (C): FINANCIAL MARKET OPERATIONS

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objective: This course aims at acquainting the students with the working of Financial Markets in India.

Unit-1

An overview of financial markets in India: Money Markets: Indian money markets composition and structure; (a) Acceptance houses, (b) Discount houses, and (c) Call money markets; Recent trends in India money markets.

Unit-2

Capital Market: Security market – (a) New issue market. (b) Secondary market: Functions and role of stock exchange: listing procedure and legal requirements: Public Issue – pricing and marketing: Stock exchanges – National Stock Exchange and over-the-counter exchanges.

Unit-3

Securities Contract and Regulations Act: Main provisions. Investors Protections: Grievances concerning stock exchange dealing and their removal: Grievances cells in stock exchanges: SEBI: Company Law Board: Press: Remedy through courts.

Unit-4

Functionaries on Stock Exchanges: Brokers, Sub brokers, market makers, jobbers, and NRIS.

Unit-4

Financial Services: Concept, functions, and types. Financial Services: Meaning and Definition, Role of Financial Services in a financial system. Leasing: Meaning and features. Introduction to equipment leasing: Types of Leases, Evolution of Indian Leasing Industry. Legal Aspects of Leasing: present Legislative Framework. Hire purchase: concept and characteristics of Hire purchase. Difference between hire purchase and leasing, SEBI guidelines: Credit rating

Learning Outcome: After completion of this paper, the student will be able to understand the nature and role of the main financial markets within the domestic and global environment.

Suggested Readings:

1. Chandler M. V. and Goldfeld S. M: Economics of Money and Banking: Harper and Row, New York.
2. Vaish M.C – Monetary Theory – Vikash Publication
3. Gupta Suraj B: Monetary Economics: S. Chand and Co., New Delhi
4. Gupta Suraj B: Monetary Planning in India: Oxford, Delhi.
5. Bhole I. M.: financial Markets and Instructional: Tata McGraw Hill, New Delhi.

SYLLABUS FOR REGULAR / PASS						
B.Com. Undergraduate Study - (CBCS) for the Academic Year 2016-17						
	Course Structure	Category	Marks			Credits
	Semester I		Theory	Practical/ Internal	Total	
1.1	Environmental Science	AECC-1	80	20 (I)	100	4
1.2	Financial Accounting	Core -1	80	20 (I)	100	6
1.3	Business Law	Core -2	80	20 (I)	100	6
1.4	Micro Economics	GE-1	80	20 (I)	100	6
Total			320	80	400	22
	Semester-II					
2.1	English Communication	AECC-2	80	20 (I)	100	4
2.2	Corporate Accounting	Core -3	80	20 (I)	100	6
2.3	Corporate Laws	Core -4	80	20 (I)	100	6
2.4	Macro Economics	GE-2	80	20 (I)	100	6
Total			320	80	400	22
	Semester III					
3.1	Human Resources Management	Core-5	80	20 (I)	100	6
3.2	Management Principles & Application	Core -6	80	20 (I)	100	6
3.3	E-Commerce	SEC-1	80	20 (I)	100	4
3.4	Personal Selling & Salesmanship	SEC-2	80	20 (I)	100	4
Total			320	80	400	20
	Semester IV					
4.1	Cost and Management Accounting	Core -7	80	20 (I)	100	6
4.2	Business Mathematics	Core -8	80	20 (I)	100	6
4.3	Computer Applications in Business	SEC-3	80	20 (I)	100	4
4.4	Entrepreneurship	SEC-4	80	20 (I)	100	4
Total			320	80	400	20

P.T.O

	Course Structure		Category	Theory	Practical / Internal	Total	Credits
	Semester V						
5.1	Principles of Marketing		Core -9	80	20 (I)	100	6
5.2	Fundamentals of Financial Management		Core -10	80	20 (I)	100	6
5.3	DSE-1 (Any one of the following)		DSE-1	80	20 (I)	100	6
	A. Accounting and Finance	Financial Markets , Institution and Services					
	B. Banking and Insurance	Indian Banking and Insurance System					
	C. Financial Markets	Indian Financial System					
5.4	DSE-2 (Any one of the following)		DSE-2	80	20 (I)	100	6
	A. Accounting and Finance	Financial Statement Analysis and Reporting					
	B. Banking and Insurance	Merchant Banking and Financial Services					
	C. Financial Markets	Financial Institutions and Services					
	Total			320	80	400	24
	Semester VI						
6.1	Auditing and Corporate Governance		Core -11	80	20 (I)	100	6
6.2	Indirect Tax		Core-12	80	20 (I)	100	6
6.3	DSE-3 (Any one of the following)		DSE-3	80	20 (I)	100	6
	A.Accounting and Finance	Corporate Tax Planning					
	B. Banking and Insurance	Fundamentals of Investment					
	C. Financial Markets	Financial Market Operations					
6.4	Business Research Methods and Project Work*		DSE-4	50	50(I)	100	6
	Total			290	110	400	24
	Grand Total			1890	510	2400	132

Notes:

- AECC- Ability Enhancement Compulsory Course
- GE- Generic Elective Course
- DSE- Discipline Specific Elective Course
- SEC- Skill Enhancement Course

B.Com. Semester - I
Paper 1.1: Environmental Science

Duration: 3 hrs

Marks: 100 (80+20)

Lectures: 65

Objectives: To provide information on environmental science, its resources and Management.

Contents:

Unit - I

The Environment: The Atmosphere, Hydrosphere, Lithosphere, Biosphere, Ecology, Ecosystem, Biogeochemical Cycle (Carbon Cycle, Nitrogen Cycle).

Unit – II

Environment Pollution: Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution, Radiation Pollution, Natural Disasters and their Management.

Unit – III

Population Ecology: Individuals, Species, Pollution, Community, Control Methods of Population, Urbanization and its effects on Society, Communicable Diseases and its Transmission, Non-Communicable Diseases.

Unit- IV

Environmental Movements in India: Grass root Environmental movements in India, Role of women, Environmental Movements in Odisha, State Pollution Control Board, Central Pollution Control Board.

Unit – V

Natural Resources: Conservation of Natural Resources, Management and Conservation of Wildlife, Soil Erosion and Conservation, Environmental Laws: Water Act, 1974, Air Act, 1981, The Wildlife (Protection) Act, 1972, Environment Protection, 1986.

Learning Outcomes: After completion of this paper, students would be able to analyse the ways in which the natural environment and the society impacts the establishment and continuation of business. Along with that, they would also gain knowledge about the ways and means of managing the natural resources for the benefit of both i.e. the business and the society thereby creating a win-win situation.

BOOKS FOR REFERENCE:

- ✓ *Text Book of Environmental Studies*, D.K.Asthana & Meera Asthana, S.Chand
- ✓ *Environmental Studies – Sanjay Ku. Batra / Kanchan Batra/ H.K.Kaur / Parul Pant – Taxmann Pub.*
- ✓ *Principles of Environmental Studies–P. C. Manoharachary & P. J. Reddy B. S. Pub., 2004*
- ✓ *Introduction to an Environmental Science–Y. Anjaneyulu, B. S. Pub. 2004.*
- ✓ *Ecology–Subramanyam & Sambamurty, Narosa Pub. House, 2000.*
- ✓ *A Text Book in Environmental Science–V. Subramaniam, Narosa Pub. House, 2000*
- ✓ *Managing Industrial Pollution –S. C. Bhatia, Mac Millan, 2003.*
- ✓ *Man and Environment–Dash and Mishra, Mac Millan*
- ✓ *Environment and Society–Mishra and Dash, Mac Millan*
- ✓ *Text Book of Environmental Science–Panigrahi and Sahu, Sadgranth Mandir.*
- ✓ *Environment and Ecology, De and De, S.Chand*
- ✓ *Environmental Management, G.N.Pandey, Vikash Publishing*

B.Com. Semester - I Paper 1.2: Financial Accounting

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65

Objectives: The objective of this paper is to help students to acquire conceptual knowledge of financial accounting and to impart skills for recording various kinds of business transactions.

Contents

Unit 1. (a) Theoretical Framework

- iii. Accounting as the language of business and an information system, the users of financial accounting information and their needs. Qualitative characteristics of accounting information. Functions, advantages and limitations of accounting. Branches of accounting. Bases of accounting; cash basis and accrual basis.
- iv. The nature of financial accounting principles – Basic concepts and conventions: entity, money measurement, going concern, cost, realization, accruals, periodicity, consistency, prudence (conservatism), materiality and full disclosures and Accounting Equation.

(b) Accounting Process

From recording of business transactions to the preparation of trial balance including adjustments: journal, sub-division of journal, ledger accounts, trial balance

Unit 2. Business Income

- iv. Measurement of business income-Net income: the accounting period, the continuity doctrine and matching concept. Objectives of measurement and revenue recognition.
- v. Depreciation Accounting: The accounting concept of depreciation. Factors in the measurement of depreciation. Methods of computing depreciation: straight line method and diminishing balance method; Disposal of depreciable assets-change of method. Salient features of Accounting Standard (AS): 6 (ICAI)
- vi. Inventory Accounting: Meaning. Significance of inventory valuation. Inventory Record

Unit 3. Final Accounts

Capital and revenue expenditures and receipts: general introduction only. Preparation of financial statements of Sole Trade and Partnership Business with adjustments

Unit 4.

Hire Purchase and Installment Systems and Accounting for Branch & Department

- iii. Concepts of operating and financial lease (theory only)
- iv. Departmental Accounting and Branch Accounting including foreign branch (Theory and Problem)

Unit 5.Accounting for Partnership Firm

Accounting of Admission of partner, Retirement and Death of partner and Dissolution of the Partnership Firm Including Insolvency of partners

Learning Outcomes: The course structure of this paper would equip the students to get in-depth knowledge of financial accounting along with its practical application thereby giving an opportunity to gain easy access to this competitive business world.

Suggested Readings:

- ✓ Anthony, R.N. Hawkins, and Merchant, *Accounting: Text and Cases*. McGraw-Hill Education.
- ✓ BalRanjan Kumar, *Financial Accounting* – S. Chand
- ✓ Bansal.K.M - *Financial Accounting* – Taxmann Publication
- ✓ Deepak Sehgal, *Financial Accounting* – Vikash Publication
- ✓ Horngren, *Introduction to Financial Accounting*, Pearson Education.
- ✓ Monga, J.R. *Financial Accounting: Concepts and Applications*. Mayoor Paper Backs, New Delhi.
- ✓ Shukla, M.C., T.S. Grewal and S.C.Gupta. *Advanced Accounts. Vol.-I*. S. Chand & Co., New Delhi.
- ✓ Maheshwari, S.N. and S. K. Maheshwari. *Financial Accounting*. Vikas Publishing House, New Delhi.
- ✓ Sehgal, Ashok, and Deepak Sehgal. *Advanced Accounting. Part –I*.Taxmann Applied Services, New Delhi.
- ✓ Bhushan Kumar Goyal and HN Tiwari, *Financial Accounting*, International Book House
- ✓ Goldwin, Alderman and Sanyal, *Financial Accounting*, Cengage Learning.
- ✓ Tulsian, P.C. *Financial Accounting*, **S. Chand**.
- ✓ Jain, S.P. and K.L. Narang. *Financial Accounting*, Kalyani Publishers, New Delhi
- ✓ Gupta, Nirmal. *Financial Accounting*, SahityaBhawan, Agra.
- ✓ *Compendium of Statements and Standards of Accounting*. The Institute of Chartered Accountants of India, New Delhi

B.Com. Semester - I
Paper 1.3: Business Law

Duration: 3 hrs

Marks: 100 (80+20)

Lectures: 65

Objective: The objective of the course is to impart basic knowledge of the important business laws along with relevant case laws.

Contents:

Unit I: The Indian Contract Act, 1872: General Principle of Law of Contract

- a) Contract – meaning, characteristics and kinds
 - b) Essentials of valid contract - Offer and acceptance, consideration, contractual capacity, free consent, legality of objects.
 - c) Void agreements
 - d) Discharge of contract – modes of discharge including breach and its remedies.
 - e) Contingent contracts
- Quasi - contracts

Unit II: The Indian Contract Act, 1872: Specific Contracts

- a) Contract of Indemnity and Guarantee
- b) Contract of Bailment
- c) Contract of Agency

Unit III: The Sale of Goods Act, 1930

- a) Contract of sale, meaning and difference between sale and agreement to sell.
- b) Conditions and warranties
- c) Transfer of ownership in goods including sale by non-owners
- d) Performance of contract of sale
- e) Unpaid seller – meaning and rights of an unpaid seller against the goods and the buyer.

Unit IV: Partnership Laws

The Partnership Act, 1932

- a. Nature and Characteristics of Partnership
- b. Registration of Firms
- c. Types of Partners
- d. Rights and Duties of Partners
- e. Implied Authority of a Partner
- f. Incoming and outgoing Partners
- g. Mode of Dissolution of Partnership

Unit V: The Negotiable Instruments Act 1881

- a) Meaning and Characteristics of Negotiable Instruments : Promissory Note, Bill of Exchange, Cheque
- b) Holder and Holder in due Course, Privileges of Holder in Due Course.
- c) Negotiation: Types of Endorsements

- d) Crossing of Cheque
- e) Bouncing of Cheques

Learning Outcomes: *The students would be able to deal with the legal aspect of different business situations.*

Suggested Readings:

- ✓ Arora Sushma – Business Law – Taxmann Publication
- ✓ Kuchhal, M.C. and Vivek Kuchhal, *Business Law*, Vikas Publishing House, New Delhi.
- ✓ Tulsian, P.C, Business Law, S.Chand
- ✓ Gogna P.P.S, Business & Industrial Law, S.Chand
- ✓ Singh, Avtar, *Business Law*, Eastern Book Company, Lucknow.
- ✓ Maheshwari & Maheshwari, *Business Law*, National Publishing House, New Delhi.
- ✓ Chadha, P. R., *Business Law* Galgotia Publishing Company, New Delhi.
- ✓ Aggarwal S K, Business Law, Galgotia Publishers Company, New Delhi.
- ✓ Goyal Bhushan Kumar and Jain Kinneri, Business Laws, International Book House
- ✓ Ravinder Kumar, Legal Aspects of Business, Cengage Learning

B.Com. Semester - I
Paper 1.4: Micro Economics

Duration: 3 hrs

Marks: 100 (80+20)

Lectures: 65

Objective: *Objective of the course is to acquaint the students with the concepts of micro-economics dealing with consumer behaviour. The course also makes the student understand the supply side of the market through the production and cost behaviour of firms.*

Contents:

Unit I: Demand and Consumer Behaviour

Concepts of revenue: Marginal and Average: Revenue under conditions of Perfect and imperfect competition Elasticity of demand: price, income and cross. Consumer Behaviour: Indifference curve analysis of consumer behavior; Consumer's equilibrium, Price elasticity and price consumption curve, income consumption curve and Engel curve, price change and income and substitution effects.

Unit II: Production and Cost

Production iso-quants, marginal rate of technical substitution, economic region of production, optimal combination of resources, the expansion path, returns to scale using iso-quants. Cost of Production: Social and private costs of production, long run and short run costs of production.

Unit III: Perfect Competition

Perfect competition: Assumptions. Equilibrium of the firm and the industry in the short and the

long-runs, including industry's long run supply curve. Measuring producer surplus under perfect competition

Unit IV: Monopoly

Monopoly: Monopoly short run and long run equilibrium. Shifts in demand curve and the absence of the supply curve. Measurement of monopoly power and the rule of thumb for pricing, Horizontal and vertical integration of firms

Unit V: Imperfect Competition

Monopolistic Competition and Oligopoly: Monopolistic competition price and output decision-equilibrium. Monopolistic Competition and economic efficiency Oligopoly and Interdependence

Learning Outcomes: The students would be able to apply tools of consumer behaviour and firm theory to business situations.

Suggested Readings:

- ✓ Ahuja, H.L, Micro Economics, S.Chand
- ✓ Dwivedi, D.N. Micro Economics, Vikash Publication
- ✓ Mehta P.K, Singh M. – Micro Economics – Taxmann Publication
- ✓ Pindyck, R.S., D. L. Rubinfeld and P. L. Mehta; *Microeconomics*, Pearson Education.
- ✓ N. Gregory Mankiw, Principles of Micro Economics, Cengage Learning
- ✓ Browning, E.K. and J.M. Browning; *Microeconomic Theory and Applications*,
- ✓ Kalyani Publishers, New Delhi.
- ✓ Gould, J.P. and E.P. Lazear; *Microeconomic Theory*, All India Traveller Bookseller, New Delhi.
- ✓ Lipsey, R.G. and K.A. Chrystal; *Economics*, Oxford University Press.
- ✓ Maddala G.S. and E. Miller; *Microeconomics: Theory and Applications*,
- ✓ McGraw-Hill International.
- ✓ Salvatore, D. *Schaum's Outline of Theory and Problems of Microeconomic Theory*,
- ✓ McGraw-Hill, International Edition.
- ✓ Bilas, Richard A. *Microeconomic Theory: A Graphical Analysis*, McGraw-Hill Book Co. Kogakusha Co. Ltd.
- ✓ Amit Sachdeva, *Micro Economics*, Kusum Lata Publishers.

B.Com. Semester - II
Paper 2.1: English Communication
Skill Enhancement Compulsory Course for Commerce

Duration: 3hrs.

Marks: 100 (80+20)

Lectures: 65

Paper: 1

Credits: 04

The purpose of this course is twofold: to train students in communication skills and to help develop in them a facility for communicative English.

Since language it is which binds society together and serves as a crucial medium of interaction as well as interchange of ideas and thoughts, it is important that students develop a capacity for clear and effective communication, spoken and written, at a relatively young age. The need has become even more urgent in an era of globalization and the increasing social and cultural diversity that comes with it.

English, being a global language par excellence, it is important that any course in communication is tied to an English proficiency programme. The present course will seek to create academic and social English competencies in speaking, listening, arguing, enunciation, reading, writing and interpreting, grammar and usage, vocabulary, syntax, and rhetorical patterns.

Students, at the end of the course, should be able to unlock the communicator in them by using English appropriately and with confidence for further studies or in professional spheres where English is the indispensable tool of communication.

Unit 1

[20]

Introduction

4. What is communication?

5. Types of communication

- Horizontal
- Vertical
- Interpersonal
- Grapevine

6. Uses of Communication

Prescribed Reading: Chapter 1 *Applying Communication Theory for Professional Life: A Practical Introduction* by Dainton and Zelle

<http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmljYXRpb25fVGh1b3J5LnBkZg%3D%3D&cidReset=true&cidReq=MBA563>

Unit-2

[20]

Language of Communication

5. Verbal: spoken and written

6. Non-verbal

- Proxemics
- Kinesics
- Haptics
- Chronemics
- Paralinguistics

7. Barriers to communication

8. Communicative English

Unit-3

[20]

Reading Comprehension

- Locate and remember the most important points in the reading
- Interpret and evaluate events, ideas, and information
- Read “between the lines” to understand underlying meanings
- Connect information to what they already know

Unit 4 Writing

[20]

18. Expanding an Idea
19. Writing a Memo
20. Report Writing
21. Creative Writing
22. News Story
23. Setting in Creative Writing
24. Writing a Business Letter
25. Letters to the Editor
26. Précis Writing
27. CV & Resume Writing
28. Dialog writing
29. Covering Letter
30. Writing Formal Email
31. Elements of Story Writing
32. Note Making
33. Information Transfer
34. Interviewing for news papers

Unit-5

[20]

Language functions in listening and conversation

6. Discussion on a given topic in pairs
7. Speaking on a given topic individually
8. Group Discussion
9. Interview
10. Dialogue

(Practice to be given using speaking activities from the prescribed textbook)

Grammar and Usage

18. Simple and Compound Sentences
19. Complex Sentences
20. Noun Clause
21. Adjective Clause
22. Adverb Clause
23. The Conditionals in English
24. The Second Conditional
25. The Third Conditional
26. Words and their features
27. Phrasal Verbs
28. Collocation
29. Using Modals
30. Use of Passives
31. Use of Prepositions
32. Subject-verb Agreement
33. Sentence as a system
34. Common Errors in English Usage

Examination pattern

Each reading and writing question will invite a 200 word response.

Midterm test **[20 marks]**

Unit 1 (preferably short questions on types and uses of communication)

Total 20 marks

Final Semester Examination

Unit 2	One long question with choice Two short notes with choice	01x 10 qns= 10 marks 02x 05 qns= 10 marks
Unit 3	Reading: 04 questions (2 prose and 2 poetry questions)	04 x 05 qns= 20 marks
Unit 4	Writing: 02 questions	02x 10 qns = 20 marks
Unit 5	Grammar & Usage	02x10 qns = 20 marks
Total		= 80 marks

Grammar questions must be set in contexts; not as isolated sentences as used for practice in the prescribed textbook.

Book Prescribed:

Vistas and Visions: An Anthology of Prose and Poetry. (Ed.) Kalyani Samantray, Himansu S. Mohapatra, Jatindra K. Nayak, Gopa Ranjan Mishra, Arun Kumar Mohanty. OBS

Texts to be studied

Prose

- The Last Leaf
- Ecology and Society
- How Wealth Accumulates and Men Decay
- The Open Window

B.Com. Semester - II

Paper 2.2: Corporate Accounting

Duration: 3 hrs.

Marks: 100(80+20) Lectures: 65

Objectives: To help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniques of preparing the financial statements.

Contents:

Unit 1. Accounting for Share Capital & Debentures

Issue of shares, forfeiture and reissue of forfeited shares- concept & process of book building, Issue of rights and bonus shares, Buy back of shares. Redemption of preference shares, Issue and Redemption of Debentures

Unit 2 Final Accounts

Preparation of profit and loss account and balance sheet of corporate entities (excluding calculation of managerial remuneration) Disposal of company profits

Unit 3. Valuation of Goodwill and Valuation of Shares

Concepts and calculation - simple problem only

Unit 4 Amalgamation of Companies

Concepts and accounting treatment as per Accounting Standard: 14 (ICAI) (excluding intercompany holdings). Internal reconstruction: concepts and Accounting treatment excluding scheme of reconstruction

Unit 5

Meaning of liquidation, modes of winding up, consequences of winding up, statement of affairs, liquidator's final statement of account, list 'B' contributories

Learning Outcomes: This paper can provide conceptual clarity about the techniques to prepare financial statements of companies along with accounting treatment of various situations viz. floating of shares, amalgamation and liquidation of companies.

Suggested Readings:

- ✓ Tulsian, P.C, Corporate Accounting, S. Chand
- ✓ Monga, J.R. *Fundamentals of Corporate Accounting*. Mayur Paper Backs, New Delhi.
- ✓ Shukla, M.C., T.S. Grewal, and S.C. Gupta. *Advanced Accounts*. Vol.-II. S. Chand & Co., New Delhi.
- ✓ Maheshwari, S.N. and S. K. Maheshwari. *Corporate Accounting*. Vikas Publishing House, New Delhi.
- ✓ Sehgal, Ashok and Deepak Sehgal. *Corporate Accounting*. Taxman Publication, New Delhi.
- ✓ Gupta, Nirmal. *Corporate Accounting*. Sahitya Bhawan, Agra.
- ✓ Jain, S.P. and K.L. Narang. *Corporate Accounting*. Kalyani Publishers, New Delhi.
- ✓ Compendium of Statements and Standards of Accounting. The Institute of Chartered Accountants of India, New Delhi.
- ✓ Bhushan Kumar Goyal, *Fundamentals of Corporate Accounting*, International Book House

B.Com. Semester - II **Paper 2.3: Corporate Laws**

Duration: 3 hrs Marks: 100 (80+20) Lectures: 65

Objectives: *The objective of the course is to impart basic knowledge of the provisions of the Companies Act 2013 and the Depositories Act, 1996. Case studies involving issues in corporate laws are required to be discussed.*

Contents:

UNIT I Introduction

Administration of Company Law [including National Company Law Tribunal (NCLT), National Company Law Appellate Tribunal (NCLAT), Special Courts]; Characteristics of a company; types of companies including one person company, small company, dormant company and producer company; association not for profit; formation of company, on-line filing of documents, promoters, their legal position. (**As per companies Act, 2013**)

UNIT II Documents

Memorandum of association, articles of association, GDR; book building; issue, allotment and forfeiture of share, transmission of shares, buyback and provisions regarding buyback; issue of bonus shares (**As per companies Act, 2013**)

UNIT III Management

Classification of directors, women directors, independent director, disqualifications, director identity number (DIN); appointment; Legal positions, powers and duties; removal of directors; managing director, meetings of shareholders and board; types of meeting, meeting through video conferencing, e-voting. Audit Committee, Nomination and Remuneration Committee, Stakeholders Relationship Committee, Corporate Social Responsibility Committee. (**As per companies Act, 2013**)

UNIT IV Dividends, Accounts, Audit–

Provisions relating to payment of Dividend, Provisions relating to Books of Account, Provisions relating to Audit, Auditors' Appointment, Rotation of Auditors, Auditors' Report.

Winding Up - Concept and modes of Winding Up.

Insider Trading, Whistle Blowing – Insider trading; meaning & legal provisions; Whistle blowing: Concept and Mechanism.

UNIT V Depositories Law:

The Depositories Act 1996 – Definitions; rights and obligations of depositories; participants issuers and beneficial owners; inquiry and inspections, penalty

Learning Outcomes: *Students would acquire knowledge about the legal framework and the ways and means to deal with the legal aspect of different situations of corporate sector.*

Suggested Readings:

- ✓ Gogna, P.P.S – Company Law, S. Chand
- ✓ Arora&Banshal, Corporate Law – Vikash Publication
- ✓ MC Kuchhal *Corporate Laws*, ShriMahaveer Book Depot. (Publishers).
- ✓ GK Kapoor& Sanjay Dhamija, *Company Law*, Bharat Law House.
- ✓ ReenaChadha and SumantChadha, *Corporate Laws*, Scholar Tech Press.
- ✓ Gowar, LCB, *Principles of Modern company Law*, Stevens & Sons, London.
- ✓ Ramaiya, *A Guide to Companies Act*, LexisNexis, Wadhwa and Buttersworth.
- ✓ *A Compendium of Companies Act 2013, along with Rules*, by TaxmannPublications.
- ✓ Avtar Singh, *Introduction to company Law*, Eastern Book Company

B.Com. Semester - II
Paper 2.4: Macro Economics

Duration: 3 hrs Marks: 100(80+20)

Lectures: 65

Objectives: *The course aims at providing the student with knowledge of basic concepts of the macro economics. The modern tools of macro-economic analysis are discussed and the policy framework is elaborated, including the open economy.*

Contents:

Unit I

Introduction – concepts and variables of macroeconomics, income, expenditure and the circular flow, components of expenditure. Static macro economic analysis short and the long run – determination of supply, determination of demand, and conditions of equilibrium

Unit II

Economy in the short run – IS–LM framework, fiscal and monetary policy, determination of aggregate demand, shifts in aggregate demand, aggregate supply in the short and long run, and aggregate demand- aggregate supply analysis.

Unit III

Inflation, causes of rising and falling inflation, inflation and interest rates, social costs of inflation. Unemployment – natural rate of unemployment, frictional and wait unemployment. The trade-off between inflation and unemployment

Unit IV

Open economy – flows of goods and capital, saving and investment in a small and a large open economy, exchange rates, Mundell – Fleming model with fixed and flexible prices in a small open economy with fixed and with flexible exchange rates, interest-rate differentials case of a large economy.

Unit V

Behavioral Foundations - Investment –determinants of business fixed investment, effect of tax, determinants of residential investment and inventory investment. Demand for Money – Portfolio and transactions theories of demand for real balances, interest and income elasticity of demand for real balances, Supply of money.

Learning Outcomes: *Students would be able to apply the modern tools of macro-economic analysis so as to minimize the adverse impact of macro-economic factors on business.*

Suggested Readings

- ✓ Ahuja H.L – Macro Economics – S.Chand
- ✓ Vaish – Macro Economics – Vikash Publication
- ✓ Mankiw, N. Gregory. Principles *Macroeconomics*. Cengage Learning
- ✓ Dornbusch, Rudiger, and Stanley. Fischer, *Macroeconomics*. McGraw-Hill.
- ✓ Dornbusch, Rudiger., Stanley. Fischer and Richard Startz, *Macroeconomics*. Irwin/McGraw-Hill.
- ✓ Deepashree, *Macro Economics*, Scholar Tech. New Delhi.
- ✓ Barro, Robert, J. *Macroeconomics*, MIT Press, Cambridge MA.
- ✓ Burda, Michael, and Wyplosz. *Macroeconomics A European Text*. Oxford University Press, Oxford.
- ✓ Salvatore, Dominick. *International Economics*. John Wiley & Sons Singapore.
- ✓ Branson, William H. *Macroeconomic Theory and Policy*. HarperCollins India Pvt. Ltd.

B.Com. Semester - III Paper 3.1: Human Resource Management

Duration: 3 hrs.

Marks: 100(80+20)

Lectures: 65

Objective: *The objective of the course is to acquaint students with the techniques and principles to manage human resource of an organization.*

Contents:

Unit I:

Human Resource Management: Concept and Functions, Role, Status and competencies of HR Manager, HR Policies, Evolution of HRM. Emerging Challenges of Human Resource Management; workforce diversity, empowerment, Downsizing; VRS; Human Resource Information System;

Unit II

Acquisition of Human Resource: Human Resource Planning- Quantitative and Qualitative dimensions; job analysis – job description and job specification; Recruitment – Concept and sources; Selection – Concept and process; test and interview; placement induction.

Unit III

Training and Development; Concept and Importance; Identifying Training and Development Needs; Designing Training Programmes; Role Specific and Competency Based Training; Evaluating Training Effectiveness; Training Process Outsourcing; Management Development; Career Development.

Unit V

Performance appraisal; nature and objectives; Modern Techniques of performance appraisal; potential appraisal and employee counseling; job changes - transfers and promotions. Compensation: concept and policies; job evaluation; methods of wage payments and incentive plans; fringe benefits; performance linked compensation.

Unit V

Maintenance: employee health and safety; employee welfare; social security; Employer Employee relations- an overview. Grievance handling and redressal Industrial Disputes causes and settlement machinery..

Learning Outcomes: This paper can enhance the capability of the students to manage the most important assets of organization i.e. human beings which is much needed to ensure growth of that organization.

Suggested Readings:

- ✓ Khanka S.S. *Human Resource Management*. S Chand.
- ✓ Rao V.S.P - *Human Resource Management*. Vikash Publication
- ✓ DeCenzo, D.A. and S.P. Robbins, “*Personnel/Human Resource Management*”, Prentice Hall of India, New Delhi.
- ✓ Bohlander and Snell, *Principles of Human Resource Management*, Cengage Learning
- ✓ Chhabra, T.N. *Essentials of Human Resource Management*. Sun India Publication New Delhi.
- ✓ Ivancevich, John M. *Human Resource Management*. McGraw Hill.
- ✓ Wreather and Davis. *Human Resource Management*. Pearson Education.
- ✓ Robert L. Mathis and John H. Jackson. *Human Resource Management*. Cengage Learning.
- ✓ SanghiSeema, *Human Resource Management* – Vikash Publication

B.Com. Semester - III
Paper 3.2: Management Principles & Applications

Duration: 3 hrs

Marks: 100(80+20)

Lectures: 65

Objective: *The objective of the course is to provide the student with an understanding of basic management concepts, principles and practices.*

Unit 1: Introduction

Concept: Need for Study, Managerial Functions – An overview; Co-ordination: Essence of Managership b. Evolution of the Management Thought, Classical Approach – Taylor, Fayol, Neo-Classical, MBO - Peter F. Drucker, Re-engineering - Hammer and Champy, Michael Porter – Five-force analysis

Unit 2: Planning

a. Types of Plan – An overview to highlight the differences b. Strategic planning – Concept, process, Importance and limitations c. Environmental Analysis and diagnosis (Internal and external environment) –Definition, Importance and Techniques (SWOT/TOWS/WOTS-UP, BCG Matrix, Competitor Analysis)

Unit 3: Organising

Concept and process of organising – An overview, Span of management, Different types of authority (line, staff and functional), Decentralisation, Delegation of authority Formal and Informal Structure; Principles of Organising; Network Organisation Structure

Unit 4: Staffing and Leading

a. *Staffing*: Concept of staffing, staffing process b. *Motivation*: Concept, Importance, extrinsic and intrinsic motivation; Major Motivation theories - Maslow's Need-Hierarchy Theory; Herzberg's Two-factor Theory, Vroom's Expectation Theory, c. *Leadership*: Concept, Importance, d. *Communication*: Concept, purpose, process; Oral and written communication; Formal and informal communication networks, Barriers to communication, Overcoming barriers to communication.

Unit 5: Control

a. *Control*: Concept, Process, Limitations, Principles of Effective Control, Major Techniques of control - Ratio Analysis, ROI, Budgetary Control, EVA, PERT/CPM.
b. Emerging issues in Management

Learning Outcomes: *Students would be able to make use of different management principles in the course of decision making in different forms of business organizations.*

Suggested Readings:

- ✓ *Gunaseelan Rupa & Kulandaiswamy V. – Principles & Practice of Mgmt. – Vikash Pub.*
- ✓ *Pillai RSN – Principles & Practice of Management – S. Chand*
- ✓ Harold Koontz and Heinz Weihrich, *Essentials of Management: An International and Leadership Perspective*, McGraw Hill Education.
- ✓ Stephen P Robbins and Madhushree Nanda Agrawal, *Fundamentals of Management: Essential Concepts and Applications*, Pearson Education.
- ✓ George Terry, *Principles of Management*, Richard D. Irwin
- ✓ Newman, Summer, and Gilbert, *Management*, PHI
- ✓ James H. Donnelly, *Fundamentals of Management*, Pearson Education.
- ✓ B.P. Singh and A.K.Singh, *Essentials of Management*, Excel Books
- ✓ Griffin, *Management Principles and Application*, Cengage Learning
- ✓ Robert Kreitner, *Management Theory and Application*, Cengage Learning
- ✓ TN Chhabra, *Management Concepts and Practice*, DhanpatRai& Co. (Pvt. Ltd.), New Delhi
- ✓ Peter F Drucker, *Practice of Management*, Mercury Books, London
- ✓ Mittal Ranjana, *Leadership – Vikash Publication*

B.Com. Semester - III **Paper 3.3: E-Commerce**

Duration: 3hrs

Marks: 100 (80+20)

Lectures: 65

Objectives: To enable the student to become familiar with the mechanism for conducting business transactions through electronic means.

Contents

Unit-1

Unit I: Introduction: Meaning, nature, concepts, advantages and reasons for transacting online, categories of E-Commerce, Supply Chain Management, Customer Relations Management

Unit 2:

Planning Online-Business: Nature and dynamics of the internet, pure online vs. brick and click business; assessing requirement for an online business designing, developing and deploying the system, one to one enterprise.

Unit 3 Technology for Online-Business:

Internet, IT Infrastructure, Middle ware contents: Text and Integrating E-business applications.

Unit 4: Mechanism of making payment through internet:

Online-payment mechanism; Electronic Payment systems; payment Gateways; Visitors to website; tools for promoting websites; Plastic Money: Debit Card, Credit Card;

Unit 5: Applications in E-Commerce and Security and Legal Aspects of E-Commerce:

E-commerce applications in manufacturing, Wholesale, retail and service sector.

Threats in E-Commerce, Security of Clients and Service-Provider; Cyber Law - Information Technology Act 2000: An overview of major provisions

Learning Outcomes: This paper would enhance the technical skills of the students to get into the business ventures using electronic means thereby providing the opportunity to gain access to a larger customer base.

Suggested Readings:

- ✓ Pandey U.S – E.Commerce& Mobile Commerce Technology – S. Chand

B.Com. Semester - III

Paper 3.4: Personal Selling and Salesmanship

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65 hours

Objective: The purpose of this course is to familiarize the students with the fundamentals of personal selling and the selling process. They will be able to understand selling as a career and what it takes to be a successful salesman

Unit 1:

Introduction to Personal Selling: Nature and importance of personal selling, myths of selling, Difference between Personal Selling, Salesmanship and Sales Management, Characteristics of a good salesman, types of selling situations, types of salespersons, Career opportunities in selling, Measures for making selling an attractive career.

Unit- II

Buying Motives: Concept of motivation, Maslow's theory of need hierarchy; Dynamic nature of motivation; Buying motives and their uses in personal selling

Unit- III

Selling Process: Prospecting and qualifying; Pre-approach; Approach; Presentation and demonstration; handling of objections; Closing the sale; Post sales activities.

Unit- IV

Sales Reports: reports and documents; sales manual, Order Book, Cash Memo; Tour Diary, Daily and Periodical Reports; Ethical aspects of Selling .

Learning outcome: After the completion of this paper, the students will able to identify an

understand the psychology of selling and different factors that shape the buying behaviour of customers.

Suggested Readings:

- ✓ Davar R.S – Salesmanship and Publicity – Vikash Publication
- ✓ Sahu P.K & Rout K.C – Salesmanship & Sales Management – S.Chand
- ✓ *Spiro, Stanton, and Rich, Management of the Sales force*, McGraw Hill.
- ✓ Russell, F. A. Beach and Richard H. Buskirk, *Selling: Principles and Practices*, McGraw Hill
- ✓ Futrell, Charles, *Sales Management: Behaviour, Practices and Cases*, The Dryden Press.
- ✓ Still, Richard R., Edward W. Cundiff and Norman A. P. Govoni, *Sales Management: Decision Strategies and Cases*, Prentice Hall of India Ltd., New Delhi,
- ✓ Johnson, Kurtz and Schueing, *Sales Management*, McGraw Hill
- ✓ KapoorNeeru, *Advertising and personal Selling*, Pinnacle, New Delhi.

B.Com. Semester – IV
Paper 4.1: COST AND MANAGEMENT ACCOUNTING

Duration: 3 hrs.

Marks: 100 (80 + 20)

Lectures: 65

Objective: To acquaint the students with basic concepts used in cost management accounting, various methods involved in cost ascertainment .

CONTENTS:

Unit I: Introduction

Introduction: Meaning, objectives and advantages of cost accounting, Difference between financial, cost, and management accounting and Cost concepts and its Classifications

Materials: Material/inventory control- concept and techniques, Accounting and control of purchases, storage and issue of materials. Methods of pricing of materials issues – FIFO, LIFO and Average

Unit II: Labour and Overhead

Labour: Accounting and Control of labour cost, time keeping and time booking, concept and treatment of idle time, over time, labour turnover and fringe benefits.

Overhead: Classification, allocation, apportionment and absorption of overhead. Under- and over-absorption

Unit III: Methods of Costing

Methods of Costing: Unit costing, Job costing. Contract Costing, Process costing (excluding process losses, valuation of work in progress, joint and by-products)

Unit IV: Budgeting and Standard Costing

Budgeting and budgetary control: Concept of budget and budgetary control, objectives,

merits, and limitations, Budget administration, Functional budgets, Fixed and flexible budgets, Zero base budget

Standard costing and variance analysis: Meaning of standard cost and standard costing: advantages, limitations and applications, Variance analysis – material, labour and overhead

Unit V: Marginal Costing

Absorption versus variable costing: Distinctive features and income determination. Cost-Volume-Profit Analysis: Break-even analysis-algebraic and graphic methods. Contribution, Margin of safety and Angle of incidence

Suggested Reading:

17. Horngreen, Charles T., George Foster and Srikant M. Dattar. *Cost Accounting: A Managerial Emphasis*. Prentice Hall of India Ltd., New Delhi.
18. Horngreen, Charles T., Gary L. Sundem. *Introduction to Management Accounting*. Prentice Hall.
19. Jain, S.P. and K.L. Narang. *Cost Accounting: Principles and Methods*. Kalyani Publishers, Jalandhar.
20. Lal, Jawahar. *Cost Accounting*. Tata McGraw Hill Publishing Co., New Delhi.
21. Nigam, B.M. Lall and I.C. Jain. *Cost Accounting: Principles and Practice*. Prentice Hall of India, New Delhi.
22. Arora, M.N. *Cost Accounting – Principles and Practice*. Vikas Publishing House, New Delhi.
23. Maheshwari, S.N. and S.N. Mittal. *Cost Accounting: Theory and Problems*. Shri Mahabir Book Depot, New Delhi.
24. Singh, S. K. and Gupta Lovleen. *Management Accounting – Theory and Practice*. Pinnacle Publishing House.
25. Usry, Milton E. and Lawrence H. Hammer. *Cost Accounting: Planning and Control*. South Western Publishing Co.
26. Barfield, Jesset T., Cecily A. Raibarn and Michael R. Kinney. *Cost Accounting: Traditions and Innovations*. Thomson Learning.
27. Lucey, T. Costing. ELST, London.
28. Garrison H., Ray and Eric W. Noreen. *Managerial Accounting*. McGraw Hill.
29. Drury, Colin. *Management and Cost Accounting*. Cengage Learning.
30. Lal, Jawahar. *Advanced Management Accounting Text and Cases*. S. Chand & Co., New Delhi.
31. Khan, M.Y. and P.K. Jain. *Management Accounting*. Tata McGraw Hill, Publishing Co., New Delhi.
32. Hansen, *Managerial Accounting*, Cengage Learning

B.Com. Semester - IV

Paper 4.2: BUSINESS MATHEMATICS

Duration: 3 hrs.

Marks: 100 (80 + 20)

Lectures: 65 hours

Objective: The objective of this course is to familiarize the students with the basic mathematical tools with emphasis on applications to business and economic situations.

Contents:

Unit 1. Matrices and Determinant

Algebra of matrices., Inverse of a matrix, Matrix Operation – Business Application Solution of system of linear equations (having unique solution and involving not more than three variables)

Unit 2. Calculus I

Mathematical functions and their types- linear, quadratic, polynomial, exponential, logarithmic and logistic function. Concepts of limit and continuity of a function, Concept and rules of differentiation, Maxima and Minima involving second or higher order derivatives

Unit 3. Calculus II

Integration: Standard forms. Methods of integration – by substitution, by parts and by use of partial fractions, definite integration, Finding areas in simple cases, Application of Integration to marginal analysis. Consumer's and Producer's Surplus, Rate of Sales and the Learning Curve.

Unit 4. Mathematics of Finance

Compounding and discounting of a sum using different types of rates. Types of annuities, like ordinary, due, deferred, continuous, perpetual, and their future and present values using different types of rates of interest. Depreciation of Assets (*General annuities to be excluded*)

Unit 5. Linear Programming

Formulation of linear programming problems (LPP): Graphical solution to LPPs. Cases of unique and multiple optimal solutions, Unbounded solutions and infeasibility, and redundant constraints, Solution to LPPs using Simplex method – maximization and minimization cases.

Learning Outcome: After reading this subject the students will be able to understand basic concepts in the areas of business calculus and financial mathematics and to connect acquired knowledge with practical problems in economic practice.

Suggested Readings:

- ✓ Arora P.N. Business Mathematics – S.Chand
- ✓ Anthony, M. and N. Biggs. *Mathematics for Economics and Finance*. Cambridge University Press.
- ✓ Arora S.R & Gupta K. – Business Mathematics – Taxmann Publication
- ✓ Ayres, Frank Jr. *Theory and Problems of Mathematics of Finance*. Schaum's Outlines Series. McGraw Hill Publishing Co.
- ✓ Budnick, P. *Applied Mathematics*. McGraw Hill Publishing Co.
- ✓ Dowling, E.T. *Mathematics for Economics*, Schaum's Outlines Series. McGraw Hill Publishing Co.
- ✓ Mizrahi and John Sullivan. *Mathematics for Business and Social Sciences*. Wiley and Sons.
- ✓ Zamirudeen&Bhambri – Business Statistics – Vikash Publication
- ✓ Wikes, F.M. *Mathematics for Business, Finance and Economics*. Thomson Learning.
- ✓ Prasad, Bindra and P.K. Mittal. *Fundamentals of Business Mathematics*. Har-Anand Publications.
- ✓ Thukral, J.K. *Mathematics for Business Studies*. Mayur Publications.
- ✓ Vohra, N.D. *Quantitative Techniques in Management*. Tata McGraw Hill Publishing Company.
- ✓ Soni, R.S. *Business Mathematics*. Pitambar Publishing House.
- ✓ Singh J. K. *Business Mathematics*. Himalaya Publishing House

B.Com. Semester - IV
Paper – 4.3: COMPUTER APPLICATIONS IN BUSINESS

Duration: 3 hrs

Marks: 100(80+20)

Lectures: 65hours

Objectives: To provide computer skills and knowledge for commerce students and to enhance the student understands of usefulness of information technology tools for business operations.

Contents:

Unit 1. Word Processing

Introduction to word Processing, Word processing concepts, Use of Templates, Working with word document: (Opening an existing document/creating a new document, Saving, Selecting text, Editing text, Finding and replacing text, Closing, Formatting, Checking and correcting spellings)Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, Mail Merge including linking with Access Database, Tables: Formatting the table, Inserting filling and formatting a table Creating Documents in the areas: Mail Merge including linking with Access Database, Handling Tables, Inserting Pictures and Video

Unit 2. Preparing Presentations:

Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation; and Slideshow

Unit 3. Spreadsheet and its Business Applications

Spreadsheet concepts, Creating a work book, Saving a work book, Editing a workbook, Inserting, deleting work sheets, Entering data in a cell, Formula Copying, Moving data from selected cells, Handling operators in formula, Rearranging Worksheet, Project involving multiple spreadsheets, Organizing Charts and graphs, Printing worksheet, Generally used Spread sheet functions: Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and reference, Text functions.

Learning Outcome: The completion of this paper will enhance students' computer abilities and skills to compete with the present technology driven business market.

NOTE:

- There shall be examination of 50 Marks (Practical-10 Marks and Theory- 40 Marks) and duration of Examination shall be 3 Hrs.
- Teaching arrangement need to be made in the computer Lab
- There shall be four lectures per class and 4 Practical Lab periods per batch to be thought in computer Lab.

Suggested Readings:

- ✓ Arora, Ashok – Computer Fundamental & Application – Vikash Publication
- ✓ Saxena & Chopra – Computer Application in Management – Vikash Publication

B.Com. Semester - IV
Paper 4.4: Entrepreneurship

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65 hours

Objective: The purpose of the paper is to orient the learner toward entrepreneurship as a career option and creative thinking and behavior for effectiveness at work and in life.

Contents:

Unit 1 Introduction

Meaning, elements, determinants and importance of entrepreneurship and creative response to the society's problems and at work, Dimensions of entrepreneurship: intrapreneurship, technopreneurship, cultural entrepreneurship, international entrepreneurship, netpreneurship, ecopreneurship, and social entrepreneurship

Unit 2

Entrepreneurship and Micro, Small and Medium Enterprises

Concept of business groups and role of business houses and family business in India: The contemporary role models in Indian business: their values, business philosophy and behavioral orientations. Conflict in family business and its resolution

Unit 3

Public and private system of stimulation, support and sustainability of entrepreneurship, Requirement, availability and access to finance, marketing assistance, technology, and industrial accommodation, Role of industries/entrepreneur's associations and self-help groups. The concept, role and functions of business incubators, angel investors, venture capital and private equity fund.

Unit 4

Sources of business ideas and tests of feasibility

Significance of writing the business plan/ project proposal, Contents of business plan/ project proposal. Designing business processes, location, layout, operation, planning & control; preparation of project report (various aspects of the project report such as size of investment, nature of product, market potential may be covered), Project submission/ presentation and appraisal thereof by external agencies, such as financial/non-financial institutions

Unit 5

Mobilizing resources for start-up, Accommodation and utilities, Preliminary contracts with the vendors, suppliers, bankers, principal customers; Contract management: Basic start-up problems.

Learning outcome: After the completion of this paper, student will have the entrepreneurial temper with conceptual input and practical insight as how to be an entrepreneur.

Suggested Readings:

- ✓ SS Khanka, Entrepreneurial Development, S. Chand & Co, Delhi.
- ✓ Kuratko and Rao, *Entrepreneurship: A South Asian Perspective*, Cengage Learning.
- ✓ Rao, V.S.P – Business Entrepreneurship & Management – Vikash Publication
- ✓ Desai, Vasant. *Dynamics of Entrepreneurial Development and Management*. Mumbai, Himalaya Publishing House.
- ✓ Dollinger, Mare J. *Entrepreneurship: Strategies and Resources*. Illinois, Irwin.
- ✓ Holt, David H. *Entrepreneurship: New Venture Creation*. Prentice-Hall of India, New Delhi.
- ✓ Jain, Arun Kumar. *Competitive Excellence: Critical Success Factors*. New Delhi: Viva Books Limited. ISBN-81-7649-272-8.
- ✓ Panda, ShibaCharan. *Entrepreneurship Development*. New Delhi, Anmol Publications. (Latest Editions)
- ✓ Plsek, Paul E. *Creativity, Innovation and Quality*. (Eastern Economic Edition), New Delhi: Prentice-Hall of India. ISBN-81-203-1690-8.
- ✓ SIDBI Reports on Small Scale Industries Sector.
- ✓ Singh, Nagendra P. *Emerging Trends in Entrepreneurship Development*. New Delhi: ASEED.

B.Com. Semester – V

Paper 5.1: PRINCIPLES OF MARKETING

Duration: 3 hrs.

Lectures: 65 hours

Marks: 100(80+20)

Objective: *The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of marketing.*

Contents:

Unit-1

Introduction: Nature, scope and importance marketing; Evolution of marketing concepts; Marketing mix, Marketing environment.

Consumer Behavior – An Overview: Consumer buying process; Factors influencing consumer buying decisions.

Unit-2

Market Selection: Market segmentation – concept, importance and bases; Target market selection; Positioning concept, importance and bases; Product differentiation vs. market segmentation;

Product: Meaning and importance. Product classifications; Concept of product mix; Branding, packaging and labeling; Product-Support; Product life-cycle; New Product Development

Unit-3

Pricing: Significance, Factors affecting price of a product; Pricing Policies and strategies;
Promotion: Nature and importance of promotion; Communication process; Types of promotion: advertising, personal selling, public relations & sales promotion, and their distinctive characteristics; Promotion mix and factors affecting promotion mix decisions.

Unit-4

Distribution: Channels of distribution - meaning and importance; Types of distribution channels; Wholesaling and retailing; Factor affecting choice of distribution channel; Physical Distribution.

Retailing: Types of retailing – store based and non-store based retailing, chain stores, specialty stores, supermarkets, retail vending machines, mail order houses, retail cooperatives; Management of retailing operations: an overview; Retailing in India: changing scenario.

Unit-5

Rural marketing: Growing Importance; Distinguishing characteristics of rural markets; Understanding rural consumers and rural markets; Marketing mix planning for rural markets.

Recent developments in marketing: Social marketing, on line **marketing**, direct marketing, services marketing, green marketing,

Learning outcome: After the completion of this paper, the students will able to identify marketing components and fit them in the value chain along with the various marketing strategies.

Suggested Readings:

14. Arun Kumar – Marketing Management – Vikash Publication
15. Kotler, Philip, Gary Armstrong, Prafulla Agnihotri and Ahsan UIHaque. *Principles of Marketing*. 13th edition. Pearson Education.
16. Mahajan & Mahajan – Principles of Marketing – Vikash Publication.
17. Michael, J. Etzel, Bruce J. Walker, William J Staton and Ajay Pandit. *Marketing Concepts and Cases*. (Special Indian Edition).
18. Rudani R.B – *Basics of Marketing Management* – S. Chand
19. McCarthy, E. Jerome., and William D. Perreault. *Basic Marketing*. Richard D. Irwin.
20. Lamb, Charles W., Joseph F. Hair, Dheeraj Sharma and Carl McDaniel. *Marketing: A South Asian Perspective*. Cengage Learning.
21. Pride, William M., and D.C. Ferrell. *Marketing: Planning, Implementation & Control*. Cengage Learning.
22. Majaro, Simon. *The Essence of Marketing*. Prentice Hall, New Delhi.
23. Zikmund William G. and Michael D'Amico. *Marketing; Creating and Keeping Customers in an E-Commerce World*. Thomson Learning.
24. Chhabra, T.N., and S. K. Grover. *Marketing Management*. Fourth Edition. Dhanpat Rai & Company.
25. The Consumer Protection Act 1986.
26. Iacobucci and Kapoor, *Marketing Management: A South Asian Perspective*. Cengage Learning.

B.Com. Semester – V
Paper 5.2: FUNDAMENTALS OF FINANCIAL MANAGEMENT

Duration: 3 hrs.

Lectures: 65 hours

Marks: 100(80+20)

Objective: To familiarize the students with the principles and practices of financial management.

Contents:

Unit-1

Introduction to Financial Management: Scope and objective, Time value of money, Risk and return, Valuation of securities – Bonds and Equities

Unit-2

Long Term Investment Decisions: The Capital Budgeting Process, Cash flow Estimation, Payback Period Method, Accounting Rate of Return, Net Present Value (NPV), Net Terminal Value, Internal Rate of Return (IRR), Profitability Index

Unit-3

Financing Decisions: Sources of long-term financing Estimation of components of cost of capital, Methods for Calculating cost of equity capital, Cost of Retained Earnings, Cost of Debt and Cost of Preference Capital, Weighted Average cost of capital (WACC) and Marginal cost of capital. Capital structure –Theories of Capital Structure (Net Income, Net Operating Income, MM Hypothesis, Traditional Approach). Operating and financial leverage, Determinants of capital structure

Unit-4

Dividend Decisions: Theories for Relevance and irrelevance of dividend decision for corporate valuation. Cash and stock dividends, Dividend policies in practice

Unit-5

Working Capital Decisions: Concepts of working capital, the risk-return trade off, sources of short-term finance, working capital estimation, cash management, receivables management, Inventory management and payables management

Learning Outcome: After the completion of this paper, students will be able to understand finance in a better way along with giving them insight to practical management of long and short finance for real business houses.

Suggested Readings

- ✓ Bhalla V.K – Financial Management – S.Chand
- ✓ Bhabesh Patel – Fundamental Financial Management – Vikash Publication
- ✓ Horne, J.C. Van and Wackowich. *Fundamentals of Financial Management*. 9thed. New Delhi Prentice Hall of India.
- ✓ Johnson, R.W. *Financial Management*. Boston Allyn and Bacon.
- ✓ Joy, O.M. *Introduction to Financial Management*. Homewood: Irwin.
- ✓ Khan and Jain. *Financial Management text and problems*. 2nd ed. Tata McGraw Hill New

B.Com (Hons.) CBCS
Delhi.

- ✓ Pandey, I.M. *Financial Management*. Vikas Publications.
- ✓ Chandra, P. *Financial Management- Theory and Practice*. (Tata McGraw Hill).
- ✓ Rustagi, R.P. *Fundamentals of Financial Management*. Taxmann Publication Pvt. Ltd.
- ✓ Singh, J.K. *Financial Management- text and Problems*. 2nd Ed. Dhanpat Rai and Company, Delhi.
- ✓ Singh, Surender and Kaur, Rajeev. *Fundamentals of Financial Management*. Book Bank International.
- ✓ Brigham and Houston, *Fundamentals of Financial Management*, 13th Ed., Cengage Learning

B.Com. Semester – V

Paper DSE 5.3(A): Financial Markets, Institutions and Services

Duration: 3 hrs.

Lectures: 65 hours

Marks: 100(80+20)

Objective: *To provide the student a basic knowledge of financial markets and institutions and to familiarize them with major financial services in India.*

Contents

Unit-1

An Introduction to Financial System, its Components – financial markets and institutions, Financial intermediation, Flow of funds matrix, Financial system and economic development, An overview of Indian financial system.

Unit-2

Financial Markets: Money market – functions, organization and instruments. Role of central bank in money market; Indian money market – An overview

Capital Markets – functions, organization and instruments. Indian debt market; Indian equity market – primary and secondary markets; Role of stock exchanges in India

Unit-3

Financial Institutions: Commercial banking – introduction, its role in project finance and working capital finance. Development Financial institutions (DFIs) – An overview and role in Indian economy, Life and non-life insurance companies in India; Mutual Funds – Introduction and their role in capital market development. Non-banking financial companies (NBFCs).

Unit-4

Overview of financial services industry: Merchant banking – pre and post issue management, underwriting. Regulatory framework relating to merchant banking in India

Unit-5

Leasing and Hire-purchase: Consumer and housing finance; Venture capital; Factoring services, bank guarantees and letter of credit; Credit rating; Counseling.

Learning Outcome: *After the completion of this paper, the student will acquire financial literacy skill particularly by giving information about the financial system, markets, services and regulatory bodies in India.*

Suggested Readings:

- ✓ Bhole, L.M. *Financial Markets and Institutions*. Tata McGraw-Hill Publishing Company.
- ✓ Pandian P. – *Financial Service and Markets*. Vikas Publishing House.
- ✓ Dhanekar. *Pricing of Securities*. New Delhi: Bharat Publishing House.
- ✓ Nibasaiya Sapna – *Indian Financial System* – S.Chand
- ✓ Prasanna, Chandra. *Financial Management: Theory and Practice*. Tata McGraw Hill \ Publishing Company Ltd., New Delhi.
- ✓ Simha, S.L.N. *Development Banking in India*. Madras: Institute of Financial Management and Research
- ✓ Khan and Jain. *Financial Services*. 2nd ed. Tata McGraw Hill
- ✓ Singh, J.K. *Venture Capital Financing in India*. Dhanpat Rai and Company, New Delhi.
- ✓ *Annual Reports of Major Financial Institutions in India*

B.Com. Semester – V

Paper DSE 5.3 (B): INDIAN BANKING AND INSURANCE SYSTEM

Duration: 3 hrs.

Lectures: 65 hours

Marks: 100(80+20)

Objectives: To enable the students to acquire knowledge about basics of banking and insurance.

Unit-1

Concept of Bank and Banking: Historical Evolution of Banking: Origin and Development of Banking - Structure of Banking in India – Banks and Economic Development – Functions of Commercial banks (conventional and innovative functions) – Central Bank – RBI – functions – Emerging trends in Banking.

Unit-2

Types of Customers and Account holders: Procedure and practice in opening and operating the accounts of customers - individuals including minors - joint account holders - Partnership firms - joint stock companies - executors and trustees-clubs and associations

Unit-3

Introduction to insurance: Purpose and need of insurance, insurance as a social security tool - insurance and economic development - Principles of insurance - various kinds of insurance - life, marine, fire, medical, general insurance - features.

Unit-4

Life Insurance - Law relating to life Insurance; General Principles of Life Insurance Contract; Proposal and policy; assignment and nomination; title and claims; General Insurance - Law relating to general insurance; different types of general insurance; general insurance Vs life insurance – Insurance business in India.

Unit-5

Fundamentals of Agency Law: Definition of an agent; Agents regulations; Insurance intermediaries; Agents' compensation. Procedure for Becoming an Agent: Pre-requisite for obtaining a license; Duration of license; Cancellation of license; Revocation or suspension/termination of agent appointment; Code of conduct; Unfair practices. Functions of the Agent: Proposal form and other forms for grant of cover; Financial and medical underwriting; Material information; Nomination and assignment; Procedure regarding settlement of policy claims.

Learning Outcome: *After the completion of this paper, the student will acquired practical knowledge of working mechanism of banking and insurance industries in India.*

Reference Books:

- ✓ Mishra S. *Banking Law and Practice* – S Chand
- ✓ Sheldon H.P : *Practice and Law of Banking*.
- ✓ Bedi. H.L : *Theory and Practice of Banking*.
- ✓ Maheshwari. S.N. : *Banking Law and Practice*.
- ✓ Shekar. K.C : *Banking Theory Law and Practice*.
- ✓ Pannandikar&Mithami': *Banking in India*.
- ✓ Radhaswamy&Vasudevan: *Text Book of Banking*.
- ✓ Indian Institute of Bankers (Pub) *Commercial Banking Vol-I/Vol-II (part I&II) Vol- III*.
- ✓ Varshaney: *Banking Law and Practice*.
- ✓ Dr. P. Periasamy: *Principles and Practice of Insurance*
- ✓ Himalaya Publishing House, Delhi.
- ✓ Inderjit Singh, RakeshKatyal& Sanjay Arora: *Insurance Principles and Practices*
- ✓ Kalyani Publishers, Chennai.
- ✓ M.N. Mishra: *Insurance Principles and Practice*, S. Chand & Company Ltd, Delhi.
- ✓ Prasad – *Banking Insurance* – Vikash Publication
- ✓ G. Krishnaswamy : *Principles & Practice of Life Insurance*
- ✓ Kothari &Bahl : *Principles and Practices of Insurance*.

B.Com. Semester – V
Paper 5.3DSE 5.3 (C): INDIAN FINANCIAL SYSTEM

Duration: 3 hrs.

Lectures: 65 hours

Marks: 100(80+20)

Objectives: *To enable the students to understand the basic knowledge about the structure, organization and working of financial system in India.*

Unit-1

Financial System: Meaning and Significance-Functions of the financial system -Financial Assets- Financial markets- Classification-Financial instruments-weakness of Indian Financial System.

Unit-2

Money market: Definition-Features-Objectives-Features of a developed money market-Importance of Money market-Composition of Money market-Operations and Participants-Money market Instruments-features of Indian money market-Recent developments.

Unit-3

Primary, Secondary and Capital Markets: New issue market-meaning-functions-methods floating new issue - intermediaries in the new issue market-merchants bankers and their functions -Recent trends in new issue market - Stock Exchanges-Functions-Structure of stock exchanges-BSE-NSE- listing of securities-Advantages of listing-methods of trading in stock exchanges-on line trading-stock indices

Unit-4

Financial Institutions: commercial banks- development financial institutions- Nonbanking financial corporation's-Mutual Funds, insurance companies – Objectives and functions (only a brief outline).

Unit-5

Regulatory Institutions: RBI – Role and Functions. The Securities and Exchange Board of India-objectives-function-powers-SEBI guidelines for primary and secondary market

Learning Outcome: *After completion of this paper, the student will be able to understand the structure and role of financial system, financial intermediaries and regulators in the Indian economy.*

Reference Books:

- ✓ Kohn, Meir: *Financial Institutions and Markets*, Tata McGraw Hill.
- ✓ Bhole L.M: *Financial Institutions and Markets*, Tata McGraw Hill.
- ✓ Desai, Vasantha: *The Indian Financial System*, Himalaya Publishing House.
- ✓ Machiraju.R.H: *Indian Financial System*, Vikas Publishing House.
- ✓ Khan M.Y: *Indian Financial System*, Tata McGraw Hill.
- ✓ Varshney, P.N., & D K Mittal, D.K.: *Indian Financial System*, Sulthan Chand & Sons
- ✓ Gordon E. &Natarajan K.: *Financial Markets & Services*, Himalaya Publishing House.
- ✓ Pathak, V. Bharati: *Indian Financial System*, Pearson Education.

B.Com. Semester – V
Paper DSE 5.4 (A): FINANCIAL STATEMENT ANALYSIS & REPORTING

Duration: 3 hrs.

Marks: 100 (80+20)

Objectives: *To enable the students to understand the basic knowledge about the financial statement analysis and reporting for economic decision making.*

Unit-1

Introduction Concepts of financial statements – Nature of financial statements – Objectives of financial statements – Different types of financial statements: income statement, balance sheet, statement of retained earnings, fund flow statement, cash flow statement, schedules – Limitations of financial statements.

Unit-2

Analysis & Interpretation of Financial Statements: Traditional Approaches Vs. Modern Approaches to financial statement analysis – Classification of financial statement analysis: based on modus operandi and based on materials used – Techniques of financial statement analysis: Comparative Statements, Common-size Statements, Trend Ratios and Ratio Analysis – Problems encountered in financial statement analysis.

Unit-3

Ratio Analysis: Classification of ratios – Ratio formation – Ratio interpretation – Practical methods of ratio analysis: Time Series (intra firm) Analysis, Cross Sectional (inter firm) Analysis, Residual Analysis and Multivariate Analysis.

Unit-4

Multivariate Ratio Analysis: Concept, objectives, uses and limitations – Univariate analysis Vs. Multivariate ratio analysis – Application of statistical tools in financial statement analysis.

Unit-5

Corporate Reporting: Cash Flow statement Analysis (AS 3) and Statutory and Non Statutory Reports, Integrated Reporting

Learning Outcome: *After the completion of this paper, the students will be able to prepare the end result of a business houses by preparation through financial statement analysis and reporting.*

Suggested Readings:

- ✓ Foster, G.: Financial Statement Analysis, Englewood Cliffs, NJ, Prentice Hall.
- ✓ Sahaf M.A – Management Accounting – Principles & Practice – Vikash Publication
- ✓ Foulke, R.A.: Practical Financial Statement Analysis, New York, McGraw-Hill.
- ✓ Hendriksen, E.S.: Accounting Theory, New Delhi, Khosla Publishing House.
- ✓ Kaveri, V.S.: Financial Ratios as Predictors of Borrowers' Health, New Delhi, Sultan Chand.
- ✓ Lev, B.: Financial Statement Analysis – A New Approach, Englewood Cliffs, NJ, Prentice Hall.
- ✓ Maheswari, S.N.: Management Accounting & Financial Control, New Delhi, Sultan Chand.

B.Com. Semester – V

Paper 5.4 (B): MERCHANT BANKING AND FINANCIAL SERVICES

Duration: 3 hrs.

Lectures: 65 hour

Marks: 100 (80+20)

Objectives: *To enable the students to understand the basic knowledge about the financial services available in India.*

Unit-1

Merchant Banking: Nature and scope of Merchant Banking - Regulation of Merchant Banking Activity - overview of current Indian Merchant Banking scene - structure of Merchant Banking industry - primary Markets in India and Abroad - - professional Ethics and code of conduct - current Development

Unit-2

Financial Services: Meaning and Definition, Role of Financial Services in a financial system. Leasing: Meaning and features. Introduction to equipment leasing: Types of Leases, Evolution of Indian Leasing Industry. Legal Aspects of Leasing: present Legislative Framework. Hire purchase: concept and characteristics of Hire purchase. Difference between hire purchase and leasing

Unit-3

Factoring: concept, nature and scope of Factoring - Forms of Factoring - Factoring vis-à-vis Bills Discounting - Factoring vis-à-vis credit Insurance Factoring vis-à-vis Forfeiting- Evaluation of a Factor - Evaluation of Factoring - Factoring in India current Developments.

Unit-4

Securitization / Mortgages: Meaning, nature and scope of securitization, securitization as a Funding Mechanism, securitization of Residential Real Estate - whole Loans - Mortgages - Graduated-payment. Depository: Meaning, Evolution, Merits and Demerits of Depository. Process of Dematerialization and Dematerialization, Brief description of NSDL and CDSL

Unit-5

Security Brokerage: Meaning of Brokerage, types of brokers. Difference between broker and jobber, SEBI Regulations relating to brokerage business in India

Learning Outcome: *After the completion of this course, the student will be able to understand the structure and function of mercantile banking and various financial services available in the present business world.*

Suggested Readings:

- ✓ M.Y.Khan, Financial Services, Tata McGraw-Hill, 11th Edition, 2008
- ✓ Bhalla, International Financial Management – Vikash Publication
- ✓ Gopal C.R – Management Financial Service – S.Chand
- ✓ NaliniPravaTripathy, Financial Services, PHI Learning, 2008
- ✓ Machiraju, Indian Financial System, Vikas Publishing House, 2nd Edition, 2002.
- ✓ J.C.Verma, A Manual of Merchant Banking, Bharath Publishing House, New Delhi.
- ✓ Varshney P.N. & Mittal D.K., Indian Financial System, Sultan Chand & Sons, New Delhi.
- ✓ Sasidharan, Financial Services and System, Tata McGraw Hill, New Delhi, 1st Edition, 2008.
- ✓ Website of SEBI

B.Com. Semester – V

Paper 5.4 (C): FINANCIAL INSTITUTIONS AND SERVICES

Duration: 3 hrs.

Lectures: 65 hours

Marks: (80+20)

Objectives:*To enable the students to understand the financial institutions operating in India and services provided by them.*

Unit-1

Basic Theoretical Framework: The financial system and its technology; The factors affecting the stability of the financial system; Development finance vs. universal banking; Financial intermediaries and Financial Innovation; RBI-Central Banking.

Unit-2

Financial Institutions: A brief historical perspective. An update on the performance of IDBI, ICICI, IFCI and SFCs, LIC & GIC, The banking Institutions: Commercial banks - the public and the private sectors - structure and comparative performance. The problems of competition; interest rates, spreads, and NPAs, Bank capital - adequacy norms and capital market support

Unit-3

Non-banking financial institutions: Evolution, control by RBI and SEBI. A perspective on future role, Unit Trust of India and Mutual Funds, Reserve bank of India Framework for/Regulation of Bank Credit, Commercial paper: Features and advantages, Framework of Indian CP Market, effective cost/interest yield

Unit-4

Financial services: Asset/fund based Financial services - lease finance, consumer credit and hire purchase finance, factoring definition, functions, advantages, evaluation and forfeiting, bills discounting, housing finance, venture capital financing. Fee-based / Advisory services: Stock broking, credit rating.

Unit-5

Operations: Financial Assets/ Instruments Rights issues, issue of Debentures, issue of Equity shares - pre-issue activity, post-issue activities. The regulatory framework: SEBI and Regulation of Primary and Secondary Markets, Company Law provisions.

Learning Outcome: *After completion of this paper, the students will be able to understand the role and benefits of financial institution and services.*

Book References

- ✓ M.Y.Khan, Financial Services, Tata McGraw-Hill, New Delhi, 2004.
- ✓ Harsh V.Verma, Marketing of Services, Global Business Press, 2002
- ✓ Sames L .Heskett, Managing In the Service Economy, Harvard Business School Press, Boston, 2001.
- ✓ M.Y.Khan, Indian Financial System, 4/eTata McGraw-Hill, New Delhi, 2004
- ✓ Frank.J.Fabozzi& Franco Modigliani, Foundations of Financial Markets and Institutions, 3/e, Pearson Education Asia, 2002.
- ✓ H.R Machiraju, Indian Financial Systems, Vikas Publishing House Pvt. Ltd.2002.
- ✓ Meir Kohn, Financial Institutions and Markets, Tata McGraw-Hill, New Delhi, 2003.
- ✓ Pathak: Indian Financial Systems Pearson Education
- ✓ NibasaiyaSapna – Indian Financial System – S. Chand
- ✓ 10.Dhamraj – Financial Service – S.Chand

Semester - VI

Paper 6.1: AUDITING AND CORPORATE GOVERNANCE

Duration: 3 hrs.

Lectures: 65 hours

Marks: 100 (80+20)

Objective: *To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards and to give an overview of the principles of Corporate Governance and Corporate Social Responsibility*

Unit-1

Auditing: Introduction, Meaning, Objects, Basic Principles and Techniques; Classification of Audit, Audit Planning, Internal Control – Internal Check and Internal Audit; Audit Procedure – Vouching and verification of Assets & Liabilities

Unit-2

Audit of Limited Companies: Company Auditor- Qualifications and disqualifications, Appointment, Rotation, Removal, Remuneration, Rights and Duties Auditor's Report-Contents and Types. Liabilities of Statutory Auditors under the Companies Act 2013

Unit-3

Special Areas of Audit: Special features of Cost audit, Tax audit, and Management audit; Recent Trends in Auditing: Basic considerations of audit in EDP Environment; Standard on Auditing(SA); Relevant Case Studies/Problems;

Unit-4

Corporate Governance: Conceptual framework of Corporate Governance, Corporate Governance Reforms. Major Corporate Scandals in India and Abroad: Common Governance Problems Noticed in various Corporate Failures. Codes & Standards on Corporate Governance

Unit-5

Corporate Social Responsibility (CSR): Strategic Planning and Corporate Social Responsibility; Corporate Philanthropy, Meaning of CSR, CSR and CR, CSR and Corporate Sustainability, CSR and Business Ethics, CSR and Corporate Governance, Environmental Aspect of CSR, CSR provision under the Companies Act 2013, CSR Committees

Learning Outcome: *At the end of the paper student will have detail knowledge about principles and techniques of audit in accordance with current legal requirement and as per the guidelines of different statutory authorities.*

Suggested Readings:

- ✓ Gupta, Kamal and Ashok Arora. *Fundamentals of Auditing*. Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi.
- ✓ Gadada Siddheswar T & Rachchh Gunvantrai – Introduction to Auditing – Vikash
- ✓ Jha, Aruna. *Auditing*. Taxmann.
- ✓ Tandon, B. N., S. Sudharsanam and S. Sundharabahu. *A Handbook of Practical Auditing*. S. Chand and Co. Ltd., New Delhi.
- ✓ Ghatalia, S.V. *Practical Auditing*. Allied Publishers Private Ltd., New Delhi.
- ✓ Singh, A. K. and Gupta Lovleen. *Auditing Theory and Practice*. Galgotia Publishing Company.
- ✓ Alvin Arens and James Loebbecke, *Auditing: an Integrated Approach*
- ✓ Ravinder Kumar and Virender Sharma, *Auditing Principles and Practice*, PHI Learning
- ✓ Christine A Mallin, *Corporate Governance (Indian Edition)*, Oxford University Press, New Delhi.
- ✓ Bob Tricker, *Corporate Governance-Principles, Policies, and Practice* (Indian Edition), Oxford University Press, New Delhi.
- ✓ The Companies Act 2013 (Relevant Sections)
- ✓ MC Kuchhal *Corporate Laws*, Shri Mahaveer Book Depot. (Publishers). (Relevant Chapters)
- ✓ Relevant Publications of ICAI on *Auditing* (CARO).

B. Com.: Semester VI
Paper 6.2: INDIRECT TAX LAW

Duration: 3 hrs.

Lectures: 65 hours

Marks: 100 (80+20)

Objective: *To provide basic knowledge and equip students with application of principles and provisions of Service Tax, VAT, Central Excise, and Customs Laws.*

Contents:

Unit-1

Service tax – concepts and general principles, Charge of service tax and taxable services, Valuation of taxable services, Payment of service tax and filing of returns, Penalties, CENVAT Credit.

Unit-2

VAT – concepts and general principles, Calculation of VAT Liability including input Tax Credits, Small Dealers and Composition Scheme, VAT Procedures

Unit-3

Central Excise Law in brief – Goods, Excisable goods, Manufacture and Manufacturer, Valuation, CENVAT, Basic procedures, Export, SSI, Job Work

Unit-4

Basic concepts of customs law, Territorial waters, high seas, Types of custom duties – Basic, Countervailing & Anti- Dumping Duty, Safeguard Duty, Valuation, Customs Procedures, Import and Export Procedures, Baggage, Exemptions

Learning outcome: *After completion of this paper, the students will have an insight to the taxation on production and distribution of goods and provision of services along taxation mechanism of international trade.*

Suggested Readings:

- ✓ Singhania Vinod K. and Monica Singhania, *Students' Guide to Indirect Taxes*, Taxmann Publications Pvt. Ltd., Delhi.
- ✓ V.S. Datey. *Indirect Tax Law and practice*, Taxmann Publications Pvt. Ltd., Delhi, Latest edition.
- ✓ Sanjeev Kumar. *Systematic Approach to Indirect Taxes*, Latest edition.
- ✓ S. S. Gupta. *Service Tax -How to meet your obligation* Taxmann Publications Pvt. Ltd., Delhi, Latest edition.
- ✓ Grish Ahuja & Dr. Ravi Gupta, *Indirect Taxes*, Flair Publication Pvt. Ltd.

B.Com. Semester - VI
PaperDSE 6.3 (A): CORPORATE TAX PLANNING

Duration: 3 hrs. Marks: 100 (80+20) Lectures: 65 hours

Objective: *To provide Basic knowledge of corporate tax planning and its impact on decision-making.*

Contents:

Unit-1

Tax planning, tax management, tax evasion, tax avoidance; corporate tax in India, Types of companies, Residential status of companies and tax incidence, Tax liability and minimum alternate tax, Tax on distributed profits

Unit-2

Tax planning with reference to setting up of a new business; Locational aspect, nature of business, form of organization; Tax planning with reference to financial management decision; Capital structure, dividend including deemed dividend and bonus shares; Tax planning with reference to sale of scientific research assets.

Unit-3

Tax planning with reference to specific management decisions; Make or buy; own or lease; repair or replace; Tax planning with reference to employees' remuneration; Tax planning with reference to receipt of insurance compensation; Tax planning with reference to distribution of assets at the time of liquidation.

Unit-4

Special provisions relating to non-residents; double taxation relief; Provisions regulating transfer pricing; Advance rulings; Advance pricing agreement

Unit-5

Tax planning with reference to business restructuring: - Amalgamation, Demerger, Slump sale, Conversion of sole proprietary concern/partnership firm into company, Conversion of company into LLP, Transfer of assets between holding and subsidiary companies.

Learning outcome: *After learning the subject, the students will be able to understand the taxation of the corporate house.*

Suggested Readings:

- ✓ Singhanian, Vinod K. and Monica Singhanian. Corporate Tax Planning. Taxmann Publications Pvt. Ltd., New Delhi.
- ✓ Ahuja, Girish. and Ravi Gupta. Corporate Tax Planning and Management. Bharat Law House, Delhi.

- ✓ Acharya, Shuklendra and M.G. Gurha. Tax Planning under Direct Taxes. Modern Law Publication, Allahabad.
- ✓ Mittal, D.P. Law of Transfer Pricing. Taxmann Publications Pvt. Ltd., New Delhi.
- ✓ IAS – 12 and AS – 22.
- ✓ T.P. Ghosh. IFRSs. Taxmann Publications Pvt. Ltd. New Delhi.

B.Com. : Semester - VI

Paper DSE 6.4: BUSINESS RESEARCH METHODS AND PROJECT WORK

Duration: 3 hrs. Lectures: 65 hours

Marks: 100 (50+50)

Objective: *This course aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data.*

Section A: Business Research Methods

50 Marks

Unit-1

Introduction: Meaning of research; Scope of Business Research; Purpose of Research –Exploration, Description, Explanation; Unit of Analysis – Individual, Organization, Groups, and Data Series; Conception, Construct, Attributes, Variables, and Hypotheses.

Unit-2

Research Process: An Overview; Problem Identification and Definition; Selection of Basic Research Methods- Field Study, Laboratory Study, Survey Method, Observational Method Existing Data Based Research, Longitudinal Studies, Panel Studies

Unit-3

Measurement: Definition; Designing and writing items; Uni-dimensional and Multi-dimensional scales; Measurement Scales- Nominal, Ordinal, Interval, Ratio; Ratings and Ranking Scale, Thurstone, Likert and Semantic Differential scaling, Paired Comparison; Sampling –Steps, Types, Sample Size Decision; Secondary data sources

Hypothesis Testing: Tests concerning means and proportions; ANOVA, Chi-square test and other Non-parametric tests; Testing the assumptions of Classical Normal Linear Regression.

Section B – Project Report

Marks 50

Unit-4

Report Preparation: Meaning, types and layout of research report; Steps in report writing; Citations, Bibliography and Annexure in report; JEL Classification

Note:

3. There shall be a written examination of 50% Marks on the basis of Unit I to III.
4. The student will write a project report under the supervision of a faculty member assigned by the college/institution based on field work. The Project Report carries 50% Marks and will be evaluated by University appointed examiners.

Learning Outcome: After completion of this paper, the students will be able to assess and apply a range of research method on a practical project.

Suggested Readings:

- ✓ Chawla Deepak – Research Methodology – Vikash Publication
- ✓ Upagade&Shende – Research Methodology – S.Chand

B.Com. Semester - VI
Paper 6.4 (B): FUNDAMENTALS OF INVESTMENT

Duration: 3 hrs.

Lectures: 65 hours

Marks: 100 (80+20)

Objective: To familiarize the students with different investment alternatives, introduce them to the framework of their analysis and valuation and highlight the role of investor protection.

Contents

Unit-I:

The Investment Environment - The investment decision process, Types of Investments – Commodities, Real Estate and Financial Assets, the Indian securities market, the market participants and trading of securities, security market indices, sources of financial information, Concept of return and risk, Impact of Taxes and Inflation on return.

Unit-II:

Fixed Income Securities - Bond features, types of bonds, estimating bond yields, Bond Valuation types of bond risks, default risk and credit rating.

Unit-III:

Approaches to Equity Analysis: Introductions to Fundamental Analysis, Technical Analysis and Efficient Market Hypothesis, dividend capitalization models, and price-earnings multiple approach to equity valuation.

Unit-IV:

Portfolio Analysis and Financial Derivatives: (a) Portfolio and Diversification, Portfolio Risk and Return. (b) Mutual Funds. (c) Introduction to Financial Derivatives, Financial Derivatives Markets in India.

Unit-V:

Investor Protection – Role of SEBI and stock exchanges in investor protection; Investor grievances and their redressal system, insider trading, investors' awareness and activism.

Learning outcome: After completion of this paper, this paper will educate the students about various aspect of investment in detail along with understandability of stock market operation, focusing on need for common investor protection.

Suggested Readings

- ✓ Bhalla – Fundamentals of Investment – S.Chand
- ✓ Pandian P. – Security Analysis & Portfolio Management – Vikash Publication
- ✓ Jones, C.P., “*Investments Analysis and Management*”, Wiley, 8thed.
- ✓ Prasanna, Chandra., “*Investment Analysis and Portfolio Management*”, Tata McGraw Hill.
- ✓ Rustogi, R.P., *Fundamentals of Investment*, Sultan Chand & Sons, New Delhi.
- ✓ Vohra, N.D., and B.R. Bagri, “*Futures and Options*”, McGraw Hill Publishing
- ✓ Mayo, *An Introduction to Investment*, Cengage Learning.

B.Com. Semester - VI

Paper 6.4 (C): FINANCIAL MARKET OPERATIONS

Duration: 3 hrs.

Marks: 100 (80+20)

Lectures: 65 hours

Objective: This course aims at acquainting the students with the working of Financial Markets in India.

Unit-1

An overview of financial markets in India: Money Markets: Indian money markets composition and structure; (a) Acceptance houses, (b) Discount houses, and (c) Call money markets; Recent trends in India money markets.

Unit-2

Capital Market: Security market – (a) New issue market. (b) Secondary market: Functions and role of stock exchange: listing procedure and legal requirements: Public Issue – pricing and marketing: Stock exchanges – National Stock Exchange and over-the-counter exchanges.

Unit-3

Securities Contract and Regulations Act: Main provisions. Investors Protections: Grievances concerning stock exchange dealing and their removal: Grievances cells in stock exchanges: SEBI: Company Law Board: Press: Remedy through courts.

Unit-4

Functionaries on Stock Exchanges: Brokers, Sub brokers, market makers, jobbers, and NRIS.

Unit-5

Financial Services: Concept, functions, and types. Financial Services: Meaning and Definition, Role of Financial Services in a financial system. Leasing: Meaning and features. Introduction to equipment leasing: Types of Leases, Evolution of Indian Leasing Industry. Legal Aspects of Leasing: present Legislative Framework. Hire purchase: concept and characteristics of Hire purchase. Difference between hire purchase and leasing, SEBI guidelines: Credit rating

Learning Outcome: After completion of this paper, the student will be able to understand the nature and role of the main financial markets within the domestic and global environment.

Suggested Readings:

- ✓ Vaish M.C – Monetary Theory – Vikash Publication
- ✓ Chandler M. V. and Goldfeld S. M: Economics of Money and Banking: Harper and Row, New York.
- ✓ Gupta Suraj B: Monetary Economics: S. Chand and Co., New Delhi
- ✓ Gupta Suraj B: Monetary Planning in India: Oxford, Delhi.
- ✓ Bhole I. M.: financial Markets and Instructional: Tata McGraw Hill, New Delhi.

UTKAL UNIVERSITY

REGULATIONS & SYLLABUS

UNDER GRADUATE PROGRAMME IN BACHELOR OF SCIENCE

(HONOURS & PASS)-CBCS PATTERN

Effective from Admission Batch: 2016 – 2017

(Applicable to Autonomous Colleges/Affiliated Colleges/DDCE)

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REGULATIONS

1. Eligibility

- 1.1 Higher Secondary/+2/ Senior Secondary or any other equivalent examination passed from any Board/Council established by the Govt. of India or any State Govt. or any other equivalent examination recognized by Central Board of Secondary Education/Council of Higher Secondary Education, Govt. of Odisha/Dept of Higher Education/Dept. of Industry or any other Dept of Govt. of Odisha or Utkal University. Those joining B.Sc. Programme must have passed the above examination under the faculty of Science/Technology/Engineering/Pharmacy etc. There shall be no such restriction for joining BA/ B.Com stream.
- 1.2 Students ordinarily may be selected for admission through Entrance Test, Group Discussion and Personal Interview and/or a combination of these with due weighage to career to be decided by the Autonomous College or Director, Higher Education. DDCE would admit students on first come first serve basis. The Govt. of Odisha may lay down admission process for colleges under its control.
- 1.3 Admission Policy would be decided by the Academic Council of the respective Autonomous Colleges and for affiliated colleges Government will decide the admission policy.
- 1.4 Directorate of Distance & Continuing Education would decide its own admission policy.

2. Duration

- 2.1 At least three years of six semesters in toto. In case of professional courses the duration may be more as per the direction of regulatory bodies established under Law.
- 2.2 Odd semester is from June to December (i.e., Sem.-I, Sem.-III & Sem.-V semester). The examination shall be held normally in the month of November - December.
- 2.3 Even semester is from January to June (i.e., Sem.-II, Sem.-IV & Sem.-VI semester). The examination shall be held normally in the month of May - June. However the Final Semester shall be conducted in April and result shall be published by end of May.
- 2.4 A student would be required to complete the course within six academic years from the date of admission.
- 2.5 A student may opt for fast track of completing all the six semesters in two years provided she/he has at least 2(two) years industry/organizational experience after +2. Such permission would be granted at the discretion of the Principal of the Autonomous Colleges and DDCE. This clause shall not be applicable to affiliated, non autonomous colleges.

3. Compulsory Registration in Semester-I

- 3.1 Registration for Semester-I is compulsory. A candidate admitted to +3 Courses but not registered for 1st semester examination, his/her admission will be automatically cancelled.

- 3.2 A candidate may take a blank Semester: A blank Semester has to be clubbed with next Odd or Even Semester as the case may be i.e. Sem.-II, Sem.-IV and Sem.-VI/Sem.-I, Sem.-III and Sem.-V. The Hostel policy for blank semester is to be decided by colleges as per their suitability. Hostel accommodation cannot be claimed as a right for a blank semester. (Blank semester is not to be confused as repetition due to failure).
- 3.3 75% attendance for non DDCE students is a requirement for being eligible to appear at Examination Up to 15% waiver may be granted by the College Principal at discretion on Health Ground or participation in sports , cultural activities, NCC and NSS activities etc.
- 3.4 A student may clear backlog papers within 6 years. Improvement if any has to be completed within 4 years.
- 3.5 A student may register for extra credit i.e. register for additional papers under the same faculty or outside the faculty under an autonomous college or DDCE provided they are in a position to facilitate such teaching.

4. Weightage Distribution (Percentage) for Evaluation

• Theory Subjects

Mid Term Test-I	Mid Term Test-II	End Term Test	Total
10	10	80	100

• Subjects with Practical

Unit Test-I	Unit Test-II	End Term Test	Total
		A-Theory B-Practical	
10	10	A-50 B-30(20+10-Record)	100

• Dissertation/Project Work

Identification of problem	Review of Literature	Methodology	Findings	Analysis	Viva-Voce	Total
10	10	10	25	25	20	100

Note: For the DDCE unit tests, quizzes, presentation, seminar etc. may not be introduced immediately.

5. Grading System

5.1

<u>Grade</u>		<u>Marks secured out of 100</u>	<u>Grade points</u>
Outstanding	'O'	90 – 100	10
Excellent	'A+'	80 – 89	9
Very Good	'A'	70 – 79	8
Good	'B+'	60 – 69	7
Above average	'B'	50 – 59	6
Fair	'C'	40 – 49	5
Pass	'D'	30 – 39	4
Failed	'F'	Below 30	0

NOTE:

- A Candidate has to secure 30% or above to pass in each of the Papers.
- The candidate obtaining Grade-*F* is considered failed and will be required to clear the back paper(s) in the subsequent examinations within the stipulated time.
- The candidate securing Grade-*B* and above in Core/Honours papers in aggregate will be awarded Honours.
- The candidate securing Grade-*B +* and above in aggregate in first appearance will be awarded Honours with Distinction/Distinction(for pass/regular course).
- Any candidate filling the forms for appearing in back papers/improvement shall not be awarded Distinction.

5.2 A transitory letter Grade-I (carrying points 2) shall be introduced for cases where the results are incomplete. This grade shall automatically be converted into appropriate grade(s) as and when the results are complete.

5.3 A student's level of competence shall be categorized by a **GRADE POINT AVERAGE** to be specified as:

SGPA: Semester Grade Point Average

CGPA: Cumulative Grade Point Average

(a) **POINT:** Integer equivalent of each letter grade.

(b) **CREDIT:** Integer signifying the relative emphasis of individual course item(s) in a semester as indicated by the Course structure and syllabus.

CREDIT POINT: $(b) \times (a)$ for each course item.

CREDIT INDEX: \sum CREDIT POINT of course items.

GRADE POINT AVERAGE: $\frac{\text{CREDIT INDEX}}{\sum \text{CREDIT}}$.

SEMESTER GRADE POINT AVERAGE(SGPA) = $\frac{\text{CREDIT INDEX for a semester}}{\sum \text{CREDIT}}$.

CUMULATIVE GRADE POINT AVERAGE(CGPA)

= $\frac{\text{CREDIT INDEX of all previous Semester up to the 6th semester}}{\sum \text{CREDIT}}$.

5.4 In addition to the points marks/ percentage would also be awarded and shall also be reflected in the Mark Sheet.

5.5 The details of grading system shall be printed on the backside of University Mark-sheet.

6. Repeat Examination

6.1 A student has to clear back papers (i.e., in the paper/papers one has failed) by appearing at subsequent semester examinations within six years from the date of admission.

6.2 A student may appear improvement (repeat) in any number of papers in the immediate subsequent examination. The higher marks shall be retained.

6.3 Improvement has to be completed with 4-yrs. from the date of admission.

7. Hard case Rule

7.1 2% of grace mark on the aggregate mark subject to maximum of 5(five) marks in single paper shall be given. This shall be applicable in each semester.

7.2 0.5(point five percent) grace mark can be given for award of B Grade in each semester provided grace mark under 7.1 has not been awarded.

8. Examination Question Pattern(Suggestive)

8.1 The end semester examination will be of three hours irrespective of marks.

8.2 **For subject without having practical** full marks are 100 per paper out of which 20 marks is allotted for Mid-Semester Examination (Internal) and 80 marks for end semester examination.

The question papers shall be divided into two parts such as Group-A & Group-B.

Group-A will carry 10 short questions of two marks each .The answer should be within two sentences.

There shall be 5 long type questions in GroupB with one alternative each have to be attempted and all questions shall be of equal value (12 marks ×5).

For subject with practical full marks are 100 per paper out of which 20 marks is allotted for Mid- Semester Examination, 50 is for End Semester Examination and 30 is for practical.

The question papers shall be divided into two parts such as Group-A & Group-B.

Group-A will carry 10 short questions of one mark each. The answer should be within two sentences.

There shall be 5 long-type questions with one alternative each have to be attempted for subjects having practical. The questions shall be of equal value (8 Marks ×5).

Practical will carry 30 marks out of which 10 will be for records.

8.3 Model answers for long questions should be between 700 – 1000 words.

9. Each Department shall have a designated Teacher in-charge of Examination to be decided by the Principal in addition to the Controller of Examinations of the College (applicable to autonomous colleges).
10. The Internal Evaluation would be the sole responsibility of Teacher offering the course.
11. Suitable modifications may be made by the Autonomous Colleges keeping in view the UGC guideline for Autonomous Colleges, University guidelines from time to time and State Govt. guidelines from time to time.

12. Broad Principles of Credit Transfer

There should be a small group to consider all cases of credit transfer. The group should consist of the following:

Chairman: Chairman P.G Council (for University affiliated colleges)/Director, DDCE for DDCE/Principals of the Autonomous College/Controller of Examinations, Utkal University.

Convener: Dy. Controller of Examinations for University affiliated colleges/Faculty member of DDCE for DDCE/Controller of Examinations of respective Autonomous colleges for Autonomous colleges.

Members: Four teachers to be nominated by the Chairman, P.G. Council/Director, DDCE/Principal of Autonomous Colleges as the case may be.

Waiver for courses covered under other colleges notwithstanding differences in detailed course can be granted. Papers which one has not studied even though they are prescribed for earlier semesters can be covered by the students.

Other Broad Principles: Student transferred after Semester-I examination cannot be given position or medal under autonomous colleges. Students who have failed/remained absent/appeared for improvement shall not be eligible for University Gold medal or Rank. Students who have been granted credit waiver under credit transfer system cannot be awarded Gold medal or position.

DETAILS OF COURSES UNDER BACHELOR OF SCIENCE(HONOURS)

Course	Theory+Practical	Theory + Tutorial
I. Core Course (6 Credits)		
(14 Papers)	$14 \times 4 = 56$	$14 \times 5 = 70$
Core Course Practical / Tutorial*		
(14 Papers)	$14 \times 2 = 28$	$14 \times 1 = 14$
II. Elective Course (6 Credits)		
(8 Papers)		
A.1. Discipline Specific Elective	$4 \times 4 = 16$	$4 \times 5 = 20$
(4 Papers)		
A.2. Discipline Specific Elective		
Practical/ Tutorial*	$4 \times 2 = 8$	$4 \times 1 = 4$
(4 Papers)		
B.1. Generic Elective/Interdis-	$4 \times 4 = 16$	$4 \times 5 = 20$
ciplinary (4 Papers)		
B.2. Generic Elective, Practical/	$4 \times 2 = 8$	$4 \times 1 = 4$
Tutorials*(4 Papers)		
<ul style="list-style-type: none"> • Optional Dissertation or Project Work in place of one Discipline Specific elective paper (6 credits) in Semester-VI. 		
III. Ability Enhancement Courses		
1. Ability Enhancement Compulsory Courses(AECC)		
(2 Papers of 4 credit each)	$2 \times 4 = 8$	$2 \times 4 = 8$
Environmental Science/English/ Hindi/MIL Communication		
2. Skill Enhancement Courses(SEC)		
(Min.2)(2 Papers of 4 credit each)	$2 \times 4 = 8$	$2 \times 4 = 8$
<hr/>		
Total Credit	148	148

- Institute should evolve a system/policy about ECA/General Interest/Hobby/Sports NCC/NSS/related courses on its own.
- Wherever there is a practical there will be no tutorial and vice-versa.
- For Generic Elective, there shall be two subjects other than the Core subject having two papers each.

SCHEME FOR CHOICE BASED CREDIT SYSTEM BACHELOR OF SCIENCE(HONOURS)

Semester	Core Course(14)	Ability Enhancement Compulsory Course (AECC)(2)	Skill Enhancement Course (SEC)(2)	Discipline Specific Elective (DSE)(4)	Generic Elective (GE)(4)
I	C-1 C-2	Environmental Science			GE-1A
II	C-3 C-4	MIL Communication (Oriya/Hindi)			GE-2A
III	C-5 C-6 C-7		SEC-1(English Communication)		GE-1B
IV	C-8 C-9 C-10		SEC-2		GE-2B
V	C-11 C-12		DSE-1 DSE-2		
VI	C-13 C-14		DSE-3 DSE-4		

DETAILS OF COURSES UNDER BACHELOR OF SCIENCE(REGULAR/PASS)

Course	Theory+Practical	Theory + Tutorial
I. Core Course (6 Credits) (12 Papers) (4 Courses from each of the 3 Disciplines of choice)	$12 \times 4 = 48$	$12 \times 5 = 60$
Core Course Practical / Tutorial* (12 Practical/Tutorials*) (4 Courses from each of the 3 Disciplines of choice)	$12 \times 2 = 24$	$12 \times 1 = 12$
II. Elective Course (6 Credits) (6 Papers) (Two papers from each discipline of choice including paper of interdisciplinary nature)	$6 \times 4 = 24$	$6 \times 5 = 30$
Elective Course Practical/Tutorials* (6 Practical/Tutorials*) (Two Papers from each Disciplines of choice including paper of interdisciplinary nature)	$6 \times 2 = 12$	$6 \times 1 = 6$
• Optional Dissertation/Project Work in place of one Discipline elective paper (6 credits) in Semester-VI.		
III. Ability Enhancement Courses		
1. Ability Enhancement Compulsory Courses(AECC) (2 Papers of 4 credit each) Environmental Science/English/ Hindi/MIL Communication	$2 \times 4 = 8$	$2 \times 4 = 8$
2. Skill Enhancement Courses(SEC) (4 Papers of 4 credit each)	$4 \times 4 = 16$	$4 \times 4 = 16$
Total Credit	132	132

- Institute should evolve a system/policy about ECA/General Interest/Hobby/Sports NCC/NSS/related courses on its own.
- Wherever there is a practical, there will be no tutorial and vice-versa.

SCHEME FOR CHOICE BASED CREDIT SYSTEM BACHELOR OF SCIENCE (REGULAR/ PASS)

Semester	Core Course(12)	Ability Enhancement Compulsory Course (AECC)(2)	Skill Enhancement Course (SEC)(2)	Discipline Specific Elective (DSE)(6)
I	DSC-1A DSC-2A DSC-3A	Environmental Science		
II	DSC-1B DSC-2B DSC-3B	MIL Communication (Oriya/Hindi)		
III	DSC-1C DSC-2C DSC-3C		SEC-1(English Communication)	
IV	DSC-1D DSC-2D DSC-3D		SEC-2	
V			SEC-3	DSE-1A DSE-2A DSE-3A
VI			SEC-4	DSE-1B DSE-2B DSE-3B

ABILITY ENHANCEMENT COMPULSORY COURSES (AECC) (For all Subjects)

SEMESTER-I

AECC-I: Environmental Science

Max. Marks:100 (End-Sem.:80 Marks, Mid-Sem.: 20 Marks)

UNIT-I

The Environment: The Atmosphere, Hydrosphere, Lithosphere, Biosphere, Ecology, Ecosystem, Biogeochemical Cycle (Carbon Cycle, Nitrogen Cycle).

UNIT-II

Environment Pollution: Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution, Radiation Pollution, Natural Disasters and their Management.

UNIT-III

Population Ecology: Individuals, Species, Pollution, Community, Control Methods of Population, Urbanization and its effects on Society, Communicable Diseases and its Transmission, Non-Communicable Diseases.

UNIT-IV

Environmental Movements in India: Grassroot Environmental movements in India, Role of women, Environmental Movements in Odisha, State Pollution Control Board, Central Pollution Control Board.

UNIT-V

Natural Resources: Conservation of Natural Resources, Management and Conservation of Wildlife, Soil Erosion and Conservation, Environmental Laws: Water Act, 1974, Air Act, 1981, The Wildlife (Protection) Act, 1972, Environment Protection, 1986.

SEMESTER-II

AECC-II: MIL Communication (Odia/Hindi)

Max. Marks:100 (End-Sem.:80 Marks, Mid-Sem.: 20 Marks)

(Detailed syllabus for this paper is available in MIL Odia/Hindi Communication syllabus).

BIO-TECHNOLOGY(HONOURS)

SEMESTER-I

C-1: BIO-CHEMISTRY & METABOLISM

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Amino acid & Proteins: Structure and properties of Amino acids, Types of Proteins and their Classification, Forces stabilizing protein structure and shape. Different levels of structural organization of proteins, Fibrous and globular proteins. Carbohydrates: Structure, Function and properties of Monosaccharides, Disaccharides and Polysaccharides. Homo & Hetero polysaccharides, Mucopolysaccharides, Bacterial cell wall polysaccharides, Glycoproteins and their biological functions.

UNIT-II

Lipids: Structure and functions Classification, nomenclature and properties of fatty acids, essential fatty acids. Phospholipids, Sphingolipids, Glycolipids, Cerebrosides, Gangliosides, Prostaglandins, Cholesterol. Nucleic acids: Structure and functions: Physical & chemical properties of Nucleic acids, Nucleosides & Nucleotides, Purines & Pyrimidines. Biologically important nucleotides, Double helical model of DNA structure and forces responsible for A, B & Z DNA.

UNIT-III

Enzymes: Nomenclature and classification of Enzymes, Holoenzyme, apoenzyme, Cofactors, coenzyme, prosthetic groups, Enzyme activity, Specific activity, Common feature of active sites, Enzyme specificity.

UNIT-IV

Carbohydrates Metabolism: Reactions, energetic and regulation. Glycolysis: Fate of pyruvate under aerobic and anerobic conditions. Pentose phosphate pathway and its significance, Gluconeogenesis, Glycogenolysis and glycogen synthesis. TCA cycle, Electron transport chain, Oxidative phosphorylation, β -oxidation of fatty acids.

PRACTICAL

1. To study activities of any enzyme under optimum conditions.
2. To study the effect of pH, temperature on the activity of salivary amylase enzyme.
3. Determination of pH optima, temperature optima, K_m value, V_{max} value, Effect of inhibitor (Inorganic phosphate) on the enzyme activity.
4. Estimation of blood by glucose oxidase method. item Principles of Colorimetry: (i) Verification of Beers Lambert's law, estimation of protein. (ii) To study relation between absorbance and % transmission.

5. Preparation of buffers.
6. Separation of Amino acids by paper chromatography.
7. Qualitative tests for Carbohydrates, lipids and proteins.
8. Quatitative estimation of proteins.

C-2: CELL BIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Cell: Introduction and structural organization of prokaryotic and Eukaryotic cells, compartmentalization of eukaryotic cells, cell fractionation. Cell membrane and Permeability: Chemical components of biological membranes and its organization, Fluid Mosaic Model, membrane as a dynamic entity, cell recognition and membrane transport.

UNIT-II

Cytoskeleton and cell motility: Structure and function of microtubules, Microfilaments, Intermediate filaments. Endoplasmic reticulum: Structure & function including role in protein segregation; Golgi complex: Structure, biogenesis and functions including role in protein secretion.

UNIT-III

Lysosomes: Vacuoles and micro bodies: Structure and functions. Ribosomes: Structure and function including role in protein synthesis Mitochondria: Structure and function, Genomes, Biogenesis. Chloroplasts: Structure and function, Genomes, Biogenesis. Nucleus: Structure and function, Chromosomes and their structure.

UNIT-IV

Extracellular Matrix: Composition, molecules that mediate cell adhesion, membranes receptors for extra cellular matrix, macromolecules, regulation of receptors expression and function. Signal transduction. Cancer: Carcinogenesis, agents promoting carcinogenesis, characteristics and molecular basis of cancer.

PRACTICAL

1. Study the effect of temperature and organic solvents on semi permeable membrane.
2. Demonstration of dialysis.
3. Study of plasmolysis and de-plasmolysis.
4. Cell fractionation and determination of enzyme activity in organelles using sprouted seed or any other suitable source.
5. Study of structure of any prokaryotic Eukaryotic cell.

6. Microtomy: Fixation, Block making, Section cutting, Double staining of animal tissues like liver, Oesophagus, Stomach, pancreas, Intestine, Kidney, Ovary, testes.
7. Cell division in onion root tip/insect gonads.
8. Preparation of Nuclear, mitochondria & cytoplasmic fractions.

GE-1: DEVELOPMENTAL BIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Gametogenesis and Fertilization: Definition, scope & historical perspective of development Biology, Gametogenesis Spermatogenesis, Oogenesis Fertilization-Definition, mechanism, types of fertilization. Different types of eggs on the basis of yolk.

UNIT-II

Early embryonic development Cleavage: Definition, types, patterns & mechanism Blastulation: Process, types & mechanism Gastrulation: Morphogenetic movementsepiboly, emboly, extension, invagination, convergence, de-lamination. Formation & differentiation of primary germ layers.

UNIT-III

Embryonic Differentiation Differentiation: Cell commitment and determination- the epigenetic landscape: a model of determination and differentiation, control of differentiation at the level of genome, transcription and post-translation level Concept of embryonic induction: Primary, secondary & tertiary embryonic induction, Neural induction and induction of vertebrate lens.

UNIT-IV

Organogenesis Neurulation, notogenesis, development of vertebrate eye. Fate of different primary germ layers Development of behaviour: constancy & plasticity, Extra embryonic membranes, placenta in Mammals.

PRACTICAL

1. Identification of developmental stages of chick and frog embryo using permanent mounts
2. Preparation of a temporary stained mount of chick embryo
3. Study of developmental stages of Anopheles.
4. Study of the developmental stages of Drosophila from stock culture/ photographs.
5. Study of different types of placenta.

SEMESTER-II

C-3: MAMMALIAN PHYSIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Digestion: Mechanism of digestion & absorption of carbohydrates, proteins, Lipids and nucleic acids. Composition of bile, Saliva, pancreatic, gastric and intestinal juice Respiration: Exchange of gases, Transport of O_2 and CO_2 , Oxygen dissociation curve, chloride shift.

UNIT-II

Composition of blood, Plasma proteins & their role, blood cells, Haematopoiesis, Mechanism of coagulation of Blood. Mechanism of Working of heart: Cardiac output, Cardiac cycle, Origin & conduction of heart beat.

UNIT-III

Muscle physiology and osmoregulation Structure of cardiac, smooth & skeletal muscle, threshold stimulus, All or None rule, single muscle twitch, muscle tone, isotonic and isometric contraction, Physical, chemical & electrical events of mechanism of muscle contraction. Excretion : Modes of excretion, Ornithine cycle, Mechanism of urine formation.

UNIT-IV

Nervous and endocrine coordination Mechanism of generation & propagation of nerve impulse, structure of synapse, synaptic conduction, salutatory conduction, Neurotransmitters. Mechanism of action of hormones (insulin and steroids) Different endocrine glands- Hypothalamus, pituitary, pineal, Thymus, thyroid, parathyroid and adrenals, hypo & hyper-secretions.

PRACTICAL

1. Finding the coagulation time of blood.
2. Determination of blood group.
3. Counting of mammalian RBCs.
4. Determination of TLC and DLC.
5. Demonstration of action of an enzyme.
6. Determination of Haemoglobin (% Hb in blood).

C-4: MICROBIAL & PLANT PHYSIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Nutritional classification of microorganism based on carbon, energy and electron sources, Metabolite Transport, Diffusion: Passive and facilitated, Primary active and secondary active transport, group translocation (phosphotransferase system), symport, antiport and uniport, electrogenic and electro transport, transport of Iron.

UNIT-II

Effect of the environment on microbial growth Temperature- temperature ranges for microbial growth, classification based on temperature ranges and adaptations, pH-classification based on pH ranges and adaptations, solutes and water activity, oxygen concentration, radiation and pressure. Chemolithotropic metabolism, Physiological groups of aerobic and anaerobic chemolithotrophs. Hydrogenoxidizing bacteria and methanogens.

UNIT-III

Photosynthesis pigments, anoxygenic and oxygenic photosynthesis, concept of two photo systems, photosynthetic pigments photophosphorylation, physiology of bacterial photosynthesis: light reactions, cyclic and non-cyclic photophosphorylation. Carbon dioxide fixation, Calvin cycle, CAM plants, photorespiration, compensation point.

UNIT-IV

Nitrogen metabolism- inorganic & molecular nitrogen fixation, nitrate reduction and ammonium assimilation in plants. Growth and development: Development, phases of growth, growth curve, growth hormones (auxins, gibberellins, cytokinins, abscisic acid, ethylene) Physiological role and mode of action, seed dormancy and seed germination, concept of photoperiodism and vernalization.

PRACTICAL

1. Separation of photosynthetic pigment by paper chromatography
2. Demonstration of aerobic respiration
3. Preparation of root nodules from a leguminous plant.
4. To study and plot the growth curve of E. coli using turbidometric method and to calculate specific growth rate and generation time.
5. To study and plot the growth curve of Aspergillus niger by radial growth measurements
6. To study the effect of pH on the growth of E. coli.
7. To study the effect of temperature of Aspergillus niger by dry weight method.

8. Demonstration of the thermal death time and decimal reduction time of E.Coli.

GE-2: BIO-TECHNOLOGY & HUMAN WELFARE-1

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Industry: protein engineering; enzyme and polysaccharide synthesis, activity and secretion, alcohol and antibiotic formation.

UNIT-II

Agriculture: N₂ fixation: transfer of pest resistance genes to plants; interaction between plants and microbes; qualitative improvement of livestock.

UNIT-III

Environments: e.g. chlorinated and non-chlorinated organ pollutant degradation; degradation of hydrocarbons and agricultural wastes, stress management, development of biodegradable polymers such as PHB.

UNIT-IV

Forensic science: DNA fingerprinting; Solving violent crimes such as murder and rape; solving claims of paternity and theft etc. using various methods of DNA finger printing. Health: e.g. development of non-toxic therapeutic agents, recombinant live vaccines, gene therapy, diagnostics, monoclonal in E.coli, human genome project.

PRACTICAL

(Wherever wet lab experiments are not possible the principles and concepts can be demonstrated through any other material or medium including videos/virtual labs etc.)

1. Study of a plant part infected with a microbe.
2. To perform quantitative estimation of residual chlorine in water samples.
3. Isolation and analysis of DNA from minimal available biological samples.
4. Case studies on Bioethics (any two).

SEMESTER-III

C-5: GENETICS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Introduction: Historical developments in the field of genetics. Organisms suitable for genetic experimentation and their genetic significance. Cell Cycle: Mitosis and Meiosis: Control points in cell-cycle progression in yeast. Role of meiosis in life cycles of organisms. Mendelian genetics : Mendels experimental design, mono-hybrid, di-hybrid and tri-hybrid crosses, Law of segregation & Principle of independent assortment. Verification of segregates by test and back crosses, Chromosomal theory of inheritance, Allelic interactions: Concept of dominance, recessiveness, incomplete dominance, co-dominance, semi-dominance, pleiotropy, multiple allele, pseudo-allele, essential and lethal genes.

UNIT-II

Non allelic interactions: Interaction producing new phenotype complementary genes, epistasis (dominant & recessive), duplicate genes and inhibitory genes. Chromosome and genomic organization: Structure and characteristics of bacterial and eukaryotic chromosome, chromosome morphology, concept of euchromatin and heterochromatin. packaging of DNA molecule into chromosomes, chromosome banding pattern, karyotype, giant chromosomes, one gene one polypeptide hypothesis, concept of cistron, exons, introns, genetic code, gene function.

UNIT-III

Chromosome and gene mutations: Definition and types of mutations, causes of mutations, Ames test for mutagenic agents, screening procedures for isolation of mutants and uses of mutants, variations in chromosomes structure-deletion, duplication, inversion and translocation (reciprocal and Robertsonian), position effects of gene expression, chromosomal aberrations in human beings, abnormalities Aneuploidy and Euploidy. Sex determination and sex linkage: Mechanisms of sex determination, Environmental factors and sex determination, sex differentiation, Barr bodies, sex linked inheritance.

UNIT-IV

Genetic linkage, crossing over and chromosome mapping: Linkage and Recombination of genes in a chromosome crossing over, Cytological basis of crossing over, Molecular mechanism of crossing over. Extra chromosomal inheritance: Rules of extra nuclear inheritance, maternal effects, maternal inheritance, cytoplasmic inheritance, organelle heredity, genomic imprinting. Evolution and population genetics: In breeding and out breeding, Hardy Weinberg law (prediction, derivation), allelic and genotype frequencies, changes in allelic frequencies, systems of mating, evolutionary genetics, natural selection.

PRACTICAL

1. Permanent and temporary mount of mitosis.
2. Permanent and temporary mount of meiosis.
3. Karyotyping with the help of photographs.
4. Pedigree charts of some common characters like blood group, color blindness and PTC tasting.
5. Study of polyploidy in onion root tip by colchicine treatment.

C-6: GENERAL MICROBIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Fundamentals, History and Evolution of Microbiology. Classification of microorganisms: Microbial taxonomy, criteria used including molecular approaches, Microbial phylogeny and current classification of bacteria. Microbial Diversity: Distribution and characterization Prokaryotic and Eukaryotic cells, Morphology and cell structure of major groups of microorganisms eg. Bacteria, Algae, Fungi, Protozoa and Unique features of viruses.

UNIT-II

Cultivation and Maintenance of microorganisms: Nutritional categories of micro-organisms, methods of isolation, Purification and preservation.

UNIT-III

Microbial growth: Growth curve, Generation time, synchronous batch and continuous culture, measurement of growth and factors affecting growth of bacteria. Microbial Metabolism: Metabolic pathways, amphi-catabolic and biosynthetic pathways Bacterial Reproduction: Transformation, Transduction and Conjugation. Endospores and sporulation in bacteria.

UNIT-IV

Control of Microorganisms: By physical, chemical and chemotherapeutic Agents Water Microbiology: Bacterial pollutants of water, coliforms and non coliforms. Sewage composition and its disposal. Food Microbiology: Important microorganism in food Microbiology: Moulds, Yeasts, bacteria.

PRACTICAL

1. Isolation of bacteria & their biochemical characterization.
2. Staining methods: simple staining, Gram staining, spore staining, negative staining, hanging drop.
3. Preparation of media & sterilization methods, Methods of Isolation of bacteria from different sources.

4. Determination of bacterial cell size by micrometry.
5. Enumeration of microorganism - total & viable count.

C-7: CHEMESTRY-1

SEC-1: MOLECULAR DIAGNOSTICS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Enzyme Immunoassays: Comparison of enzymes available for enzyme immunoassays, conjugation of enzymes. Solid phases used in enzyme immunoassays. Homogeneous and heterogeneous enzyme immunoassays. Enzyme immunoassays after immuno blotting. Enzyme immuno histochemical techniques. Use of polyclonal or monoclonal antibodies in enzymes immuno assays. Applications of enzyme immunoassays in diagnostic microbiology.

UNIT-II

Molecular methods in clinical microbiology: Applications of PCR, RFLP, Nuclear hybridization methods, Single nucleotide polymorphism and plasmid finger printing in clinical microbiology Laboratory tests in chemotherapy: Susceptibility tests: Micro-dilution and macro-dilution broth procedures. Susceptibility tests: Diffusion test procedures. Susceptibility tests: Tests for bactericidal activity. Automated procedures for antimicrobial susceptibility tests.

UNIT-III

Automation in microbial diagnosis, rapid diagnostic approach including technical purification and standardization of antigen and specific antibodies. Concepts and methods in idiotypes. Anti idiotypes and molecular mimicry and receptors. Epitope design and applications. Immunodiagnostic tests. Immuno florescence. Radioimmunoassay.

UNIT-IV

GLC, HPLC, Electron microscopy, flow cytometry and cell sorting. Transgenic animals.

PRACTICAL

(Wherever wet lab experiments are not possible the principles and concepts can be demonstrated through any other material or medium including videos/virtual labs etc.)

1. Kirby-Bauyer method (disc-diffusion method) to study antibiotic sensitivity of a bacterial culture
2. A kit-based detection of a microbial infection (Widal test)
3. Study of Electron micrographs (any four).
4. Perform any one immuno diagnostic test (Typhoid, Malaria, Dengue)

GE-3: BIO-TECHNOLOGY, BIO-SAFETY & HUMAN WELFARE-I or II
(Bioethics and Biosafety)

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Bioremediation of soil & water contaminated with oil spills, heavy metals and detergents. Degradation of lignin and cellulose using microbes. Phyto-remediation. Degradation of pesticides and other toxic chemicals by micro-organisms-degradation aromatic and chlorinated hydrocarbons and petroleum products.

UNIT-II

Biosafety Introduction to biosafety and health hazards concerning biotechnology. Introduction to the concept of containment level and Good Laboratory Practices (GLP) and Good Manufacturing Practices(GMP).

UNIT-III

Genetic modification in Medicine-gene therapy, types of gene therapy, vectors in gene therapy, molecular engineering, human genetic engineering, problems & ethics.

UNIT-IV

Morphology, pathogenesis, symptoms, laboratory diagnosis, preventive measures and chemotherapy caused by gram negative bacteria: *E.coli*, *N. gonorrhoea*, *N. meningitidis*, *P. aeruginosa*, *S. typhi*, *S. dysenteriae*, *Y. pestis*, *B. abortus*, *H. influenzae*, *V. cholerae*, *M. pneumoniae*, *T. pallidum* *M. pneumoniae*, *Rickettsiaceae*, *Chlamydiae*.

PRACTICAL

1. Identification of pathogenic bacteria(any two)based on cultural, morphological and biochemical characteristics.
2. Isolation of lymphocytes for culturing.
3. Case study on handling and disposal of radioactive waste
4. Calculation of BOD of water sample.

SEMESTER-IV

C-8: MOLECULAR BIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

DNA structure and replication: DNA as genetic material, Structure of DNA, Types of DNA, Replication of DNA in prokaryotes and eukaryotes: Semiconservative nature of DNA replication, Bi-directional replication, DNA polymerases, The replication complex: Pre-priming proteins, primosome, replisome, Rolling circle replication, Unique aspects of eukaryotic chromosome replication, Fidelity of replication.

UNIT-II

DNA damage, repair and homologous recombination: DNA damage and repair: causes and types of DNA damage, mechanism of DNA repair: Homologous recombination: models and mechanism.

UNIT-III

Transcription and RNA processing: RNA structure and types of RNA, Transcription in prokaryotes: Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains Transcription in eukaryotes: Eukaryotic RNA polymerases, transcription factors, promoters, enhancers, mechanism of transcription initiation, promoter clearance and elongation RNA splicing and processing: processing of pre-mRNA: 5 cap formation, polyadenylation, splicing, rRNA and tRNA splicing.

UNIT-IV

Regulation of gene expression and translation: Regulation of gene expression in prokaryotes: Operon concept (inducible and repressible system), Genetic code and its characteristics, Prokaryotic and eukaryotic translation: ribosome structure and assembly, Charging of tRNA, aminoacyl tRNA synthetases, Mechanism of initiation, elongation and termination of polypeptides, Post-translational modifications of proteins.

PRACTICAL

1. Preparation of solutions for Molecular Biology experiments.
2. Isolation of chromosomal DNA from bacterial cells.
3. Isolation of Plasmid DNA by alkaline lysis method
4. Agarose gel electrophoresis of genomic DNA & plasmid DN.

C-9: IMMUNOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Immune Response - An overview, components of mammalian immune system, molecular structure of Immuno-globulins or Antibodies, Humoral & Cellular immune responses, Tlymphocytes & immune response (cytotoxic T-cell, helper T-cell, suppressor T-cells), T-cell receptors, genome rearrangements during B-lymphocyte differentiation, Antibody affinity maturation class switching, assembly of T-cell receptor genes by somatic recombination.

UNIT-II

Regulation of immunoglobulin gene expression clonal selection theory, allotypes & idiotypes, allelic exclusion, immunologic memory.

UNIT-III

Major Histocompatibility complexes class I & class II MHC antigens, antigen processing and presentation, Immunity to infection immunity to different organisms, pathogen defense strategies, avoidance of recognition. Autoimmune diseases, Immunodeficiency diseases, AIDS.

UNIT-IV

Vaccines & Vaccination adjuvants, cytokines, DNA vaccines, recombinant vaccines, bacterial vaccines, viral vaccines, vaccines to other infectious agents, passive & active immunization. Introduction to immunodiagnostics RIA, ELISA.

PRACTICAL

1. Differential leucocytes count.
2. Total leucocytes count.
3. Total RBC count.
4. Haemagglutination assay.
5. Haemagglutination inhibition assay.
6. Separation of serum from blood.

C-10: CHEMISTRY-2

SEC-2: ENGLISH

Marks:50

GE-4: ENTREPRENEURSHIP DEVELOPMENT

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

INTRODUCTION: Meaning, Needs and Importance of Entrepreneurship, Promotion of entrepreneurship, Factors influencing entrepreneurship, Features of a successful Entrepreneurship.

UNIT-II

ESTABLISHING AN ENTERPRISE: Forms of Business Organization, Project Identification, Selection of the product, Project formulation, Assessment of project feasibility.

UNIT-III

FINANCING THE ENTERPRISE: Importance of finance/loans and repayments, Characteristics of Business finance, Fixed capital management: Sources of fixed capital, working capital its sources and how to move for loans, Inventory direct and indirect raw materials and its management.

UNIT-IV

MARKETING MANAGEMENT: Meaning and Importance, Marketing-mix, product management Product line, Product mix, stages of product life cycle, marketing Research and Importance of survey, Physical Distribution and Stock Management.

UNIT-IV

ENTREPRENEURSHIP AND INTERNATIONAL BUSINESS: Meaning of International business, Selection of a product, Selection of a market for international business, Export financing, Institutional support for exports.

PRACTICAL

Project Report on a selected product should be prepared and submitted.

SEMESTER-V

C-11: INDUSTRIAL FERMENTATION

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Production of industrial chemicals, biochemicals and chemotherapeutic products. Propionic acid, butyric acid, 2 – 3 butanediol, gluconic acid, itaconic acid, Biofuels: Biogas, Ethanol, butanol, hydrogen, biodiesel, microbial electricity, starch conversion processes; Microbial polysaccharides; Microbial insecticides; microbial flavours and fragrances, newer antibiotics, anti cancer agents, amino acids.

UNIT-II

Production of microbial metabolite, Secondary metabolism its significance and products. Metabolic engineering of secondary metabolism for highest productivity. Enzyme and cell immobilization techniques in industrial processing, enzymes in organic synthesis, proteolytic enzymes, hydrolytic enzymes, glucose isomerase, enzymes in food technology/organic synthesis.

UNIT-III

Purification & characterization of proteins, Upstream and downstream processing. Distribution of microbial cells, centrifugation, filtration of fermentation broth, ultra centrifugation, liquid extraction, ion-exchange recovery of biological products. Experimental model for design of fermentation systems, Anaerobic fermentations.

UNIT-IV

Rate equations for enzyme kinetics, simple and complex reactions. Inhibition kinetics; effect of pH and temperature on rate of enzyme reactions. Mathematical derivation of growth kinetics, mathematical derivations of batch and continuous culture operations; single stage CSTR; mass transfer in aerobic fermentation; resistances encountered; overall mass transfer co-efficient (K_a) determination, factors depending on scale up principle and different methods of scaling up. Metabolic engineering of antibiotic biosynthetic pathways.

PRACTICAL

1. Comparative analysis of design of a batch and continuous fermenter.
2. Calculation of Mathematical derivation of growth kinetics.
3. Solvent extraction & analysis of a metabolite from a bacterial culture.
4. Perform an enzyme assay demonstrating its hydrolytic activity (protease/peptidase/glucosidase etc.)

C-12: RECOMBINANT DNA TECHNOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Molecular tools and applications- restriction enzymes, ligases, polymerases, alkaline phosphatase. Gene Recombination and Gene transfer: Transformation, Episomes, Plasmids and other cloning vectors (Bacteriophage-derived vectors, artificial chromosomes), Microinjection, Electroporation, Ultrasonication, Principle and applications of Polymerase chain reaction (PCR), primer-design, and RT- (Reverse transcription) PCR.

UNIT-II

Restriction and modification system, restriction mapping. Southern and Northern hybridization.

Preparation and comparison of Genomic and cDNA library, screening of recombinants, reverse transcription,. Genome mapping, Applications of Genetic Engineering in animals: Production and applications of transgenic mice, Therapeutic products produced by genetic engineering blood proteins, human hormones, immune modulators and vaccines (one example each).

UNIT-III

Random and site-directed mutagenesis: Primer extension and PCR based methods of site directed mutagenesis, Random mutagenesis, Protein engineering concepts and examples (any two).

UNIT-IV

Genetic engineering in plants:]Use of *Agrobacterium tumefaciens* and *A. rhizogenes*, Ti plasmids, Strategies for gene transfer to plant cells, Direct DNA transfer to plants, Gene targeting in plants.

PRACTICAL

1. Isolation of chromosomal DNA from plant cells
2. Isolation of chromosomal DNA from *E.coli*
3. Qualitative and quantitative analysis of DNA using spectrophotometer
4. Plasmid DNA isolation
5. Restriction digestion of DNA
6. Demonstration of PCR

DSE-1: ANIMAL DIVERSITY-I

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

- (a) Outline of classification of Non- Chordates upto subclasses. Coelomata, Acoelomata, Symmetries, Deutrostomes, Protostomes.
- (b) Protozoa: Locomotion, Reproduction, evolution of Sex, General features of *Paramecium* and *Plasmodium*. Pathogenic protozoans.
- (c) Porifera: General characters, outline of Classification; skeleton, Canal System.

UNIT-II

- (a) Coelenterata: General Characters, Outline of classifications Polymorphism, Various types of stinging cells; Metagenesis, coral reefs and their formation.
- (b) Platyhelminthes- General Characters; Outline of classification; Pathogenic flatworms: Parasitic adaptations.
- (c) Aschelminthes: General features, Outline of classification, Pathogenic roundworms and their vectors in relation to man: Parasite adaptation.

UNIT-III

(a) Annelida: - General features, Outline of classification, Coelom: Metameric segmentation, General features of Earthworm, Vermicomposting.

(b) Arthropoda: General Features, Outline of Classification; Larval forms of crustacean, Respiration in Arthropoda; Metamorphosis in insects; Social insects; Insect vectors of diseases; Apiculture, Sericulture.

UNIT-IV

(a) Mollusca : general features, Outline of classification, Shell Diversity; Torsion in gastropoda.

(b) Echinodermata: General features, Outline of Classification Larval forms.

(c) Hemichordata: Phylogeny: Affinities of *Balanoglossus*.

PRACTICAL

1. Identification and Classification of any these of the following:

Porifera: *Scypha*, *Leucosolenia*, *Euspongia*, *Hylonema*, *Euplectella* Cnidaria: *Medrepora*, *Millepora*, *Physalia*, *Porpita*, *Valella*, *Aurelia*, *Metridium*.

Platyhelminthes: *Taenia*, *Fasciola*, *Aschelminthes*: *Ascaris*, *Ancylostoma*, *Enterobius* Annelida: *Pheretima*, *Hirudinaria*, *Chaetopterus*, *Nereis*, *Aphrodite*.

Arthropoda: *Julus*, *Scolopendra*, *Peripatus*, *Carcinus*, *Limulus*, *Lepisma*, *Dragonfly*, *Musca*, *Acheta*.

Mollusca: *Pila*, *Unio*, *Mytilus*, *Loligo*, *Sepia*, *Octopus*, *Solen*.

Echinodermata: *Asterias*, *Ophiothrix*, *Echinus*, *Holothuria*, *Astrophyton* Hemichordata: *Balanoglossus*.

2. Identification of slides with two points of identification.

Amoeba, *Paramoecium*, *Ceratium*, *Plasmodium*, *Opalina*, L.S. Sponge, Spicules of sponges, L.S. *Hydra*, *Obelia*, *Bougainvillia*, Larvae of *Fasciola*, Seta of Earthworm, Radula

3. Ecological Note On any of the specimens in Exercise No. 1 Models of dissection of Earthworm, Cockroach.

Earthworm: Digestive, Nervous System,

Cockroach: Digestive Reproductive, Nervous System.

DSE-2: PLANT DIVERSITY-I

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Algae:

General character, classification & economic importance. Life histories of algae belonging to various classes:

Chlorophyceae *Volvox*, *Oedogonium*, Xanthophyceae *Vaucheria*, Phaeophyceae *Ectocarpus*, Rhodophyceae-*Polysiphonia*

UNIT-II

Fungi:

General characters, classification & economic importance. Life histories of Fungi:

Mastigomycotina-*Phytophthora*, Zygomycotina-*Mucor*, Ascomycotina-*Saccharomyces*, Basidiomycotina-*Agaricus*, Deutromycotina-*Colletotrichum*.

UNIT-III

Lichens:

Classification, general structure, reproduction and economic importance. Plant diseases: 4 of 36
Casual organism, symptoms and control of following plant diseases. Rust & Smut of Wheat, White rust of Crucifers, Late blight of Potato, Red rot of Sugarcane, Citrus Canker.

UNIT-IV

Bryophytes:

General characters, classification & economic importance. Life histories of following: *Marchantia*, *Funaria*.

PRACTICAL

1. Comparative study of thallus and reproductive organs of various algae mentioned in theory.
2. Comparative study of vegetative and reproductive parts of various fungi mentioned in theory.
3. Study and section cutting and lectophenol mount of plant disease materials studied in theory.
4. Study of various types of lichens.
5. Study of external features & anatomy of vegetative and reproductive parts of *Marchantia* and *Funaria*
6. Collection of algae, fungi, plant diseases materials and bryophytes available locally.

SEMESTER-VI

C-13: BIO-ANALYTICAL TOOLS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Simple microscopy, phase contrast microscopy, fluorescence and electron microscopy (TEM and SEM), pH meter, absorption and emission spectroscopy

UNIT-II

Principle and law of absorption fluorimetry, colorimetry, spectrophotometry (visible, UV, infrared), centrifugation, cell fractionation techniques, isolation of sub-cellular organelles and particles.

UNIT-III

Introduction to the principle of chromatography. Paper chromatography, thin layer chromatography, column chromatography: silica and gel filtration, affinity and ion exchange chromatography, gas chromatography, HPLC.

UNIT-IV

Introduction to electrophoresis, polyacrylamide gel (native and SDS-PAGE), agarose-gel electrophoresis, immuno- electrophoresis, isoelectric focusing, Western blotting. Introduction to Biosensors and Nanotechnology and their applications.

PRACTICAL

1. Native gel electrophoresis of proteins
2. SDS-polyacrylamide slab gel electrophoresis of proteins under reducing conditions.
3. Preparation of the sub-cellular fractions of rat liver cells.
4. Preparation of protoplasts from leaves.
5. Separation of amino acids by paper chromatography.
6. To identify lipids in a given sample by TLC.
7. To verify the validity of Beers law and determine the molar extinction coefficient of NADH.

C-14: GENOMICS & PROTEOMICS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Introduction to Genomics, DNA sequencing methods manual & automated: Maxam & Gilbert and Sangers method. Pyrosequencing, Genome Sequencing: Shotgun & Hierarchical (clone contig) methods, Computer tools for sequencing projects: Genome sequence assembly software.

UNIT-II

Managing and Distributing Genome Data: Web based servers and softwares for genome analysis: ENSEMBL, VISTA, UCSC Genome Browser, NCBI genome. Selected Model Organisms' Genomes and Databases.

UNIT-III

Introduction to protein structure, Chemical properties of proteins. Physical interactions that determine the property of proteins. Short-range interactions, electrostatic forces, van der waal interactions, hydrogen bonds, Hydrophobic interactions. Determination of sizes (Sedimentation analysis, gel filtration, SDS-PAGE); Native PAGE, Determination of covalent structures Edman degradation.

UNIT-IV

Introduction to Proteomics, Analysis of proteomes. 2D-PAGE. Sample preparation, solubilization, reduction, resolution. Reproducibility of 2D-PAGE. Mass spectrometry based methods for protein identification. *De novo* sequencing using mass spectrometric data.

PRACTICAL

1. Use of SNP databases at NCBI and other sites
2. Detection of Open Reading Frames using ORF Finder
3. Proteomics 2D PAGE database
4. Softwares for Protein localization.
5. Native PAGE
6. SDS-PAGE

DSE-3: ANIMAL DIVERSITY-II

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Proto-chordates, Pisces and Ambhibia

Proto-chordates: Outline of classification, General features and important characters of *Herdmania*, *Branchiostoma*

Origin of Chordates

Pisces: Migration in Pisces, Outline of classification

Amphibia: Classification, Origin, Parental care, Paedogenesis.

UNIT-II

Reptilia, Aves and Mammalia (15 Periods)

Reptelia: Classification, Origin

Aves: Classification, Origin, flight- adaptations, migration

Mammalia: Classification, Origin, dentition.

UNIT-III

Comparative anatomy of vertebrates I (15 Periods)

Comparative anatomy of various systems of vertebrates: Integumentary, digestive respiratory systems.

UNIT-IV

Comparative anatomy of vertebrates II (15 Periods)

Comparative Anatomy of vertebrates Heart, Aortic arches, Kidney & urinogenital system, Brain, Eye, Ear.

Autonomic Nervous system in Mammals.

PRACTICAL

1. Identification & Classification upto order of the following: Proto-chordata: *Salpa*, *Doliolum*, *Herdmania*, *Branchiostoma*
Cyclostomata: *Myxine*, *Petromyzon*
Chondrichthyes: *Scoliodon*, *Zygnea*, *Pristis*, *Trygon*, *Raja*, *Chimaera* Osteichthyes: *Labeo*, *Mystus*, *Catla*, *Hippocampus*, *Anabas*, *Echeneis*, *Lophius*, *Polypeterus*
Amphibia: *Rana*, *Hyla*, *Amblystoma*, *Necturus*, *Proteus*
Reptiles: *Hemidactylus*, *Calotes*, *Draco*, *Phrynosoma*, *Naja Vipera*, *Bungarus* Aves: *Columba*, *Alcedo*, *Passer*
Mammalia: *Ornithorhynchus*, *Macropus*, *Didelphes*, *Dasybus*
2. An Ecological Note on any one of the specimens in Experiment 1
3. Identification of the following slides Mammalian Histology: Liver, Lung, Intestine, Kidney, Ovary, Testes Slides of *Salpa*, *Doliolum*, Spicules of *Herdmania*, Tadpole of Frog
4. Preparation of a permanent mount of *Salpa*, Placoid scales, spicules of *Herdmania*, Pharynx of *Amphioxus*, Tadpole Larva of frog
5. Identification of endoskeletons of frog and rabbit.

DSE-4: PLANT DIVERSITY-II

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Pteridophytes

General characters of pteridophytes, affinities with bryophytes & gymnosperms, classification, economic importance, study of life histories of fossil Pteridophytes *Rhynia*.

UNIT-II

Pteridophytes: Type studies

Life histories of *Selaginella*-(Heterospory and seed habit), *Equisetum*, *Pteris*, *Lycopodium*.

UNIT-III

Gymnosperms

General characters, classification, geological time scale, theories of fossil formation, types of fossils, fossil gymnosperms-*Williamsonia* & *Glossopteris*, telome and stele concept.

UNIT-IV

Gymnosperms: Type studies Life histories of *Cycas* & *Pinus*, economic importance of gymnosperms.

PRACTICAL

1. Examination of morphology and anatomy of vegetative and reproductive parts of *Selaginella*, *Equisetum* & *Pteris*.
2. Examination of morphology and anatomy of vegetative & reproductive parts of *Cycas* & *Pinus*.
3. Plant collection (pteridophytes & gymnosperms)

OR
PROJECT WORK

Marks:100

BIO-TECHNOLOGY(PASS)

SEMESTER-I

C-1: BIOCHEMISTRY & METABOLISM

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Amino acid & Proteins: Structure and properties of Amino acids, Types of Proteins and their Classification, Forces stabilizing protein structure and shape. Different levels of structural organization of proteins, Carbohydrates: Structure, Function and properties of Monosaccharides, Disaccharides and Polysaccharides.

UNIT-II

Lipids: Structure and functions Classification, nomenclature and properties of fatty acids, essential fatty acids, Nucleic acids: Structure and functions: Physical & chemical properties of Nucleic acids, Nucleosides & Nucleotides, Purines & Pyrimidines, Double helical model of DNA structure.

UNIT-III

Enzymes: Nomenclature and classification of Enzymes, Holoenzyme, apoenzyme, Cofactors, coenzyme, prosthetic groups, Enzyme kinetics and activity, Specific activity.

UNIT-IV

Carbohydrates Metabolism: Reactions, energetic and regulation. Glycolysis: Fate of pyruvate under aerobic and anerobic conditions. Pentose phosphate pathway and its significance, Gluconeogenesis, Glycogenolysis and glycogen synthesis, TCA cycle.

PRACTICAL

1. To study activities of any enzyme under optimum conditions.
2. To study the effect of pH, temperature on the activity of salivary amylase enzyme.
3. Principles of Colorimetry: (i) Verification of Beers Lambert's law, estimation of protein.
(ii) To study relation between absorbance and % transmission.
4. Determination of pH optima, temperature optima, Km value, Vmax value, Effect of inhibitor (Inorganic phosphate) on the enzyme activity.
5. Estimation of blood by glucose oxidase method.
6. Preparation of buffers.
7. Separation of Amino acids by paper chromatography.

8. Qualitative tests for Carbohydrates, lipids and proteins.
9. Quatitative estimation of proteins.

C-2: CELL BIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Cell: Introduction and structural organization of prokaryotic and Eukaryotic cells, compartmentalization of eukaryotic cells, cell fractionation. Cell membrane and Permeability: Chemical components of biological membranes and its organization.

UNIT-II

Cytoskeleton and cell motility: Structure and function of microtubules, Microfilaments, Intermediate filaments, Endoplasmic reticulum: Structure & function including role in protein segregation; Golgi complex: Structure, biogenesis and functions including role in protein secretion.

UNIT-III

Lysosomes: Vacuoles and micro bodies: Structure and functions. Ribosomes: Structure and function Mitochondria: Structure and function, Genomes. Chloroplasts: Structure and function, Genomes. Nucleus: Structure and function, Chromosomes and their structure.

UNIT-IV

Extracellular Matrix: Composition, molecules that mediate cell adhesion, membranes receptors for extra cellular matrix, macromolecules, Cancer: Carcinogenesis, agents promoting carcinogenesis and their characteristics.

PRACTICAL

1. Study the effect of temperature and organic solvents on semi permeable membrane.
2. Demonstration of dialysis.
3. Study of plasmolysis and de-plasmolysis.
4. Cell fractionation and determination of enzyme activity in organelles using sprouted seed or any other suitable source.
5. Study of structure of any prokaryotic Eukaryotic cell.
6. Microtomy: Fixation, Block making, Section cutting, Double staining of animal tissues like liver, Oesphagus, Stomach, pancreas, Intestine, Kidney, Ovary, testes.
7. Cell division in onion root tip/insect gonads.

AECC-1: ENVIRONMENTAL STUDIES(Compulsory)

Marks: 100 (End Sem.-80, Mid. Sem.-20)

GE-1: DEVELOPMENTAL BIOLOGY

THEORY: Marks-30

UNIT-I

Gametogenesis and Fertilization Definition, scope & historical perspective of development Biology, Gametogenesis Spermatogenesis, Oogenesis Fertilization - Definition, mechanism, types of fertilization. Different types of eggs on the basis of yolk.

UNIT-II

Early embryonic development Cleavage: Definition, types & patterns, Mechanism of Blastulation: Process, types, Mechanism of Gastrulation, Morphogenetic movements epiboly, emboly, extension, invagination, convergence, de-lamination. Formation & differentiation of primary germ layers.

UNIT-III

Embryonic Differentiation Differentiation: Cell commitment and determination- the epigenetic landscape: a model of determination and differentiation, control of differentiation at the level of genome, transcription and post-translation level. Concept of embryonic induction: Primary, secondary & tertiary embryonic induction, Neural induction and induction of vertebrate lens.

UNIT-IV

Organogenesis Neurulation, notogenesis, development of vertebrate eye. Fate of different primary germ layers Development of behaviour: constancy & plasticity, Extra embryonic membranes, placenta in Mammals.

Practical: Marks-20

1. Identification of developmental stages of chick and frog embryo using permanent mounts
2. Preparation of a temporary stained mount of chick embryo
3. Study of developmental stages of Anopheles.
4. Study of the developmental stages of Drosophila from stock culture/ photographs.
5. Study of different types of placenta.

SEMESTER-II

C-3: MAMMALIAN PHYSIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Digestion: Mechanism of digestion & absorption of carbohydrates, proteins, lipids and nucleic acids.
Respiration: Exchange of gases, transport of O_2 and CO_2 .

UNIT-II

Composition of blood, Plasma proteins & their role, blood cells, haematopoiesis, Mechanism of Working of heart: Cardiac output, Cardiac cycle.

UNIT-III

Muscle physiology and osmoregulation Structure of cardiac, smooth & skeletal muscle, threshold stimulus, Physical, chemical & electrical events of mechanism of muscle contraction. Excretion : Modes of excretion, Ornithine cycle, Mechanism of urine formation.

UNIT-IV

Nervous and endocrine coordination Mechanism of generation & propagation of nerve impulse, structure of synapse, synaptic conduction, Neurotransmitters. Mechanism of action of hormones, Different endocrine glands- Hypothalamus, pituitary, pineal, thymus, thyroid, parathyroid and adrenals.

PRACTICAL

1. Finding the coagulation time of blood
2. Determination of blood group
3. Counting of mammalian RBCs
4. Determination of TLC and DLC
5. Demonstration of action of an enzyme
6. Determination of Haemoglobin (% Hb in blood)

C-4: MICROBIAL & PLANT PHYSIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Nutritional classification of microorganism based on carbon, energy and electron sources, Metabolite Transport, Diffusion: active transport, group translocation (phosphotransferase system), transport of Iron.

UNIT-II

Effect of the environment on microbial growth Temperature- temperature ranges for microbial growth, classification based on temperature ranges, pH-classification based on pH ranges, solutes and water activity, oxygen concentration, Chemolithotropic metabolism, methanogens.

UNIT-III

Photosynthesis pigments, anoxygenic and oxygenic photosynthesis, concept of two photo systems, photosynthetic pigments photophosphorylation, Carbon dioxide fixation, Calvin cycle.

UNIT-IV

Nitrogen metabolism- inorganic & molecular nitrogen fixation, nitrate reduction and ammonium assimilation in plants, Growth and development: Development, phases of growth, growth curve, growth hormones (auxins, gibberlins, cytokinins, abscisic acid, ethylene)

PRACTICAL

1. Separation of photosynthetic pigment by paper chromatography
2. Demonstration of aerobic respiration
3. Preparation of root nodules from a leguminous plant.
4. To study and plot the growth curve of Ecoli using turbidometric method and to calculate specific growth rate and generation time.
5. To study and plot the growth curve of Aspergillus niger by radical growth measeurments
6. To study the effect of pH on the growth of E.Coli.
7. To study the effect of temperature of Aspergillus niger by dry weight method.
8. Demonstration of the termal death time and ecimal reduction time of E.Coli.

GE 2: BIOTECHNOLOGY & HUMAN WELFARE-1

(Theory: 30 Marks, Practical: 20)

UNIT-I

Industry: protein engineering; enzyme and polysaccharide synthesis, activity and secretion, alcohol and antibiotic formation.

UNIT-II

Agriculture: N₂ fixation: transfer of pest resistance genes to plants; interaction between plants and microbes; qualitative improvement of livestock.

UNIT-III

Environments: e.g. chlorinated and non-chlorinated pollutant degradation; degradation of hydrocarbons and agricultural wastes, stress management, development of biodegradable polymers such as PHB.

UNIT-IV

Forensic science: DNA fingerprinting; Solving violent crimes such as murder and rape; solving claims of paternity and theft etc. using various methods of DNA finger printing. Health: e.g. development of non-toxic therapeutic agents, recombinant live vaccines, gene therapy, diagnostics, monoclonal in E.coli, human genome project.

PRACTICAL

(Wherever wet lab experiments are not possible the principles and concepts can be demonstrated through any other material or medium including videos/virtual labs etc.)

1. Study of a plant part infected with a microbe
2. To perform quantitative estimation of residual chlorine in water samples
3. Isolation and analysis of DNA from minimal available biological samples
4. Case studies on Bioethics (any two).

SEMESTER-III

C-5: GENETICS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Introduction: Historical developments in the field of genetics. Organisms suitable for genetic experimentation and their genetic significance. Cell Cycle: Mitosis and Meiosis: Role of meiosis in life cycles of organisms. Mendelian genetics : Mendels experimental design, monohybrid, di-hybrid and tri hybrid crosses, Law of segregation & Principle of independent assortment, Chromosomal theory of inheritance, Allelic interactions: Concept of dominance, recessiveness, incomplete dominance, co-dominance, multiple allele, pseudo-allele, essential and lethal genes.

UNIT-II

Non allelic interactions: Interaction producing new phenotype complementary genes, epistasis (dominant & recessive), duplicate genes and inhibitory genes. Chromosome and genomic organization: Structure and characteristics of bacterial and eukaryotic chromosome, chromosome morphology, concept of euchromatin and heterochromatin. packaging of DNA molecule into chromosomes, concept of cistron, exons, introns, genetic code, gene function.

UNIT-III

Chromosome and gene mutations: Definition and types of mutations, causes of mutations, Ames test for mutagenic agents, screening procedures for isolation of mutants and uses of mutants, variations in chromosomes structure - deletion, duplication, inversion and translocation (reciprocal and robertsonian, chromosomal aberrations in human beings, abnormalities Aneuploidy and Euploidy.

Sex determination and sex linkage: Mechanisms of sex determination, environmental factors and sex determination, sex differentiation, Barr bodies, sex linked inheritance.

UNIT-IV

Genetic linkage, crossing over and chromosome mapping: Linkage and Recombination of genes in a chromosome crossing over, Molecular mechanism of crossing over. Extra chromosomal inheritance: Rules of extra nuclear inheritance, maternal effects, maternal inheritance, Evolution and population genetics: In breeding and out breeding, Hardy Weinberg law (prediction, derivation), allelic and genotype frequencies, changes in allelic frequencies, systems of mating, evolutionary genetics, natural selection.

PRACTICAL

1. Permanent and temporary mount of mitosis.
2. Permanent and temporary mount of meiosis.
3. Karyotyping with the help of photographs
4. Pedigree charts of some common characters like blood group, color blindness and PTC tasting.
5. Study of polyploidy in onion root tip by colchicine treatment.

C-6: GENERAL MICROBIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Fundamentals, History and Evolution of Microbiology. Classification of microorganisms: Microbial phylogeny and current classification of bacteria, Microbial Diversity: Distribution and characterization Prokaryotic and Eukaryotic cells, Morphology and cell structure of major groups of microorganisms eg. Bacteria, Algae, Fungi, Protozoa and Unique features of viruses.

UNIT-II

Cultivation and Maintenance of microorganisms: Nutritional categories of micro-organisms, methods of isolation, Purification and preservation.

UNIT-III

Microbial growth: Growth curve, Generation time, synchronous batch and continuous culture, measurement of growth and factors affecting growth of bacteria. Microbial Metabolism: Metabolic pathways, amphi-catabolic and biosynthetic pathways Bacterial Reproduction: Transformation, Transduction and Conjugation. Endospores.

UNIT-IV

Control of Microorganisms: By physical, chemical and chemotherapeutic agents, aquatic Microbiology: Bacterial pollutants of water, Food Microbiology: Important microorganism in food Microbiology: moulds, yeasts, bacteria.

PRACTICAL

1. Isolation of bacteria & their biochemical characterization.
2. Staining methods: simple staining, Gram staining, spore staining, negative staining, hanging drop.
3. Preparation of media & sterilization methods, Methods of Isolation of bacteria from different sources.
4. Determination of bacterial cell size by micrometry.
5. Enumeration of microorganism - total & viable count.

C-7: CHEMESTRY-1

SEC-1: MOLECULAR DIAGNOSTICS

(THEORY: Marks-30, PRACTICAL: Marks-20)

UNIT-I

Enzyme Immunoassays: Comparison of enzymes available for enzyme immunoassays, conjugation of enzymes. Solid phases used in enzyme immunoassays. Homogeneous and heterogeneous enzyme immunoassays. Enzyme immuno histochemical techniques, Applications of enzyme immunoassays in diagnostic microbiology

UNIT-II

Molecular methods in clinical microbiology: Applications of PCR, RFLP, Nuclear hybridization methods, Single nucleotide polymorphism and plasmid finger printing in clinical microbiology Laboratory tests in chemotherapy: Susceptibility tests: Micro-dilution and macro-dilution broth procedures. Susceptibility tests: Diffusion test procedures. Susceptibility tests: Tests for bactericidal activity. Automated procedures for antimicrobial susceptibility tests.

UNIT-III

Automation in microbial diagnosis, rapid diagnostic approach including technical purification and standardization of antigen and specific antibodies. Concepts and methods in idiotypes. Anti-idiotypes and molecular mimicry and receptors. Epitope design and applications. Immunodiagnostic tests. Immuno fluorescence. Radioimmunoassay.

UNIT-IV

GLC, HPLC, Electron microscopy, flowcytometry and cell sorting. Transgenic animals.

PRACTICAL

(Wherever wet lab experiments are not possible the principles and concepts can be demonstrated through any other material or medium including videos/virtual labs etc.)

1. Kirby-Bauer method (disc-diffusion method) to study antibiotic sensitivity of a bacterial culture

2. A kit-based detection of a microbial infection (Widal test)
3. Study of Electron micrographs (any four).
4. Perform any one immuno diagnostic test (Typhoid, Malaria, Dengue).

GE-3: BIOTECHNOLOGY, BIOSAFETY AND HUMAN WELFARE-I or II
(Bioethics and Biosafety)
 (THEORY: Marks-30, PRACTICAL: Marks-20)

UNIT-I

Bioremediation of soil & water contaminated with oil spills, heavy metals and detergents. Degradation of lignin and cellulose using microbes. Phyto-remediation. Degradation of pesticides and other toxic chemicals by micro-organisms- degradation aromatic and chlorinated hydrocarbons and petroleum products

UNIT-II

Biosafety Introduction to biosafety and health hazards concerning biotechnology. Introduction to the concept of containment level and Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP).

UNIT-III

Genetic modification in Medicine - gene therapy, types of gene therapy, vectors in gene therapy, molecular engineering, human genetic engineering, problems & ethics.

UNIT-IV

Morphology, pathogenesis, symptoms, laboratory diagnosis, preventive measures and chemotherapy caused by gram negative bacteria: E.coli, N. gonorrhoea, N. meningitidis, P. aeruginosa, S. typhi, S. dysenteriae, Y. pestis, B. abortus, H. influenzae, V. cholerae, M. pneumoniae, T. pallidum M. pneumoniae, Rickettsiaceae, Chlamydiae.

PRACTICAL

1. Identification of pathogenic bacteria (any two) based on cultural, morphological and biochemical characteristics.
2. Isolation of lymphocytes for culturing
3. Case study on handling and disposal of radioactive waste
4. Calculation of BOD of water sample.

SEMESTER-IV

C-8: MOLECULAR BIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

DNA structure and replication DNA as genetic material, Structure of DNA, Types of DNA, Replication of DNA in prokaryotes and eukaryotes: Semiconservative nature of DNA replication, Bi-directional replication, DNA polymerases, Fidelity of replication.

UNIT-II

DNA damage, repair and homologous recombination DNA damage and repair: causes and types of DNA damage, mechanism of DNA repair: Homologous recombination: models and mechanism.

UNIT-III

Transcription and RNA processing RNA structure and types of RNA, Transcription in prokaryotes: Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains Transcription in eukaryotes: Eukaryotic RNA polymerases, transcription factors, promoters, enhancers, mechanism of transcription initiation, promoter clearance and elongation RNA splicing and processing: processing of pre-mRNA: 5 cap formation, polyadenylation, splicing, rRNA and tRNA splicing.

UNIT-IV

Regulation of gene expression and translation Regulation of gene expression in prokaryotes: Operon concept (inducible and repressible system), Genetic code and its characteristics, Prokaryotic and eukaryotic translation: ribosome structure and assembly, Charging of tRNA, aminoacyl tRNA synthetases, Mechanism of initiation, elongation and termination of polypeptides, Posttranslational modifications of proteins.

PRACTICAL

1. Preparation of solutions for Molecular Biology experiments.
2. Isolation of chromosomal DNA from bacterial cells.
3. Isolation of Plasmid DNA by alkaline lysis method
4. Agarose gel electrophoresis of genomic DNA & plasmid DN.

C-9: IMMUNOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Phylogeny of Immune system, Innate and acquired Immunity, Clonal nature of Immune response. An overview of components (cells, tissues and organs) of mammalian immune system.

UNIT-II

Molecular structure of Immuno-globulins or Antibodies, Humoral & Cellular immune responses,

T-lymphocytes & immune response (cytotoxic T-cell, helper T-cell, suppressor T-cells), T-cell receptors, genome rearrangements during B-lymphocyte differentiation.

UNIT-III

Major Histocompatibility complexes class I & class II MHC antigens, antigen processing and presentation, Immunity to infection immunity to different organisms, pathogen defense strategies, avoidance of recognition. Autoimmune diseases, Immunodeficiency diseases, AIDS.

UNIT-IV

Vaccines & Vaccination adjuvants, cytokines, DNA vaccines, recombinant vaccines, bacterial vaccines, viral vaccines, vaccines to other infectious agents, passive & active immunization. Introduction to immunodiagnostics RIA, ELISA.

PRACTICAL

1. Differential leucocytes count.
2. Total leucocytes count.
3. Total RBC count.
4. Haemagglutination assay.
5. Haemagglutination inhibition assay.
6. Separation of serum from blood.

C-10: CHEMISTRY-2

SEC-2: ENGLISH: Marks-50

GE-4: ENTREPRENEURSHIP DEVELOPMENT (THEORY: Marks-30, PRACTICAL: Marks-20)

UNIT-I

INTRODUCTION: Meaning, Needs and Importance of Entrepreneurship, Promotion of entrepreneurship, Factors influencing entrepreneurship, Features of a successful Entrepreneurship.

UNIT-II

ESTABLISHING AN ENTERPRISE: Forms of Business Organization, Project Identification, Selection of the product, Project formulation, Assessment of project feasibility.

UNIT-III

FINANCING THE ENTERPRISE :Importance of finance / loans and repayments, Characteristics of Business finance, Fixed capital management: Sources of fixed capital, working capital its sources and how to move for loans, Inventory direct and indirect raw materials and its management.

UNIT-IV

MARKETING MANAGEMENT: Meaning and Importance, Marketing-mix, product management

Product line, Product mix, stages of product life cycle, marketing Research and Importance of survey, Physical Distribution and Stock Management.

UNIT-V

ENTREPRENEURSHIP AND INTERNATIONAL BUSINESS: Meaning of International business, Selection of a product, Selection of a market for international business, Export financing, Institutional support for exports.

PRACTICAL

Project Report on a selected product should be prepared and submitted.

SEMESTER-V

C-11: INDUSTRIAL FERMENTATION

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Production of industrial chemicals, biochemicals and chemotherapeutic products. Propionic acid, butyric acid, 2 – 3 butanediol, gluconic acid, itaconic acid, Biofuels: Biogas, Ethanol, butanol, hydrogen, biodiesel, starch conversion processes; Microbial polysaccharides; Microbial insecticides; newer antibiotics, anti cancer agents, amino acids.

UNIT-II

Production of microbial metabolite, Secondary metabolism its significance and products. Metabolic engineering of secondary metabolism for highest productivity. Enzyme and cell immobilization techniques in industrial processing, enzymes in organic synthesis, proteolytic enzymes, hydrolytic enzymes, glucose isomerase, enzymes in food technology/organic synthesis.

UNIT-III

Purification & characterization of proteins, Upstream and downstream processing. Distribution of microbial cells, centrifugation, ultra centrifugation, liquid extraction, ion-exchange recovery of biological products. Experimental model for design of fermentation systems, Anaerobic fermentations.

UNIT-IV

Rate equations for enzyme kinetics, simple and complex reactions. Inhibition kinetics; effect of pH and temperature on rate of enzyme reactions. Mathematical derivation of growth kinetics, mathematical derivations of batch and continuous culture operations; single stage CSTR; mass transfer in aerobic fermentation; resistances encountered; overall mass transfer co-efficient (K_a) determination, factors depending on scale up principle and different methods of scaling up. Metabolic engineering of antibiotic biosynthetic pathways.

PRACTICAL

1. Comparative analysis of design of a batch and continuous fermenter.

2. Calculation of Mathematical derivation of growth kinetics.
3. Solvent extraction & analysis of a metabolite from a bacterial culture.
4. Perform an enzyme assay demonstrating its hydrolytic activity (protease/peptidase/glucosidase etc.)

C-12: RECOMBINANT DNA TECHNOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Molecular tools and applications- restriction enzymes, ligases, polymerases, alkaline phosphatase. Gene Recombination and Gene transfer: Transformation, Episomes, Plasmids and other cloning vectors (Bacteriophage-derived vectors, artificial chromosomes), Microinjection, Electroporation, Principle and applications of Polymerase chain reaction (PCR), primer-design, and RT- (Reverse transcription) PCR.

UNIT-II

Restriction and modification system, restriction mapping. Southern and Northern hybridization. Preparation and comparison of Genomic and cDNA library, screening of recombinants, reverse transcription. Genome mapping, Applications of Genetic Engineering in animals: Production and applications of transgenic mice, Therapeutic products produced by genetic engineering-blood proteins, human hormones.

UNIT-III

Random and site-directed mutagenesis: Primer extension and PCR based methods of site directed mutagenesis, Random mutagenesis, Protein engineering concepts and examples (any two).

UNIT-IV

Genetic engineering in plants: Use of *Agrobacterium tumefaciens* and *A. rhizogenes*, Ti plasmids, Strategies for gene transfer to plant cells, Direct DNA transfer to plants, Gene targeting in plants.

PRACTICAL

1. Isolation of genomic DNA from plant cells.
2. Isolation of genomic DNA from *E.coli*.
3. Qualitative and quantitative analysis of DNA using spectrophotometer.
4. Plasmid DNA isolation.
5. Restriction digestion of DNA
6. Demonstration of PCR.

DSE-1: ANIMAL DIVERSITY-I AND PLANT DIVERSITY-I

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

- (a) Outline of classification of Non- Chordates upto subclasses. Coelomata, Acoelomata, Symmetries, Deutrostomes, Protostomes.
- (b) Protozoa: Locomotion, Reproduction, evolution of Sex, General features of Paramecium and Plasmodium. Pathogenic protozoans
- (c) Porifera: General characters, outline of Classification; skeleton, Canal System.
- (d) Coelenterata: General Characters, Outline of classifications Polymorphism, Various types of stinging cells; Metagenesis, coral reefs and their formation.
- (e) Platyhelminthes- General Characters; Outline of classification; Pathogenic flatworms: Parasitic adaptations.

UNIT-II

- (a) Annelida: - General features, Outline of classification, Coelom: Metameric segmentation, General features of Earthworm, Vermicomposting.
- (b) Arthropoda: General features, Outline of Classification; Larval forms of crustacean, Respiration in Arthropoda; Metamorphosis in insects; Social insects; Insect vectors of diseases; Apiculture, Sericulture.
- (c) Mollusca : general features, Outline of classification, Shell Diversity; Torsion in gastropoda,
- (d) Echinodermata: General features, Outline of Classification Larval forms
- (e) Hemichordata: Phylogeny: Affinities of Balanoglossus

UNIT-III

Algae: General characters, classification and economic importance. Life histories of algae belonging to various classes: Chlorophyceae Volvox, Oedogonium Phaeophyceae Ectocarpus Rhodophyceae- Polysiphonia Fungi: General characters, classification & economic importance. Life histories of Fungi: Mastigomycotina- Phytophthora Ascomycotina- Saccharomyces Basidiomycotina-Agaricus

UNIT-IV

Lichens : Classification, general structure, reproduction and economic importance. Plant diseases: 4 of 36. Casual organism, symptoms and control of following plant diseases. Rust & Smut of Wheat, White rust of Crucifers, Late blight of Potato, Red rot of Sugarcane. Bryophytes: General characters, classification & economic importance. Life histories of following: Marchantia, Funaria.

PRACTICAL

1. Identification and Classification of Any three of the following Porifera: Scypha, Leucosolenia, Euspongia, Hylonomus, Euplectella Cnidaria: Medusae, Millepora, Physalia, Obelia, Velella, Aurelia, Metridium Arthropoda: Julus, Scolopendra, Peripatus, Carcinus, Limulus, Lepisma, Dragonfly, Musca, Acheta Mollusca: Pila, Unio, Mytilus, Loligo, Sepia, Octopus,

Solen Echinodermata: Asterias, Ophiothrix, Echinus, Holothuria, Astrophyton Hemichordata: Balanoglossus

2. Ecological Note On any of the specimens in Exercise No 1.
3. Models of dissection of Earthworm, Cockroach Earthworm: Digestive, Nervous System, Cockroach: Digestive Reproductive, Nervous System
4. Comparative study of thallus and reproductive organs of various algae mentioned in theory.
5. Comparative study of vegetative and reproductive parts of various fungi mentioned in theory.
6. Study and section cutting and lectophenol mount of plant disease materials studied in theory.

SEMESTER-VI

C-13: BIO-ANALYTICAL TOOLS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Simple microscopy, phase contrast microscopy, florescence and electron microscopy (TEM and SEM), pH meter, absorption and emission spectroscopy.

UNIT-II

Principle and law of absorption fluorimetry, colorimetry, spectrophotometry (visible, UV, infrared), centrifugation, cell fractionation techniques, isolation of sub-cellular organelles and particles.

UNIT-III

Introduction to the principle of chromatography. Paper chromatography, thin layer chromatography, column chromatography: silica and gel filtration, affinity and ion exchange chromatography, gas chromatography, HPLC.

UNIT-IV

Introduction to electrophoresis, polyacrylamide gel (native and SDS-PAGE), agarose-gel electrophoresis, immuno- electrophoresis, isoelectric focusing, Western blotting.

PRACTICAL

1. Native gel electrophoresis of proteins
2. SDS-polyacrylamide slab gel electrophoresis of proteins under reducing conditions.
3. Preparation of the sub-cellular fractions of rat liver cells.
4. Preparation of protoplasts from leaves.
5. Separation of amino acids by paper chromatography.

6. To identify lipids in a given sample by TLC.
7. To verify the validity of Beers law and determine the molar extinction coefficient of NADH.

C-14: GENOMICS & PROTEOMICS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Introduction to Genomics, DNA sequencing methods manual & automated: Maxam & Gilbert and Sangers method. Pyrosequencing, Genome Sequencing: Shotgun & Hierarchical (clone contig) methods, Computer tools for sequencing projects: Genome sequence assembly software.

UNIT-II

Managing and Distributing Genome Data: Web based servers and softwares for genome analysis: ENSEMBL, VISTA, UCSC Genome Browser, NCBI genome. Selected Model Organisms' Genomes and Databases.

UNIT-III

Introduction to protein structure, Chemical properties of proteins. Physical interactions that determine the property of proteins. Determination of sizes (Sedimentation analysis, gel filtration, SDS-PAGE); Native PAGE, Determination of primary structures Edman degradation.

UNIT-IV

Introduction to Proteomics, Analysis of proteomes. 2D-PAGE. Sample preparation, solubilization, reduction, resolution. Reproducibility of 2D-PAGE. Mass spectrometry based methods for protein identification. De novo sequencing using mass spectrometric data.

PRACTICAL

1. Use of SNP databases at NCBI and other sites
2. Detection of Open Reading Frames using ORF Finder
3. Proteomics 2D PAGE database
4. Softwares for Protein localization.
5. Native PAGE
6. SDS-PAGE.

DSE-II: ANIMAL DIVERSITY-II and PLANT DIVERSITY-II

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I

Proto-chordates, Pisces and Ambhibia Proto-chordates: Outline of classification, General features and important characters of Herdmania, Branchiostoma Origin of Chordates Pisces: Outline of classification, Migration in Pisces. Amphibia: Classification, Origin, Parental care, Paedogenesis Pteridophytes General characters of pteridophytes, affinities with bryophytes & gymnosperms, classification, economic importance, study of life histories of fossil Pteridophytes Rhynia.

UNIT-II

Reptilia, Aves and Mammalia Reptelia: Classification, Origin Aves: Classification, Origin, flight-adaptations, migration Mammalia: Classification, Origin, dentition Pteridophytes: Type studies Life histories of Selaginella- (Heterospory and seed habit), Equisetum, Pteris, Lycopodium.

UNIT-III

Comparative anatomy of vertebrates I Comparative anatomy of various systems of vertebrates: Integumentary, digestive respiratory systems. Gymnosperms General characters, classification, geological time scale, theories of fossil formation, types of fossils, fossil gymnosperms- Williamsonia & Glossopteris, telome and stele concept.

UNIT-IV

Comparative anatomy of vertebrates II Comparative Anatomy of vertebrates Heart, Aortic arches, Kidney & urinogenital system, Brain, Eye, Ear. Autonomic Nervous system in Mammals Gymnosperms: Type studies Life histories of Cycas & Pinus, economic importance of gymnosperms.

PRACTICAL

1. Identification & Classification upto order of the following: Proto-chordata: Salpa, Doliolum, Herdmania, Branchiostoma Osteichthyes: Labeo, Mystus, Catla, Hippocampus, Anabas, Echeineis, Lophius, Polypeterus Amphibia: Rana, Hyla, Amblystoma, Necturus, Proteus. Reptiles: Hemidactylus, Calotes, Draco, Aves: Columba, Alcedo Mammalia: Ornithorhynchus, Macropus.
2. Identification of the following slides Mammalian Histology: Liver, Lung, Intestine, Kidney, Ovary, Testes.
3. Identification of endoskeletons of frog and rabbit.
4. Examination of morphology and anatomy of vegetative and reproductive parts of Selaginella, Equisetum & Pteris.
5. Examination of morphology and anatomy of vegetative & reproductive parts of Cycas & Pinus
6. Plant collection (pteridophytes & gymnosperms)

PROJECT WORK/REPORT: Marks-100

BOTANY(HONOURS)

SEMESTER-I

C-I: MICROBIOLOGY & PHYCOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Introduction to microbial world, microbial nutrition, growth and metabolism. (2 lectures)

Unit-II

Bacteria: Discovery, general characteristics, types-archaebacteria, eubacteria, wall-less forms(mycoplasma and spheroplasts), cell structure, nutritional types, reproduction-vegetative, asexual and recombination (conjugation, transformation and transduction). Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine). (5 lectures)

Unit-III

Algae:- General characteristics; Ecology and distribution; range of thallus organization; Cell structure and components; cell wall, pigment system, reserve food (of only groups represented in the syllabus), flagella; and methods of reproduction, classification; criteria, system of Fritsch, and evolutionary classification of Lee (only upto groups); significant contributions of important phycologists (F.E. Fritsch, G.M. Smith, R.N. Singh, T.V. Desikachary, H.D. Kumar, M.O.P. Iyengar). Role of algae in the environment, agriculture, biotechnology and industry. (6 lectures)

Unit-IV

Cyanophyta:- Ecology and occurrence, range of thallus organization, cell structure, heterocyst, reproduction.economic importance; role in biotechnology. Morphology and life-cycle of Nostoc.(5 lectures)

Chlorophyta:- General characteristics, occurrence, range of thallus organization, cell structure and reproduction. Morphology and life-cycles of Chlamydomonas, Volvox, Oedogonium, Coleochaete. Evolutionary significance of Prochloron.(5 lectures)

Unit-V

Charophyta:- General characteristics; occurrence, morphology, cell structure and life-cycle of Chara; evolutionary significance.(2 lectures)

Xanthophyta:- General characteristics; range of thallus organization; Occurrence, morphology and life-cycle of Vaucheria.(3 lectures)

Phaeophyta:- Characteristics, occurrence, range of thallus organization, cell structure and reproduction. Morphology and life-cycles of Ectocarpus and Fucus.(3 lectures)

Rhodophyta:- General characteristics, occurrence, range of thallus organization, cell structure and reproduction. Morphology and life-cycle of Polysiphonia.(4 lectures)

PRACTICAL

Microbiology:

1. Electron micrographs/Models of viruses T-Phage and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle.
2. Types of Bacteria to be observed from temporary/permanent slides/photographs. Electron micrographs of bacteria, binary fission, endospore, conjugation, root Nodule.
3. Gram staining.
4. Endospore staining with malachite green using the (endospores taken from soil bacteria).

Phycology:

Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Volvox, Oedogonium, Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus and Polysiphonia, Prochloron through electron micrographs, temporary preparations and permanent slides.

Suggested Readings:

1. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
2. Prescott, L.M., Harley J.P., Klein D. A. (2005). Microbiology, McGraw Hill, India. 6th edition.
3. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.
4. Sahoo, D. (2000). Farming the ocean: seaweeds cultivation and utilization. Aravali International, New Delhi.
5. Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson R.B. (2008). Biology, Pearson Benjamin Cummings, USA. 8th edition.
6. Pelczar, M.J. (2001) Microbiology, 5th edition, Tata McGraw-Hill Co, New Delhi.

C-2: BIOMOLECULES & CELL BIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Biomolecules: Types and significance of chemical bonds; Structure and properties of water; pH and buffers.(2 lectures)

Carbohydrates: Nomenclature and classification; Role of monosaccharides (glucose, fructose, sugar alcohols mannitol and sorbitol); Disaccharides (sucrose, maltose, lactose), Oligosaccharides and polysaccharides (structural-cellulose, hemicelluloses, pectin, chitin, mucilage; storage, starch, insulin) (3 lectures)

Lipids: Definition and major classes of storage and structural lipids. Storage lipids. Fatty acids

structure and functions. Essential fatty acids. Triacyl glycerols structure, functions and properties. (2 lectures)

Proteins: Structure of amino acids; Peptide bonds; Levels of protein structure-primary, secondary, tertiary and quarternary; Isoelectric point; Protein denaturation and biological roles of proteins. (2 lectures)

Nucleic acids: Structure of nitrogenous bases; Structure and function of nucleotides; Types of nucleic acids; Structure of A, B, Z types of DNA; Types of RNA; Structure of tRNA. (4 lectures)

Unit-II

Bioenergenetics: Laws of thermodynamics, concept of free energy, endergonic and exergonic reactions, coupled reactions, redox reactions. ATP: structure, its role as a energy currency molecule. (3 lectures)

Enzymes: Structure of enzyme: holoenzyme, apoenzyme, cofactors, coenzymes and prosthetic group; Classification of enzymes; Features of active site, substrate specificity, mechanism of action (activation energy, lock and key hypothesis, induced - fit theory), Michaelis Menten equation, enzyme inhibition and factors affecting enzyme activity. (4 lectures)

Unit-III

The cell: Cell as a unit of structure and function; Characteristics of prokaryotic and eukaryotic cells; Origin of eukaryotic cell (Endosymbiotic theory). (2 lectures)

Cell wall and plasma membrane: Chemistry, structure and function of Plant Cell Wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport Passive, active and facilitated transport, endocytosis and exocytosis. (3 lectures)

Unit-IV

Cell organelles: Nucleus; Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus. (3 lectures)

Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament. (2 lectures)

Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. (2 lectures)

Endoplasmic Reticulum, Golgi Apparatus, Lysosomes (2 lectures)

Unit-V

Cell division: Eukaryotic cell cycle, different stages of mitosis and meiosis. Cell cycle, Regulation of cell cycle. (6 lectures)

PRACTICAL

1. Qualitative tests for carbohydrates, reducing sugars, non-reducing sugars, lipids and proteins.
2. Study of plant cell structure with the help of epidermal peel mount of Onion/Rhoeo/Crinum.
3. Demonstration of the phenomenon of protoplasmic streaming in Hydrilla leaf.
4. Measurement of cell size by the technique of micrometry.
5. Counting the cells per unit volume with the help of haemocytometer. (Yeast/pollen grains).
6. Study of cell and its organelles with the help of electron micrographs.

7. Study the phenomenon of plasmolysis and deplasmolysis.
8. Study different stages of mitosis and meiosis using aceto carmine and aceto orcin method.

Suggested Readings:

1. Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning.
2. Campbell, PN and Smith AD (2011) Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone.
3. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H. Freeman
4. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H. Freeman and Company
5. Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.
6. Karp, G. (2010). Cell Biology, John Wiley & Sons, U.S.A. 6th edition.
7. Hardin, J., Becker, G., Skliensmith, L.J. (2012). Beckers World of the Cell, Pearson Education Inc. U.S.A. 8th edition.
8. Cooper, G.M. and Hausman, R.E. 2009 The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
9. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009 The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco

SEMESTER-II

C-3: MYCOLOGY & PHYTOPATHOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Introduction to true fungi: Definition, General characteristics; Affinities with plants and animals; Thallus organization; Cellwall composition; Nutrition; Classification.

Chytridiomycetes: General account (5 lectures)

Zygomycota: General characteristics; Ecology; Thallus organisation; Life cycle with reference to Rhizopus. (4 lectures)

Ascomycota: General characteristics (asexual and sexual fruiting bodies); Ecology; Life cycle, Heterokaryosis and parasexuality; life cycle and classification with reference to Saccharomyces, Aspergillus, Penicillium, Alternaria and Neurospora, Peziza. (5 lectures)

Unit-II

Basidiomycota: General characteristics; Ecology; Life cycle and Classification with reference to black stem rust on wheat Puccinia (Physiological Specialization), loose and covered smut (symptoms only), Agaricus; Bioluminescence, Fairy Rings and Mushroom Cultivation. (5 lectures)

Allied Fungi: General characteristics; Status of Slime molds, Classification; Occurrence; Types of plasmodia; Types of fruiting bodies. (3 lectures)

Oomycota: General characteristic; Ecology; Life cycle and classification with reference to Phytophthora, Albugo. (4 lectures)

Unit-III

Symbiotic associations: Lichen Occurrence; General characteristics; Growth forms and range of thallus organization; Nature of associations of algal and fungal partners; Reproduction. Mycorrhiza- Ectomycorrhiza, Endomycorrhiza and their significance. (4 lectures)

Unit-IV

Applied Mycology: Role of fungi in biotechnology, Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides, Myconematicides); Medical mycology. (5 Lectures)

Unit-V

Phytopathology: Terms and concepts; General symptoms; Geographical distribution of diseases; etiology; symptomology; Host- Pathogen relationships; disease cycle and environmental relation; prevention and control of plant diseases, and role of quarantine. Bacterial diseases Citrus canker and angular leaf spot disease of Cotton. Viral diseases Tobacco Mosaic viruses, vein clearing. Fungal diseases Early blight of potato, Black stem rust of wheat, white rust of crucifers. (5 lectures)

PRACTICAL

1. Introduction to the world of fungi (Unicellular, coenocytic/septate mycelium, asocarps & basidiocarps).
2. Rhizopus: study of asexual stage from temporary mounts and sexual structures through permanent slides.
3. Aspergillus and Penicillium: study of asexual stage from temporary mounts. Study of Sexual stage from permanent slides/photographs.
4. Peziza: sectioning through ascocarp.
5. Alternaria: Specimens/photographs and temporary mounts.
6. Puccinia: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; sections/ mounts of spores on wheat and permanent slides of both the hosts.
7. Agaricus: Specimens of button stage and full grown mushroom; sectioning of gills of Agaricus, fairy rings and bioluminescent mushrooms to be shown.
8. Albugo: Study of symptoms of plants infected with Albugo; asexual phase study through section/temporary mounts and sexual structures through permanent slides.

9. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose) on different substrates. Study of thallus and reproductive structures (soredia and apothecium) through permanent slides. Mycorrhizae: ectomycorrhiza and endo mycorrhiza (Photographs)
10. Phytopathology: Herbarium specimens of bacterial diseases; Citrus Canker; Viral diseases: TMV, Fungal diseases: Early blight of potato, and White rust of crucifers.

Suggested Readings:

1. Agrios, G.N. 1997 Plant Pathology, 4th edition, Academic Press, U.K.
2. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley & Sons (Asia) Singapore. 4th edition.
3. Webster, J. and Weber, R. (2007). Introduction to Fungi, Cambridge University Press, Cambridge. 3rd edition.
4. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies, Macmillan Publishers India Ltd.
5. Sharma, P.D. (2011). Plant Pathology, Rastogi Publication, Meerut, India.

C-4: ARCHEGONIATE

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Introduction: Unifying features of archegoniates; Transition to land habit; Alternation of generations. (2 lectures)

Unit-II

Bryophytes: General characteristics; Adaptations to land habit; Classification; Range of thallus organization. Classification (up to family). Riccia, Marchantia, Pellia, Porella, Anthoceros, Sphagnum and Funaria; Reproduction and evolutionary trends in Riccia, Marchantia, Anthoceros and Funaria (developmental stages not included). Ecological and economic importance of bryophytes with special reference to Sphagnum. (12 lectures)

Unit-III

Pteridophytes: General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of Psilotum, Selaginella, Equisetum and Pteris. (Developmental details not to be included). Apogamy, and apospory, heterospory and seed habit, telome theory, stelar evolution. Ecological and economic importance. (10 lectures)

Unit-IV

Gymnosperms: General characteristics, classification (up to family), morphology, anatomy and reproduction of Cycas, Pinus, Ginkgo and Gnetum. (Developmental details not to be included). Ecological and economic importance. (8 lectures)

Unit-V

Fossils: Geographical time scale, fossils and fossilization process. Morphology, anatomy and affinities of Rhynia, Calamites, Lepidodendron, Lyginopteris and Cycadeoidea. (8 lectures)

PRACTICAL

1. Riccia Morphology of thallus.
2. Marchantia- Morphology of thallus, whole mount of rhizoids & Scales, vertical section of thallus through Gemma cup, whole mount of Gemmae (all temporary slides), vertical section of Antheridiophore, Archegoniophore, longitudinal section of Sporophyte (all permanent slides).
3. Anthoceros- Morphology of thallus, dissection of sporophyte (to show stomata, spores, pseudoelaters, columella) (temporary slide), vertical section of thallus (permanent slide).
4. Pellia, Porella- Permanent slides.
5. Sphagnum- Morphology of plant, whole mount of leaf (permanent slide only).
6. Funaria- Morphology, whole mount of leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, longitudinal section of capsule and protonema.
7. Psilotum- Study of specimen, transverse section of synangium (permanent slide).
8. Selaginella- Morphology, whole mount of leaf with ligule, transverse section of stem, whole mount of strobilus, whole mount of microsporophyll and megasporophyll (temporary slides), longitudinal section of strobilus (permanent slide).
9. Equisetum- Morphology, transverse section of internode, longitudinal section of strobilus, transverse section of strobilus, whole mount of sporangiophore, whole mount of spores (wet and dry) (temporary slide), transverse section of rhizome (permanent slide).
10. Pteris- Morphology, transverse section of rachis, vertical section of sporophyll, whole mount of sporangium, whole mount of spores (temporary slides), transverse section of rhizome, whole mount of prothallus with sex organs and young sporophyte (permanent slide).
11. Cycas- Morphology (coralloid roots, bulbil, leaf), whole mount of microsporophyll, transverse section of coralloid root, transverse section of rachis, vertical section of leaflet, vertical section of microsporophyll, whole mount of spores (temporary slides), longitudinal section of ovule, transverse section of root (permanent slide).
12. Pinus- Morphology (long and dwarf shoots, whole mount of dwarf shoot, male and female cones), transverse section of Needle, transverse section of stem, longitudinal section of transverse section of male cone, whole mount of microsporophyll, whole mount of Microspores (temporary slides), longitudinal section of female cone, tangential longitudinal section & radial longitudinal sections stem (permanent slide).

13. Gnetum- Morphology (stem, male & female cones), transverse section of stem, vertical section of ovule (permanent slide)
14. Botanical excursion.

Suggested Readings:

1. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. Delhi, India.
2. Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
3. Parihar, N.S. (1991). An introduction to Embryophyta: Vol. I. Bryophyta. Central Book Depot. Allahabad.
4. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi.
5. Vander-Poorteri 2009 Introduction to Bryophytes. COP.

SEMESTER-III

C-5: ANATOMY OF ANGIOSPERMS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Introduction and scope of Plant Anatomy: Applications in systematics, forensics and pharmacognosy. (2 Lectures)

Tissues: Classification of tissues; Simple and complex tissues (no phylogeny); cytodifferentiation of tracheary elements and sieve elements; Pits and plasmodesmata; Wall ingrowths and transfer cells, adcrustation and incrustation, Ergastic substances. (5 Lectures)

Unit-II

Stem: Organization of shoot apex (Apical cell theory, Histogen theory, Tunica Corpus theory, continuing meristematic residue, cytohistological zonation); Types of vascular bundles; Structure of dicot and monocot stem. (5 Lectures)

Leaf: Structure of dicot and monocot leaf, Kranz anatomy. (4 Lectures)

Root: Organization of root apex (Apical cell theory, Histogen theory, Korper-Kappe theory); Quiescent centre; Root cap; Structure of dicot and monocot root; Endodermis, exodermis and origin of lateral root. (4 Lectures)

Unit-III

Vascular Cambium: Structure, function and seasonal activity of cambium; Secondary growth in root and stem. (4 Lectures)

Wood: Axially and radially oriented elements; Types of rays and axial parenchyma; Cyclic aspects and

reaction wood; Sapwood and heartwood; Ring and diffuse porous wood; Early and late wood, tyloses; Dendrochronology. (5 Lectures)

Periderm: Development and composition of periderm, rhytidome and lenticels. (3 Lectures)

Unit-IV

Adaptive and Protective Systems Epidermal tissue system, cuticle, epicuticular waxes, trichomes (uni- and multicellular, glandular and nonglandular, two examples of each), stomata (classification); Adcrustation and incrustation; Anatomical adaptations of xerophytes and hydrophytes. (5 Lectures)

Unit-V

Secretory System: Hydathodes, cavities, lithocysts and laticifers. (3 Lectures)

PRACTICAL

1. Study of anatomical details through permanent slides/temporary stain mounts/macerations/museum specimens with the help of suitable examples.
2. Apical meristem of root, shoot and vascular cambium.
3. Distribution and types of parenchyma, collenchyma and sclerenchyma.
4. Xylem: Tracheary elements-tracheids, vessel elements; thickenings; perforation plates; xylem fibres.
5. Wood: ring porous; diffuse porous; tyloses; heart- and sapwood.
6. Phloem: Sieve tubes-sieve plates; companion cells; phloem fibres.
7. Epidermal system: cell types, stomata types; trichomes: non-glandular and glandular.
8. Root: monocot, dicot, secondary growth.
9. Stem: monocot, dicot - primary and secondary growth; periderm; lenticels.
10. Leaf: isobilateral, dorsiventral, C4 leaves (Kranz anatomy).
11. Adaptive Anatomy: xerophytes, hydrophytes.
12. Secretory tissues: cavities, lithocysts and laticifers.

Suggested Readings:

1. Dickison, W.C. (2000). Integrative Plant Anatomy. Harcourt Academic Press, USA.
2. Fahn, A. (1974). Plant Anatomy. Pergmon Press, USA.
3. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.
4. Esau, K. (1977). Anatomy of Seed Plants. John Wiley & Sons, Inc., Delhi.

C-6: ECONOMIC BOTANY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Origin of Cultivated Plants: Concept of Centres of Origin, their importance with reference to Vavilov's work. Examples of major plant introductions; Crop domestication and loss of genetic diversity; evolution of new crops/varieties, importance of germplasm diversity. (3 Lectures)

Unit-II

Cereals : Wheat and Rice (origin, morphology, processing & uses), brief account of millets. (3 lectures)

Legumes: General account, importance to man and ecosystem. (3 Lectures)

Sugars & Starches: Morphology and processing of sugarcane, products and by-products of sugarcane industry. Potato morphology, propagation & uses. (3 lectures)

Unit-III

Spices: Listing of important spices, their family and part used, economic importance with special reference to fennel, saffron, clove and black pepper (4 Lectures)

Beverages: Tea, Coffee (morphology, processing & uses)(4 lectures) Drug-yielding plants: Therapeutic and habit-forming drugs with special reference to Cinchona, Digitalis, Papaver and Cannabis. (4 Lectures)

Tobacco: Tobacco (Morphology, processing, uses and health hazards) (2 Lectures)

Unit-IV

Oils & Fats: General description, classification, extraction, their uses and health implications groundnut, coconut, linseed and Brassica and Coconut (Botanical name, family & uses) (4 lectures)

Essential Oils: General account, extraction methods, comparison with fatty oils & their uses. (4 Lectures)

Unit-V

Natural Rubber: Para-rubber: tapping, processing and uses. (2 Lectures)

Timber plants: General account with special reference to teak and pine. (2 Lectures)

Fibres: Classification based on the origin of fibres, Cotton and Jute (morphology, extraction and uses). (2 Lectures)

PRACTICAL

1. Cereals: Rice (habit sketch, study of paddy and grain, starch grains, micro-chemical tests).
2. Legumes: Soya bean, Groundnut, (habit, fruit, seed structure, micro-chemical tests).
3. Sugars & Starches: Sugarcane (habit sketch; cane juice- micro-chemical tests), Potato(habit sketch, tuber morphology, T.S. tuber to show localization of starch grains, w.m. starch grains, micro-chemical tests).
4. Spices: Black pepper, Fennel and Clove (habit and sections).

5. Beverages: Tea (plant specimen, tea leaves), Coffee (plant specimen, beans).
6. Oils & Fats: Coconut- T.S. nut, Mustard plant specimen, seeds; tests for fats in crushed seeds.
7. Essential oil-yielding plants: Habit sketch of Rosa, Vetiveria, Santalum and Eucalyptus (specimens/photographs).
8. Rubber: specimen, photograph/model of tapping, samples of rubber products.
9. Drug-yielding plants: Specimens of Digitalis, Papaver and Cannabis.
10. Tobacco: specimen and products of Tobacco.
11. Woods: Tectona, Pinus: Specimen, Section of young stem.
12. Fibre-yielding plants: Cotton (specimen, whole mount of seed to show lint and fuzz; whole mount of fibre and test for cellulose), Jute (specimen, transverse section of stem, test for lignin on transverse section of stem and fibre).

Suggested Readings:

1. Kochhar, S.L. (2012). Economic Botany in Tropics, MacMillan & Co. New Delhi, India.
2. Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.
3. Chrispeels, M.J. and Sadava, D.E. (2003). Plants, Genes and Agriculture. Jones & Bartlett Publishers.

C-7: GENETICS-

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Mendelian genetics and its extension Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; Probability and pedigree analysis; Incomplete dominance and codominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Recessive and Dominant traits, Penetrance and Expressivity, Numericals; Polygenic inheritance. (16 lectures)

Unit-II

Extrachromosomal Inheritance: Chloroplast mutation: Variegation in Four o'clock plant; Mitochondrial mutations in yeast; Maternal effects-shell coiling in snail; Infective heredity- Kappa particles in Paramecium. (6 lectures)

Unit-III

Linkage, crossing over and chromosome mapping: Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage. (12 lectures)

Unit-IV

Variation in chromosome number and structure: Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy (8 lectures)

Gene mutations: Types of mutations; Molecular basis of Mutations; Mutagens physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CIB method. Role of Transposons in mutation. DNA repair mechanisms. (6 lectures)

Unit-V

Fine structure of gene: Classical vs molecular concepts of gene; Cis-Trans complementation test for functional allelism; Structure of Phage T4, rII Locus. (6 lectures)

Population and Evolutionary Genetics: Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation. (6 lectures)

PRACTICAL

1. Meiosis through temporary squash preparation.
2. Mendels laws through seed ratios. Laboratory exercises in probability and chi-square analysis.
3. Chromosome mapping using test cross data.
4. Pedigree analysis for dominant and recessive autosomal and sex linked traits with floral chart.
5. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4).
6. Blood Typing: ABO groups & Rh factor.
7. Study of aneuploidy: Downs, Klinefelters and Turners syndromes.
8. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.

Suggested Readings:

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics, John Wiley & sons, India. 8th edition.
2. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics, John Wiley & Sons Inc., India. 5th edition.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. Benjamin Cummings, U.S.A. 10th edition.
4. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freeman and Co., U.S.A. 10th edition.

SEMESTER-IV

C-8: MOLECULAR BIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Nucleic acids : Carriers of genetic information: Historical perspective; DNA as the carrier of genetic information (Griffiths, Hershey & Chase, Avery, McLeod & McCarty, Fraenkel-Conrats experiment. (4 lectures)

Unit-II

The Structures of DNA and RNA / Genetic Material: DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation, cot curves; Organization of DNA Prokaryotes, Viruses, Eukaryotes. RNA Structure- Organelle DNA - mitochondria and chloroplast DNA. The Nucleosome -Chromatin structure- Euchromatin, Heterochromatin- Constitutive and Facultative heterochromatin. (8 lectures)

The replication of DNA: Chemistry of DNA synthesis (Kornberg's discovery); General principles bidirectional, semi-conservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, (theta) mode of replication, replication of linear ds-DNA, replication of the 5' end of linear chromosome; Enzymes involved in DNA replication. (6 lectures)

Unit-III

Central dogma and genetic code: Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features) (2 lectures)

Mechanism of Transcription: Transcription in prokaryotes; Transcription in eukaryotes (4 lectures)

Processing and modification of RNA: Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I & group II intron splicing, alternative splicing eukaryotic mRNA processing (5' cap, 3' polyA tail); Ribozymes, exon shuffling; RNA editing and mRNA transport. (5 lectures)

Unit-IV

Translation (Prokaryotes and eukaryotes): Ribosome structure and assembly, mRNA; Charging of tRNA, aminoacyl tRNA synthetases; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides; Fidelity of translation; Inhibitors of protein synthesis; Post-translational modifications of proteins. (6 lectures)

Unit-V

Regulation of transcription in prokaryotes and eukaryotes: Principles of transcriptional regulation; Prokaryotes: Regulation of lactose metabolism and tryptophan synthesis in E.coli. Eukaryotes: transcription factors, heat shock proteins, steroids and peptide hormones; Gene silencing. (5 lectures)

PRACTICAL

1. Preparation of LB medium and raising E.Coli.
2. Isolation of genomic DNA from E.Coli.

3. DNA isolation and RNA estimation by orcinol method.
4. DNA estimation by diphenylamine reagent/UV Spectrophotometry.
5. Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and semi-discontinuous replication).
6. Study of structures of prokaryotic RNA polymerase and eukaryotic RNA polymerase II through photographs.
7. Photographs establishing nucleic acid as genetic material (Messelson and Stahls, Avery et al, Griffiths, Hershey & Chases and Fraenkel & Conrats experiments)
8. Study of the following through photographs: Assembly of Spliceosome machinery; Splicing mechanism in group I & group II introns; Ribozyme and Alternative splicing.

Suggested Readings:

1. Watson J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M., Losick, R. (2007). Molecular Biology of the Gene, Pearson Benjamin Cummings, CSHL Press, New York, U.S.A. 6th edition.
2. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons Inc., U.S.A. 5th edition.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. Benjamin Cummings. U.S.A. 9th edition.
4. Russell, P. J. (2010). iGenetics- A Molecular Approach. Benjamin Cummings, U.S.A. 3rd edition.
5. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freeman and Co., U.S.A. 10th edition.

C-9: PLANT ECOLOGY & PHYTOGEOGRAPHY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Introduction Concept of ecology, Autoecology, Synecology, system ecology, Levels of organization. Inter-relationships between the living world and the environment, the components of environmental, concept of hydrosphere and lithosphere and dynamism, homeostasis. (2 lectures)

Unit-II

Soil: Importance; Origin; Formation; Composition; Physical; Chemical and Biological components; Soil profile; Role of climate in soil development. (5 lectures)

Water: Importance: States of water in the environment; Atmospheric moisture; Precipitation types (rain, fog, snow, hail, dew); Hydrological Cycle; Water in soil; Water table. (2 lectures)

Light, temperature, wind and fire: Variations; adaptations of plants to their variation. (4 lectures)

Unit-III

Biotic interactions: 2 lectures Population ecology: Characteristics and Dynamics .Ecological Speciation 4 lectures Plant communities: Concept of ecological amplitude; Habitat and niche; Characters: analytical and synthetic; Ecotone and edge effect; Dynamics: succession processes, types; climax concepts. (4 lectures)

Unit-IV

Ecological pyramids. (4 lectures)

Functional aspects of ecosystem: Principles and models of energy flow; Production and productivity; Ecological efficiencies; Biogeochemical cycles; Cycling of Carbon, Nitrogen and Phosphorus. (5 lectures)

Unit-V

Phytogeography: Principles; Continental drift; Theory of tolerance; Endemism; Brief description of major terrestrial biomes (one each from tropical, temperate & tundra); Phytogeographical division of India; Local Vegetation. (8 lectures)

PRACTICAL

1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.
2. Determination of pH of various soil and water samples (pH meter, universal indicator/Lovibond comparator and pH paper)
3. Analysis for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency from two soil samples by rapid field tests.
4. Determination of organic matter of different soil samples by Walkley & Black rapid titration method.
5. Comparison of bulk density, porosity and rate of infiltration of water in soils of three habitats.
6. Determination of dissolved oxygen of water samples from polluted and unpolluted sources.
7. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each). (b) Study of biotic interactions of the following: Stem parasite (*Cuscuta*), Root parasite (*Orobanch*) Epiphytes, Predation (Insectivorous plants).
8. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus, by species area curve method (species to be listed).
9. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaers frequency distribution law.
10. Quantitative analysis of herbaceous vegetation for density and abundance in the college campus.

11. Field visit to familiarise students with ecology of different sites.

Suggested Readings:

1. Odum, E.P. (2005). Fundamentals of ecology. Cengage Learning India Pvt. Ltd., New Delhi. 5th edition.
2. Singh, J.S., Singh, S.P., Gupta, S. (2006). Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi, India.
3. Sharma, P.D. (2010). Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
4. Wilkinson, D.M. (2007). Fundamental Processes in Ecology: An Earth Systems Approach. Oxford University Press. U.S.A.
5. Kormondy, E.J. (1996). Concepts of ecology. PHI Learning Pvt. Ltd., Delhi, India. 4th edition.

C-10: PLANT SYSTEMATICS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Plant identification, Classification, Nomenclature; Biosystematics. (2 lectures)

Identification: Field inventory; Functions of Herbarium; Important herbaria and botanical gardens of the world and India; Virtual herbarium; E-flora; Documentation: Flora, Monographs, Journals; Keys: Single access and Multi-access. (5 lectures)

Unit-II

Taxonomic hierarchy: Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concept (taxonomic, biological, evolutionary). (5 lectures)

Botanical nomenclature: Principles and rules (ICN); Ranks and names; Typification, author citation, valid publication, rejection of names, principle of priority and its limitations; Names of hybrids. (5 lectures)

Unit-III

Systematics-an interdisciplinary science: Evidence from palynology, cytology, phytochemistry and molecular data. (6 lectures)

Systems of classification: Major contributions of Theophrastus, Bauhin, Tournefort, Linnaeus, Adanson, de Candolle, Bessey, Hutchinson, Takhtajan and Cronquist; Classification systems of Bentham and Hooker (upto series) and Engler and Prantl (upto series); Brief reference of Angiosperm Phylogeny Group (APG III) classification. (6 lectures)

Unit-IV

Biometrics, numerical taxonomy and cladistics: Characters; Variations; OTUs, character weighting and coding; cluster analysis; Phenograms, cladograms (definitions and differences). (4 lectures)

Unit-V

Phylogeny of Angiosperms: Terms and concepts (primitive and advanced, homology and analogy, parallelism and convergence, monophyly, Paraphyly, polyphyly and clades).origin & evolution of angiosperms; coevolution of angiosperms and animals; methods of illustrating evolutionary relationship (phylogenetic tree, cladogram). (7 lectures)

PRACTICAL

1. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hookers system of classification):
Ranunculaceae - Ranunculus, Delphinium
Brassicaceae - Brassica, Alyssum / Iberis
Myrtaceae - Eucalyptus, Callistemon
Umbelliferae - Coriandrum /Anethum / Foeniculum
Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax
Solanaceae - Solanum nigrum/Withania
Lamiaceae - Salvia/Ocimum
Euphorbiaceae - Euphorbia hirta/E.milii, Jatropha
Liliaceae - Asphodelus/Lilium/Allium
Poaceae - Triticum/Hordeum/Avena
2. Field visit (local) Subject to grant of funds from the university.
3. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book)

Suggested Readings:

1. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.
2. Jeffrey, C. (1982). An Introduction to Plant Taxonomy. Cambridge University Press, Cambridge.
3. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Plant Systematics-A Phylogenetic Approach. Sinauer Associates Inc., U.S.A. 2nd edition.
4. Maheshwari, J.K. (1963). Flora of Delhi. CSIR, New Delhi.
5. Radford, A.E. (1986). Fundamentals of Plant Systematics. Harper and Row, New York.

SEMESTER-V

C-11: REPRODUCTIVE BIOLOGY OF ANGIOSPERMS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Introduction: History (contributions of G.B. Amici, W. Hofmeister, E. Strasburger, S.G. Nawaschin, P. Maheshwari, B.M. Johri, W.A. Jensen, J. Heslop-Harrison) and scope. (2 lectures)

Unit-II

Anther: Anther wall: Structure and functions, microsporogenesis, callose deposition and its significance. (2 lectures)

Pollen biology: Microgametogenesis; Pollen wall structure, MGU (male germ unit) structure, NPC system; Palynology and scope (a brief account); Pollen wall proteins; Pollen viability, storage and germination; Abnormal features: Pseudomonads, polyads, massulae, pollinia. (5 lectures)

Unit-III

Ovule: Structure; Types; Special structures endothelium, obturator, aril, caruncle and hypostase; Female gametophyte megasporogenesis (monosporic, bisporic and tetrasporic) and megagametogenesis (details of Polygonum type); Organization and ultrastructure of mature embryo sac. (5 lectures)

Endosperm: Types, development, structure and functions. (3 lectures)

Embryo: Six types of embryogeny; General pattern of development of dicot and monocot embryo; Suspensor: structure and functions; Embryoendosperm relationship; Nutrition of embryo; Unusual features; Embryo development in Paeonia. (6 lectures)

Unit-IV

Pollination and fertilization: Pollination types and significance; adaptations; structure of stigma and style; path of pollen tube in pistil; double fertilization. (4 lectures)

Self incompatibility: Basic concepts (interspecific, intraspecific, homomorphic, heteromorphic, GSI and SSI); Methods to overcome self incompatibility: mixed pollination, bud pollination, stub pollination; Intraovarian and in vitro pollination; Modification of stigma surface, parasexual hybridization; Cybrids, in vitro fertilization. (5 lectures)

Unit-V

Seed: Structure, importance and dispersal mechanisms (3 lectures)

Polyembryony and apomixes: Introduction; Classification; Causes and applications. (4 lectures)

Germline transformation: Pollen grain and ovules through pollen tube pathway method/ Agrobacterium/ electrofusion/floral dip/biostatic. (4 lectures)

PRACTICAL

1. Anther: Wall and its ontogeny; Tapetum (amoeboid and glandular); MMC, spore tetrads, uninucleate, bicelled and dehiscent anther stages through slides/micrographs, male germ unit (MGU) through photographs and schematic representation.
2. Pollen grains: Fresh and acetolyzed showing ornamentation and aperture, pseudomonads, polyads, pollinia (slides/photographs, fresh material), ultrastructure of pollen wall (micrograph); Pollen viability: Tetrazolium test. germination: Calculation of percentage germination in different media using hanging drop method.
3. Ovule: Types-anatropous, orthotropous, amphitropous/campylotropous, circinotropous, unitegmic,

bitegmic; Tenuinucellate and crassinucellate; Special structures: Endothelium, obturator, hypostase, caruncle and aril (permanent slides/specimens/photographs).

4. Female gametophyte through permanent slides/ photographs: Types, ultrastructure of mature egg apparatus.
5. Intra-ovarian pollination; Test tube pollination through photographs.
6. Endosperm: Dissections of developing seeds for endosperm with free-nuclear haustoria.
7. Embryogenesis: Study of development of dicot embryo through permanent slides; dissection of developing seeds for embryos at various developmental stages; Study of suspensor through electron micrographs.

Suggested Readings:

1. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, Vikas Publishing House. Delhi. 5th edition.
2. Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd. Delhi.
3. Raghavan, V. (2000). Developmental Biology of Flowering plants, Springer, Netherlands.
4. Johri, B.M. I (1984). Embryology of Angiosperms, Springer-Verlag, Netherlands.

C-12: PLANT PHYSIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Plant water relationship: Water Potential and its components, water absorption by roots, aquaporins, pathway of water movement, symplast, apoplast, transmembrane pathways, root pressure, guttation. Ascent of sap cohesion-tension theory. Transpiration and factors affecting transpiration, antitranspirants, mechanism of stomatal movement. (6 lectures)

Translocation in the phloem: Experimental evidence in support of phloem as the site of sugar translocation. Pressure-Flow Model; Phloem loading and unloading; Source-sink relationship. (5 lectures)

Unit-II

Mineral nutrition: Essential and beneficial elements, macro and micronutrients, methods of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents. (5 lectures)

Unit-III

Nutrient Uptake: Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, electrochemical gradient, facilitated diffusion, active absorption, role of ATP, carrier systems, proton ATPase pump and ion flux, uniport, co-transport, symport, antiport. (5 lectures)

Unit-IV

Plant growth regulators: Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Abscissic acid, Ethylene, Brassinosteroids and Jasmonic acid. (10 lectures)

Unit-V

Physiology of flowering: Photoperiodism, flowering stimulus, florigen concept, vernalization, seed dormancy. (4 lectures)

Phytochrome: Discovery, chemical nature, role of phytochrome in photomorphogenesis, low energy responses (LER) and high irradiance responses (HIR), mode of action. (5 lectures)

PRACTICAL

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. Determination of water potential of given tissue (potato tuber) by weight method.
3. Study of the effect of wind velocity and light on the rate of transpiration in excised twig/leaf.
4. Calculation of stomatal index and stomatal frequency from the two surfaces of leaves of a mesophyte and xerophyte.
5. To calculate the area of an open stoma and percentage of leaf area open through stomata in a mesophyte and xerophyte (both surfaces).
6. To study the phenomenon of seed germination (effect of light).
7. To study the induction of amylase activity in germinating barley grains.

Demonstration experiments:

(a) To demonstrate suction due to transpiration. (b) Fruit ripening/Rooting from cuttings (Demonstration). (c) Bolting experiment/Avena coleptile bioassay (demonstration).

Suggested Readings:

1. Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons. U.S.A. 4th edition.
2. Taiz, L., Zeiger, E., Miller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
3. Bajracharya D. (1999). Experiments in Plant Physiology-A Laboratory Manual. Narosa Publishing House, New Delhi.

SEMESTER-VI

C-13: PLANT METABOLISM

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Concept of metabolism: Introduction, anabolic and catabolic pathways, regulation of metabolism, role of regulatory enzymes (allosteric, covalent modulation and Isozymes). (5 lectures)

Carbohydrate metabolism: Synthesis and catabolism of sucrose and starch. (1 lecture)

Unit-II

Carbon assimilation: Historical background, photosynthetic pigments, role of photosynthetic pigments (chlorophylls and accessory pigments), antenna molecules and reaction centres, photochemical reactions, photosynthetic electron transport, PSI, PSII, Q cycle, CO_2 reduction, photorespiration, C4 pathways; Crassulacean acid metabolism; Factors affecting CO_2 reduction. (10 lectures)

Unit-III

Carbon Oxidation: Glycolysis, fate of pyruvate, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, regulation of PDH, NADH shuttle; TCA cycle, amphibolic role, anaplerotic reactions, regulation of the cycle, mitochondrial electron transport, oxidative phosphorylation, cyanideresistant respiration, factors affecting respiration. (6 lectures)

ATP-Synthesis: Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic mechanism (oxidative and photophosphorylation), ATP synthase, Boyers conformational model, Rackers experiment, Jagendorfs experiment; role of uncouplers. (4 lectures)

Unit-IV

Lipid metabolism: Synthesis and breakdown of triglycerides, β -oxidation, glyoxylate cycle, gluconeogenesis and its role in mobilisation of lipids during seed germination, α oxidation. (5 lectures)

Unit-V

Nitrogen metabolism: Nitrate assimilation, biological nitrogen fixation (examples of legumes and non-legumes); Physiology and biochemistry of nitrogen fixation; Ammonia assimilation and transamination. (5 lectures)

Mechanisms of signal transduction: Calcium, phospholipids, cGMP, NO. (4 lectures)

PRACTICAL

1. Chemical separation of photosynthetic pigments.
2. Experimental demonstration of Hilla reaction.
3. To study the effect of light intensity on the rate of photosynthesis.
4. Effect of carbon dioxide on the rate of photosynthesis.
5. To compare the rate of respiration in different parts of a plant.
6. To demonstrate activity of Nitrate Reductase in germinating leaves of different plant sources.
7. To study the activity of lipases in germinating oilseeds and demonstrate mobilization of lipids during germination.
8. Demonstration of fluorescence by isolated chlorophyll pigments.
9. Demonstration of absorption spectrum of photosynthetic pigments.

Suggested Readings:

1. Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons. U.S.A. 4th edition.
2. Taiz, L., Zeiger, E., Mller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
3. Harborne, J.B. (1973). Phytochemical Methods. John Wiley & Sons. New York.

C-14: PLANT BIO-TECHNOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I

Plant Tissue Culture: Historical perspective; Aseptic tissue culture techniques, Composition of media; Nutrient and hormone requirements (role of vitamins and hormones). (3 lectures)

Unit-II

Totipotency; Organogenesis; Embryogenesis (somatic and zygotic); Protoplast isolation, culture and fusion; Tissue culture applications (micropropagation, androgenesis, virus elimination, secondary metabolite production, haploids, triploids and hybrids; Cryopreservation; Germplasm Conservation). (7 lectures)

Unit-III

Recombinant DNA technology-I: Restriction Endonucleases (History, Types I-IV, biological role and application); Restriction Mapping (Linear and Circular); Cloning Vectors: Prokaryotic (pUC 18 and pUC19, pBR322, Ti plasmid, BAC); Lambda phage, M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC and briefly PAC, MAC, HAC). Gene Cloning (Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCR-mediated gene cloning). (10 lectures)

Unit-IV

Recombinant DNA technology-II: Gene Construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; Probes-oligonucleotide, heterologous, PCR; Methods of gene transfer- Agrobacterium-mediated, Direct gene transfer by Electroporation, Microinjection, Microprojectile bombardment; Selection of transgenics selectable marker and reporter genes (Luciferase, GUS, GFP). (10 lectures)

Unit-V

Applications of Biotechnology: Pest resistant (Bt-cotton); herbicide resistant plants (RoundUp Ready soybean); Transgenic crops with improved quality traits (Flavr Savr tomato, Golden rice); Improved horticultural varieties (Moondust carnations); Role of transgenics in bioremediation (Superbug); edible vaccines; Industrial enzymes (Aspergillase, Protease, Lipase); Genetically Engineered Products Human Growth Hormone; Humulin; Biosafety concerns. (10 lectures)

PRACTICAL

1. (a) Preparation of MS medium.
(b) Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc.
2. Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs.
3. Isolation of protoplasts.
4. Construction of restriction map of circular and linear DNA from the data provided.
5. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment.
6. Study of steps of genetic engineering for production of Bt cotton, Golden rice, Flavr Savr tomato through photographs.
7. Isolation of plasmid DNA.
8. Restriction digestion and gel electrophoresis of plasmid DNA.

Suggested Readings:

1. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
2. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
3. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms. Vikas Publication House Pvt. Ltd., New Delhi. 5th edition.
4. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons, U.K. 5th edition.
5. Stewart, C.N. Jr. (2008). Plant Biotechnology & Genetics: Principles, Techniques and Applications. John Wiley & Sons Inc. U.S.A.
6. Chawla, H.S. (2010). Introduction to Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
7. Singh, B. D. (2010) Biotechnology: Expanding Horizon. Kalyani Publishers. New Delhi.

DISCIPLINE SPECIFIC ELECTIVE COURSES

DSE-1A: ANALYTICAL TECHNIQUES IN PLANT SCIENCES

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Imaging and related techniques: Principles of microscopy; Light microscopy; Fluorescence microscopy; Confocal microscopy; Use of fluorochromes: (a) Flow cytometry (FACS); (b) Applications of fluorescence microscopy: Chromosome banding, FISH, chromosome painting; Transmission and Scanning electron microscopy sample preparation for electron microscopy, cryofixation, negative staining, shadow casting, freeze fracture, freeze etching. (10 lectures)

UNIT-II: Cell fractionation: Centrifugation: Differential and density gradient centrifugation, sucrose density gradient, CsCl₂ gradient, analytical centrifugation, ultracentrifugation, marker enzymes. (5 lectures)

UNIT-III: Radioisotopes: Use in biological research, auto-radiography, pulse chase experiment. (3 lectures)

Spectrophotometry: Principle and its application in biological research. 3 lectures Chromatography: Principle; Paper chromatography; Column chromatography, TLC, GLC, HPLC, Ion-exchange chromatography; Molecular sieve chromatography; Affinity chromatography. (6 lectures)

UNIT-IV: Characterization of proteins and nucleic acids: Mass spectrometry; X-ray diffraction; X-ray crystallography; Characterization of proteins and nucleic acids; Electrophoresis: AGE, PAGE, SDS-PAGE (5 lectures)

UNIT-V: Biostatistics: Statistics, data, population, samples, parameters; Representation of Data: Tabular, Graphical; Measures of central tendency: Arithmetic mean, mode, median; Measures of dispersion: Range, mean deviation, variation, standard deviation; Chi-square test for goodness of fit. (8 lectures)

PRACTICAL

1. Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting, DNA sequencing, PCR through photographs.
2. Demonstration of ELISA.
3. To separate nitrogenous bases by paper chromatography.
4. To separate sugars by thin layer chromatography.
5. Isolation of chloroplasts by differential centrifugation.
6. To separate chloroplast pigments by column chromatography.
7. To estimate protein concentration through Lowry's methods.

8. To separate proteins using PAGE.
9. To separation DNA (marker) using AGE.
10. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH).
11. Preparation of permanent slides (double staining).
12. Estimation of plant pigments.

Suggested Readings:

1. Plummer, D.T. (1996). An Introduction to Practical Biochemistry. Tata McGraw-Hill Publishing Co. Ltd. New Delhi. 3rd edition.
2. Ruzin, S.E. (1999). Plant Microtechnique and Microscopy, Oxford University Press, New York. U.S.A.
3. Ausubel, F., Brent, R., Kingston, R. E., Moore, D.D., Seidman, J.G., Smith, J.A., Struhl, K. (1995). Short Protocols in Molecular Biology. John Wiley & Sons. 3rd edition.
4. Zar, J.H. (2012). Biostatistical Analysis. Pearson Publication. U.S.A. 4th ed

DSE-1B: BIO-INFORMATICS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Introduction to Bioinformatics: Introduction, Branches of Bioinformatics, Aim, Scope and Research areas of Bioinformatics. (3 Lectures)

Databases in Bioinformatics: Introduction, Biological Databases, Classification format of Biological Databases, Biological Database Retrieval System. (4 Lectures)

UNIT-II: Biological Sequence Databases: National Center for Biotechnology Information (NCBI): Tools and Databases of NCBI, Database Retrieval Tool, Sequence Submission to NCBI, Basic local alignment search tool (BLAST), Nucleotide Database, Protein Database, Gene Expression Database. EMBL Nucleotide Sequence Database (EMBL-Bank): Introduction, Sequence Retrieval, Sequence Submission to EMBL, Sequence analysis tools. DNA Data Bank of Japan (DDBJ): Introduction, Resources at DDBJ, Data Submission at DDBJ. Protein Information Resource (PIR): About PIR, Resources of PIR, Databases of PIR, Data Retrieval in PIR. Swiss-Prot: Introduction and Salient Features. (15 Lectures)

UNIT-III: Sequence Alignments: Introduction, Concept of Alignment, Multiple Sequence Alignment (MSA), MSA by CLUSTALW, Scoring Matrices, Percent Accepted Mutation (PAM), Blocks of Amino Acid Substitution Matrix (BLOSUM). (8 Lectures)

UNIT-IV: Molecular Phylogeny: Methods of Phylogeny, Software for Phylogenetic Analyses, Consistency of Molecular Phylogenetic Prediction. (5 Lectures)

UNIT-V: Applications of Bioinformatics: Structural Bioinformatics in Drug Discovery, Quantitative structure-activity relationship (QSAR) techniques in Drug Design, Microbial genome applications, Crop improvement. (5 Lectures)

PRACTICAL

1. Nucleic acid and protein databases.
2. Sequence retrieval from databases.
3. Sequence alignment.
4. Sequence homology and Gene annotation.
5. Construction of phylogenetic tree.

Suggested Readings:

1. Ghosh Z. and Bibekanand M. (2008) Bioinformatics: Principles and Applications. Oxford University Press.
2. Pevsner J. (2009) Bioinformatics and Functional Genomics. II Edition. Wiley-Blackwell.
3. Campbell A. M., Heyer L. J. (2006) Discovering Genomics, Proteomics and Bioinformatics-II Edition. Benjamin Cummings.

DSE-2A: PLANT BREEDING

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Plant Breeding : Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding. (6 lectures)

UNIT-II; Methods of crop improvement: Introduction: Centres of origin and domestication of crop plants, plant genetic resources; Acclimatization; Selection methods: For self pollinated, cross pollinated and vegetatively propagated plants; Hybridization: For self, cross and vegetatively propagated plants Procedure, advantages and limitations. (15 lectures)

UNIT-III: Quantitative inheritance: Concept, mechanism, examples of inheritance of Kernel colour in wheat, Skin colour in human beings. Monogenic vs polygenic Inheritance. (6 lectures)

UNIT-IV: Inbreeding depression and heterosis: History, genetic basis of inbreeding depression and heterosis; Applications. (6 lectures)

UNIT-V: Crop improvement and breeding: Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement. (7 lectures)

PRACTICAL

Practical related to theory.

Suggested Readings:

1. Singh, B.D. (2005). Plant Breeding: Principles and Methods. Kalyani Publishers. 7th edition.
2. Chaudhari, H.K. (1984). Elementary Principles of Plant Breeding. Oxford IBH. 2nd edition.
3. Acquaah, G. (2007). Principles of Plant Genetics & Breeding. Blackwell Publishers.

DSE-2B: NATURAL RESOURCE MANAGEMENT

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Natural resources: Definition and types. 2 lectures Sustainable utilization : Concept, approaches (economic, ecological and socio-cultural). (5 lectures)

UNIT-II: Land: Utilization (agricultural, pastoral, horticultural, silvicultural); Soil degradation and management. (5 lectures)

Water: Fresh water (rivers, lakes, groundwater, aquifers, watershed); Marine; Estuarine; Wetlands; Threats and management strategies. (4 lectures)

UNIT-III: Biological Resources: Biodiversity-definition and types; Significance; Threats; Management strategies; Bioprospecting; IPR; CBD; National Biodiversity Action Plan). (8 lectures)

Forests: Definition, Cover and its significance (with special reference to India); Major and minor forest products; Depletion; Management. (4 lectures)

UNIT-IV: Energy: Renewable and non-renewable sources of energy 4 lectures Contemporary practices in resource management: EIA, GIS, Participatory Resource Appraisal, Ecological Footprint with emphasis on carbon footprint. (6 lectures)

UNIT-V: Resource Accounting; Waste management. National and international efforts in resource management and conservation (4 lectures)

PRACTICAL

1. Estimation of solid waste generated by a domestic system (biodegradable and nonbiodegradable) and its impact on land degradation.
2. Collection of data on forest cover of specific area.
3. Measurement of dominance of woody species by DBH (diameter at breast height) method.
4. Calculation and analysis of ecological footprint.
5. Ecological modeling.

Suggested Readings:

1. Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House, New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.
3. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

DSE-2C: BIO-STATISTICS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Unit-I Biostatistics - definition - statistical methods - basic principles. Variables - measurements, functions, limitations and uses of statistics. (8 lectures)

Unit-II: Collection of data primary and secondary - types and methods of data collection procedures - merits and demerits. Classification - tabulation and presentation of data sampling methods. (8 lectures)

Unit-III: Measures of central tendency - mean, median, mode, geometric mean - merits & demerits. Measures of dispersion - range, standard deviation, mean deviation, quartile deviation - merits and demerits; Co- efficient of variations. (10 lectures)

Unit-IV: Correlation - types and methods of correlation, regression, simple regression equation, fitting prediction, similarities and dissimilarities of correlation and regression. (8 lectures)

Unit-V: Statistical inference - hypothesis - simple hypothesis - student 't' test - chi square test. (6 lectures)

PRACTICAL

1. Calculation of mean, standard deviation and standard error
2. Calculation of correlation coefficient values and finding out the probability
3. Calculation of F value and finding out the probability value for the F value.

Suggested Readings:

1. Biostatistic, Danniel, W.W., 1987. New York, John Wiley Sons.
2. An introduction to Biostatistics, 3rd edition, Sundarrao, P.S.S and Richards, J. Christian Medical College, Vellore
3. Statistical Analysis of epidemiological data, Selvin, S., 1991. New York University Press.
4. Statistics for Biology, Boston, Bishop, O.N. Houghton, Mifflin.

5. The Principles of scientific research, Freedman, P. New York, Pergamon Press.
6. Statistics for Biologists, Campbell, R.C., 1998. Cambridge University Press.

DSE-3A: STRESS BIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Defining plant stress: Acclimation and adaptation. (2 lectures)

UNIT-II: Environmental factors: Water stress; Salinity stress, High light stress; Temperature stress; Hypersensitive reaction; Pathogenesis related (PR) proteins; Systemic acquired resistance; Mediation of insect and disease resistance by jasmonates. (12 lectures)

UNIT-III: Stress sensing mechanisms in plants: Role of nitric oxide. Calcium modulation, Phospholipid signaling (12 lectures)

UNIT-IV: Developmental and physiological mechanisms that protect plants against environmental stress: Adaptation in plants; Changes in root: shoot ratio; Aerenchyma development; Osmotic adjustment; Compatible solute production. (10 lectures)

UNIT-V: Reactive oxygen species Production and scavenging mechanisms. (4 lectures)

PRACTICAL

1. Quantitative estimation of peroxidase activity in the seedlings in the absence and presence of salt stress.
2. Superoxide activity in seedlings in the absence and presence of salt stress.
3. Assay of Ascorbate
4. Assay of peroxidase.
5. Assay of superoxide dismutase activity.
6. Quantitative estimation and analysis of catalase.

Suggested Readings:

1. Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons. U.S.A. 4th edition.
2. Taiz, L., Zeiger, E., Mller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.

DSE-3B: HORTICULTURAL PRACTICES & POST-HARVEST TECHNOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Introduction: Scope and importance, Branches of horticulture; Role in rural economy and employment generation; Importance in food and nutritional security; Urban horticulture and ecotourism. (2 lectures)

Ornamental plants: Types, classification (annuals, perennials, climbers and trees); Identification and salient features of some ornamental plants [rose, marigold, gladiolus, carnations, orchids, poppies, gerberas, tuberose, sages, cacti and succulents (opuntia, agave and spurges)] Ornamental flowering trees (Indian laburnum, gulmohar, Jacaranda, Lagerstroemia, fishtail and areca palms, semul, Coral tree). (3 lectures)

UNIT-II: Fruit and vegetable crops: Production, origin and distribution; Description of plants and their economic products; Management and marketing of vegetable and fruit crops; Identification of some fruits and vegetable varieties (citrus, banana, mango, chillies and cucurbits). (4 lectures)

Horticultural techniques: Application of manure, fertilizers, nutrients and PGRs; Weed control; Biofertilizers, biopesticides; Irrigation methods (drip irrigation, surface irrigation, furrow and border irrigation); Hydroponics; Propagation Methods: asexual (grafting, cutting, layering, budding), sexual (seed propagation), Scope and limitations. (6 lectures)

UNIT-III: Landscaping and garden design : Planning and layout (parks and avenues); gardening traditions - Ancient Indian, European, Mughal and Japanese Gardens; Urban forestry; policies and practices. (4 lectures)

Floriculture: Cut flowers, bonsai, commerce (market demand and supply); Importance of flower shows and exhibitions. (4 lectures)

UNIT-IV: Post-harvest technology: Importance of post harvest technology in horticultural crops; Evaluation of quality traits; Harvesting and handling of fruits, vegetables and cut flowers; Principles, methods of preservation and processing; Methods of minimizing losses during storage and transportation; Food irradiation - advantages and disadvantages; food safety. (6 lectures)

Disease control and management : Field and post-harvest diseases; Identification of deficiency symptoms; remedial measures and nutritional management practices; Crop sanitation; IPM strategies (genetic, biological and chemical methods for pest control); Quarantine practices; Identification of common diseases and pests of ornamentals, fruits and vegetable crops. (5 lectures)

UNIT-V: Horticultural crops - conservation and management: Documentation and conservation of germplasm; Role of micropropagation and tissue culture techniques; Varieties and cultivars of various horticultural crops; IPR issues; National, international and professional societies and sources of information on horticulture. (6 lectures)

Field Trip: Field visits to gardens, standing crop sites, nurseries, vegetable gardens and horticul-

tural fields at IARI or other suitable locations.

PRACTICAL

Practical related to theory.

Suggested Readings:

1. Singh, D. & Manivannan, S. (2009). Genetic Resources of Horticultural Crops. Ridhi International, Delhi, India.
2. Swaminathan, M.S. and Kochhar, S.L. (2007). Groves of Beauty and Plenty: An Atlas of Major Flowering Trees in India. Macmillan Publishers, India.
3. NIIR Board (2005). Cultivation of Fruits, Vegetables and Floriculture. National Institute of Industrial Research Board, Delhi.
4. Kader, A.A. (2002). Post-Harvest Technology of Horticultural Crops. UCANR Publications, USA.
5. Capon, B. (2010). Botany for Gardeners. 3rd Edition. Timber Press, Portland, Oregon.

DSE-3C: RESEARCH METHODOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Basic concepts of research :Research-definition and types of research (Descriptive vs analytical; applied vs fundamental; quantitative vs qualitative; conceptual vs empirical).Research methods vs methodology.Literature-review and its consolidation; Library research; field research; laboratory research. (6 lectures) General laboratory practices: Common calculations in botany laboratories. Understanding the details on the label of reagent bottles. Molarity and normality of common acids and bases.Preparation of solutions. Dilutions. Percentage solutions. Molar, molal and normal solutions.Technique of handling micropipettes; Knowledge about common toxic chemicals and safety measures in their handling. (8 lectures)

UNIT-II: Data collection and documentation of observations: Maintaining a laboratory record; Tabulation and generation of graphs. Imaging of tissuespecimens and application of scale bars. The art of field photography. (4 lectures)

Overview of Biological Problems : History; Key biology research areas, Model organisms in biology (A Brief overview): Genetics, Physiology, Biochemistry, Molecular Biology, Cell Biology, Genomics, Proteomics- Transcriptional regulatory network. (4 lectures)

UNIT-III: Methods to study plant cell/tissue structure: Whole mounts, peel mounts, squash preparations, clearing, maceration and sectioning; Tissue preparation: living vs fixed, physical vs chemical fixation, coagulating fixatives, noncoagulant fixatives; tissue dehydration using graded solvent series; Paraffin and plastic infiltration; Preparation of thin and ultrathin sections. (4 lectures)

UNIT-IV: Plant microtechniques : Staining procedures, classification and chemistry of stains. Staining equipment. Reactive dyes and fluorochromes (including genetically engineered protein labeling with GFP and other tags). Cytogenetic techniques with squashed plant materials. (8 lectures)

UNIT-V: The art of scientific writing and its presentation : Numbers, units, abbreviations and nomenclature used in scientific writing. Writing references. Power point presentation. Poster presentation. Scientific writing and ethics, Introduction to copyright-academic misconduct/plagiarism. (6 lectures)

PRACTICAL

1. Experiments based on chemical calculations.
2. Plant microtechnique experiments.
3. The art of imaging of samples through microphotography and field photography.
4. Poster presentation on defined topics.
5. Technical writing on topics assigned.

Suggested Readings:

1. Dawson, C. (2002). Practical research methods. UBS Publishers, New Delhi.
2. Stapleton, P., Yondeowei, A., Mukanyange, J., Houten, H. (1995). Scientific writing for agricultural research scientists a training reference manual. West Africa Rice Development Association, Hong Kong.
3. Ruzin, S.E. (1999). Plant microtechnique and microscopy. Oxford University Press, New York, U.S.

DSE-3D: INDUSTRIAL & ENVIRONMENTAL MICROBIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Scope of microbes in industry and environment: (2 lectures)

Bioreactors/Fermenters and fermentation processes: Solid-state and liquid-state (stationary and submerged) fermentations; Batch and continuous fermentations. Components of a typical bioreactor, Types of bioreactors laboratory, pilotscale and production fermenters; Constantly stirred tank fermenter, tower fermenter, fixed bed and fluidized bed bioreactors and airlift fermenter. A visit to any educational institute/ industry to see an industrial fermenter, and other downstream processing operations. (8 lectures)

UNIT-II: Microbial production of industrial products: Microorganisms involved, media, fermentation conditions, downstream processing and uses; Filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, lyophilization, spray drying; Hands on microbial fermentations for the production and estimation (qualitative and quantitative) of Enzyme: amylase or lipase activity, Organic acid (citric acid or glutamic acid), alcohol (Ethanol) and antibiotic (Penicillin) (8 lectures)

Microbial enzymes of industrial interest and enzyme immobilization: Microorganisms for industrial applications and hands on screening microorganisms for casein hydrolysis; starch hydrolysis; cellulose hydrolysis. Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase). (6 lectures)

UNIT-III: Microbes and quality of environment: Distribution of microbes in air; Isolation of microorganisms from soil, air and water. (4 lectures)

UNIT-IV: Microbial flora of water: Water pollution, role of microbes in sewage and domestic waste water treatment systems. Determination of BOD, COD, TDS and TOC of water samples; Microorganisms as indicators of water quality, check coliform and fecal coliform in water samples. (6 lectures)

UNIT-V: Microbes in agriculture and remediation of contaminated soils: Biological fixation; Mycorrhizae; Bioremediation of contaminated soils. Isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots. (6 lectures)

PRACTICAL

1. Principles and functioning of instruments in microbiology laboratory
2. Hands on sterilization techniques and preparation of culture media.

Suggested Readings:

1. Pelzar, M.J. Jr., Chen E.C. S., Krieg, N.R. (2010). Microbiology: An application based approach. Tata McGraw Hill Education Pvt. Ltd., Delhi.
2. Tortora, G.J., Funke, B.R., Case. C.L. (2007). Microbiology. Pearson Benjamin Cummings, San Francisco, U.S.A. 9th edition.

GENERIC ELECTIVE COURSES

GE-1A: INDUSTRIAL & ENVIRONMENTAL MICROBIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Microbes : Viruses Discovery, general structure, replication (general account), DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance; Bacteria Discovery, General characteristics and cell structure; Reproduction vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance. (8 lectures)

UNIT-II: Algae: General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae; Morphology and lifecycles of the following: Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Fucus, Polysiphonia. Economic importance of algae. (10 lectures)

Fungi : Introduction- General characteristics, ecology and significance, range of thallus organization, cell wall composition, nutrition, reproduction and classification; True Fungi- General characteristics, ecology and significance, life cycle of Rhizopus (Zygomycota) Penicillium, Alternaria (Ascomycota), Puccinia, Agaricus (Basidiomycota); Symbiotic Associations-Lichens: (6 lectures)

UNIT-III: Introduction to Archegoniate : Unifying features of archegoniates, Transition to land habit, Alternation of generations. (2 lectures)

Bryophytes : General characteristics, adaptations to land habit, Classification, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of Marchantia and Funaria. (Developmental details not to be included). Ecology and economic importance of bryophytes with special mention of Sphagnum. (6 lectures)

UNIT-IV: Pteridophytes : General characteristics, classification, Early land plants (Cooksonia and Rhynia). Classification (up to family), morphology, anatomy and reproduction of Selaginella, Equisetum and Pteris. (Developmental details not to be included). Heterospory and seed habit, stellar evolution. Ecological and economical importance of Pteridophytes. (5 lectures)

UNIT-V: Gymnosperms: General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of Cycas and Pinus. (Developmental details not to be included). Ecological and economical importance. (6 lectures)

PRACTICAL

1. EMs/Models of viruses T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.
2. Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation; Structure of root nodule.

3. Gram staining.
4. Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Oedogonium, Vaucheria, Fucus* and Polysiphonia through temporary preparations and permanent slides. (*: Fucus - Specimen and permanent slides)
5. Rhizopus and Penicillium: Asexual stage from temporary mounts and sexual structures through permanent slides.
6. Alternaria: Specimens/photographs and tease mounts.
7. Puccinia: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores on Wheat and permanent slides of both the hosts.
8. Agaricus: Specimens of button stage and full grown mushroom; Sectioning of gills of Agaricus.
9. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose)
10. Mycorrhiza: ecto mycorrhiza and endo mycorrhiza (Photographs)
11. Marchantia- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides).
12. Funaria- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.
13. Selaginella- morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m. microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide).
14. Equisetum- morphology, t.s. internode, l.s. strobilus, t.s. strobilus, w.m. sporangiophore, w.m. spores (wet and dry) (temporary slides); t.s. rhizome (permanent slide).
15. Pteris- morphology, t.s. rachis, v.s. sporophyll, w.m. sporangium, w.m. spores (temporary slides), t.s. rhizome, w.m. prothallus with sex organs and young sporophyte (permanent slide).
16. Cycas- morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, t.s. rachis, v.s. leaflet, v.s. microsporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide).
17. Pinus- morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m. dwarf shoot, t.s. needle, t.s. stem, , l.s./t.s. male cone, w.m. microsporophyll, w.m. microspores (temporary slides), l.s. female cone, t.l.s. & r.l.s. stem (permanent slide).

Suggested Readings:

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.

2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3. . Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
4. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.
5. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.
6. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
7. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
8. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.

GE-1B: PLANT ECOLOGY & TAXONOMY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Introduction: (2 lectures)

Ecological factors : Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes (6 lectures)

Plant communities : Characters; Ecotone and edge effect; Succession; Processes and types (3 lectures)

UNIT-II: Ecosystem : Structure; Biotic and abiotic components, energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous (6 lectures)

Phytogeography : Principle biogeographical zones; Endemism (2 lectures)

UNIT-III: Introduction to plant taxonomy: Identification, Classification, Nomenclature. (2 lectures)

Identification : Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access (3 lectures)

UNIT-IV: Taxonomic evidences from palynology, cytology, phytochemistry and molecular Data: (4 lectures)

Taxonomic hierarchy: Ranks, categories and taxonomic groups 2 lectures Biometrics, numerical taxonomy and cladistics: Characters; variations; OTUs, character weighting and coding; cluster analysis; phenograms, cladograms (definitions and differences). (5 lectures)

UNIT-V: Botanical nomenclature: Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations. (4 lectures)

Classification: Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series). (5 lectures)

PRACTICAL

1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.
2. Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.
3. Comparison of bulk density, porosity and rate of infiltration of water in soil of three habitats.
4. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each).
(b) Study of biotic interactions of the following: Stem parasite (*Cuscuta*), Root parasite (*Orobanch*e), Epiphytes, Predation (Insectivorous plants).
5. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)
6. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaers frequency distribution law
7. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hookers system of classification): Brassicaceae - Brassica, Alyssum / Iberis; Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax; Solanaceae - Solanum nigrum, Withania; Lamiaceae - Salvia, Ocimum; Liliaceae - Asphodelus / Lilium / Allium.
8. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).

Suggested Readings:

1. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition.
2. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
3. Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, San Diego, CA, U.S.A.

4. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.

GE-2: PLANT PHYSIOLOGY & METABOLISM

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Introduction: (2 lectures)

Meristematic and permanent tissues : Root and shoot apical meristems; Simple and complex tissues (5 lectures)

Organs : Structure of dicot and monocot root stem and leaf. (3 lectures)

UNIT-II: Secondary Growth : Vascular cambium structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood) (6 lectures)(

Adaptive and protective systems: Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes. (5 lectures)

UNIT-III: Structural organization of flower : Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac. (5 lectures)

Pollination and fertilization : Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms. (6 lectures)

UNIT-IV: Embryo and endosperm : Endosperm types, structure and functions; Dicot and monocot embryo; Embryo endosperm relationship (5 lectures)

UNIT-V: Apomixis and polyembryony : Definition, types and Practical applications. (5 lectures)

PRACTICAL

1. Study of meristems through permanent slides and photographs.
2. Tissues (parenchyma, collenchyma and sclerenchyma); Macerated xylary elements, Phloem (Permanent slides, photographs)
3. Stem: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).
4. Root: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).
5. Leaf: Dicot and Monocot leaf (only Permanent slides).
6. Adaptive anatomy: Xerophyte (Nerium leaf); Hydrophyte (Hydrilla stem).
7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).

8. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.
9. Female gametophyte: Polygonum (monosporic) type of Embryo sac Development (Permanent slides/photographs).
10. Ultrastructure of mature egg apparatus cells through electron micrographs.
11. Pollination types and seed dispersal mechanisms (including appendages, aril, caruncle) (Photographs and specimens).
12. Dissection of embryo/endosperm from developing seeds.
13. Calculation of percentage of germinated pollen in a given medium.

Suggested Readings:

1. Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
2. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.

GE-4A: ECONOMIC PLANT ANATOMY & EMBRYOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Plant-water relations: Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation. (4 lectures)
Mineral nutrition: Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps. (4 lectures)

Translocation in phloem.: Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading (4 lectures)

UNIT-II: Photosynthesis: Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation; Photorespiration. (8 lectures)

UNIT-III: Respiration : Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Glyoxylate, Oxidative Pentose Phosphate Pathway. (4 lectures)

UNIT-IV: Enzymes: Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition. (3 lectures)

Nitrogen metabolism : Biological nitrogen fixation; Nitrate and ammonia assimilation. (3 lectures)

UNIT-V: Plant growth regulators :Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene. (5 lectures)

Plant response to light and temperature: Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Vernalization. (5 lectures)

PRACTICAL

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. To study the effect of two environmental factors (light and wind) on transpiration by excised twig.
3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.
4. Demonstration of Hill reaction.
5. Demonstrate the activity of catalase and study the effect of pH and enzyme concentration.
6. To study the effect of light intensity and bicarbonate concentration on O_2 evolution in photosynthesis.
7. Comparison of the rate of respiration in any two parts of a plant.
8. Separation of amino acids by paper chromatography.

Demonstration experiments (any four): (a) Bolting.

(b) Effect of auxins on rooting.

(c) Suction due to transpiration.

(d) R.Q. (e) Respiration in roots.

Suggested Readings:

1. Taiz, L., Zeiger, E., Mller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
2. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
3. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.

GE-4B: BOTANY & PLANT BIO-TECHNOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Origin of Cultivated Plants: Concept of centres of origin, their importance with reference to Vavilov's work. (3 lectures)

UNIT-II: Cereals: Wheat -Origin, morphology, uses 3 lectures Legumes : General account with special reference to Gram and soybean (4 lectures)

UNIT-III: Spices : General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses) (4 lectures)
Beverages: Tea (morphology, processing, uses) (3 lectures)

UNIT-IV: Oils and Fats : General description with special reference to groundnut 3 lectures Fibre Yielding Plants: General description with special reference to Cotton (Botanical name, family, part used, morphology and uses) (3 lectures)

UNIT-V: Introduction to biotechnology (2 lectures)

Plant tissue culture: Micropropagation ; haploid production through androgenesis and gynogenesis; brief account of embryo and endosperm culture with their applications, Gene cloning by recombinant DNA technology, transgenic plants. (6 lectures)

Molecular Techniques: Blotting techniques: Northern, Southern and Western Blotting, DNA Fingerprinting; Molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR and Reverse Transcriptase-PCR. Hybridoma and monoclonal antibodies, ELISA and Immunodetection. Molecular diagnosis of human disease, Human gene Therapy. (9 lectures)

PRACTICAL

1. Study of economically important plants : Wheat, Gram, Soybean, Black pepper, Clove Tea, Cotton, Groundnut through specimens, sections and microchemical tests
2. Familiarization with basic equipments in tissue culture.
3. Study through photographs: Anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation.
4. Study of molecular techniques: PCR, Blotting techniques, AGE and PAGE.

Suggested Readings:

1. Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
2. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
3. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.

GE-V: ENVIRONMENTAL BIO-TECHNOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70
PRACTICAL (Each class 2 hrs.): Marks-30
Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Environment - basic concepts and issues, global environmental problems ozone depletion, UV-B, greenhouse effect and acid rain due to anthropogenic activities, their impact and biotechnological approaches for management. (4 lectures)

An overview of atmosphere, hydrosphere, lithosphere and anthrosphere - environmental problems. Environmental pollution - types of pollution, sources of pollution, measurement of pollution, Bio-concentration, bio/geomagnification. (4 lectures)

UNIT-II: Microbiology of waste water treatment, aerobic process - activated sludge, oxidation ponds, trickling filter, towers, rotating discs, rotating drums, oxidation ditch. Anaerobic process - anaerobic digestion, anaerobic filters, up-flow anaerobic sludge blanket reactors. Treatment schemes for waste waters of dairy, distillery, tannery, sugar and antibiotic industries. (6 lectures)

UNIT-III: Xenobiotic compounds - organic (chlorinated hydrocarbons, substituted simple aromatic compounds, poly-aromatic hydrocarbons, pesticides, surfactants) and inorganic (metals, radionuclides, phosphates, nitrates). Bio-remediation of xenobiotics in environment - ecological consideration, decay behavior and degradative plasmids, molecular techniques in bio-remediation. (6 lectures)

Role of immobilized cells/enzymes in treatment of toxic compounds. Bio-pesticides, bio-reactors, bio-leaching, bio-mining, bio-sensors, bio-techniques for air pollution abatement and odour control. (4 lectures)

UNIT-IV: Sustainable Development: Economics and Environment: Economic growth, Gross National Productivity and the quality of life, Tragedy of Commons, Economics of Pollution control, Cost-benefit and cost effectiveness analysis, WTO and Environment, Corporate Social Responsibility, Environmental awareness and Education; Environmental Ethics. (6 lectures)

UNIT-V: International Legislations, Policies for Environmental Protection: Stockholm Conference (1972) and its declaration, WCED (1983) and Brundtland Report (1987), Rio Earth Summit-UNCED (1992) and its declaration, Montreal Protocol - 1987, Basel Convention (1989), Kyoto Protocol-1997, Ramsar Convention 1971. (3 lectures)

National Legislations, Policies for Pollution Management: Salient features of Wild life protection act 1972, Water Pollution (Prevention and Control) Act- 1974, Forest conservation act 1980, Air Pollution (Prevention and Control) Act-1981, National Environmental Policy-2006, Central and State Pollution Control Boards: Constitution and power. (3 lectures)

Public Participation for Environmental Protection: Environmental movement and peoples participation with special references to Gandhamardan, Chilika and Narmada Bachao Andolan, Chipko and Silent valley Movement; Women and Environmental Protection, Role of NGO in bringing environmental awareness and education in the society. (4 lectures)

PRACTICAL

1. Water/Soil analysis-DO, salinity, pH, chloride, total hardness, alkalinity, acidity, nitrate, cal-

cium, Magnesium and phosphorus.

2. Gravimetric analysis-Total solid, dissolved solid, suspended solid in an effluent
3. Microbial assessment of air (open plate and air sample) and water.

Suggested Readings:

1. Waste water engineering-treatment, disposal and reuse, Metcalf and Eddy Inc., Tata McGraw Hill, New Delhi.
2. Environmental Chemistry, AK. De, Wiley Eastern Ltd, New Delhi.
3. Introduction to Bio-deterioration, D.Allsopp and K.J. Seal, ELBS / Edward Arnold.
4. Bioremediation, Baaker, KH and Herson D.S., 1994. Mc.GrawHill Inc, NewYork.
5. Industrial and Environmental Biotechnology - Nuzhat Ahmed, Fouad M. Qureshi and Obaid Y. Khan, 2006. Horizon Press.
6. Environmental Molecular Biology, Paul. A, Rochelle, 2001.Horizon Press.
7. Environmental Protection and Laws by Jadhav and Bhosale, V.M.Himalaya publ. House 13. Bio-diversity Assessment and Conservation by PC Trivedi, Agrobios publ.

SKILL ENHANCEMENT COURSES (SEC)

SEC-I: BIO-FERTILIZERS

(Credits-2: Lectures: 30)

THEORY (Each class 1 hr.)-Marks: 50.

Unit-I: General account about the microbes used as biofertilizer Rhizobium isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis. (4 lectures)

Unit-II: Azospirillum: isolation and mass multiplication carrier based inoculant, associative effect of different microorganisms. Azotobacter: classification, characteristics crop response to Azotobacter inoculum, maintenance and mass multiplication. (8 lectures)

Unit-III: Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation. (4 lectures)

Unit-IV: Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield colonization of VAM isolation and inoculum production of VAM, and its influence on growth and yield of crop plants. (8 lectures)

Unit-V: Organic farming Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes bio-compost making methods, types and method of vermicomposting field Application. (6 lectures)

Suggested Readings:

1. Dubey, R.C., 2005 A Text book of Biotechnology S.Chand & Co, New Delhi.
2. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
3. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay, Publication, New Delhi.
4. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.
5. Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi.
6. Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic, Farming Akta Prakashan, Nadiad

SEC-II: HERBAL TECHNOLOGY

(Credits-2: Lectures: 30)

THEORY (Each class 1 hr.)-Marks: 50.

Unit-I: Herbal medicines: history and scope - definition of medical terms - role of medicinal plants in Siddha systems of medicine; cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants. (6 lectures)

Unit-II: Pharmacognosy - systematic position and medicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Goose berry and Ashoka. (6 lectures)

Unit-III: Phytochemistry - active principles and methods of their testing - identification and utilization of the medicinal herbs; Catharanthus roseus (cardiotonic), Withania somnifera (drugs acting on nervous system), Clerodendron phlomoides (anti-rheumatic) and Centella asiatica (memory booster). (6 lectures)

Unit-IV: Analytical pharmacognosy: Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds) (8 lectures)

Unit-V: Medicinal plant banks micro propagation of important species (Withania somnifera, neem and tulsi- Herbal foods-future of pharmacognosy) (4 lectures)

Suggested Readings:

1. Glossary of Indian medicinal plants, R.N.Chopra, S.L.Nayar and I.C.Chopra, 1956. C.S.I.R, New Delhi.
2. The indigenous drugs of India, Kanny, Lall, Dey and Raj Bahadur, 1984. International Book Distributors.
3. Herbal plants and Drugs Agnes Arber, 1999. Mangal Deep Publications.
4. Ayurvedic drugs and their plant source. V.V. Sivarajan and Balachandran Indra 1994. Oxford IBH publishing Co.
5. Ayurveda and Aromatherapy. Miller, Light and Miller, Bryan, 1998. Banarsidass, Delhi.
6. Principles of Ayurveda, Anne Green, 2000. Thomsons, London.
7. Pharmacognosy, Dr.C.K.Kokate et al. 1999. Nirali Prakashan.

SEC-III: NURSERY & GARDENING

(Credits-2: Lectures: 30)

THEORY (Each class 1 hr.)-Marks: 50.

Unit-I: Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants. (4 lectures)

Unit-II: Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion Seed production technology - seed testing and certification. (6 lectures)

Unit-III: Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants green house - mist chamber, shed root, shade house and glass house. (6 lectures)

Unit-IV: Gardening: definition, objectives and scope - different types of gardening landscape and home gardening - parks and its components - plant materials and design computer applications

in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting. (8 lectures)

Unit-V: Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures. (6 lectures)

Suggested Readings:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

SEC-IV: FLORICULTURE

(Credits-2: Lectures: 30)

THEORY (Each class 1 hr.)-Marks: 50.

Unit-I: Introduction: History of gardening; Importance and scope of floriculture and landscape gardening. (2 lectures)

Unit-II: Nursery Management and Routine Garden Operations: Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators. (8 lectures)

Unit-III: Ornamental Plants: Flowering annuals; Herbaceous perennials; Climbing vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai. (4 lectures)

Unit-IV: Principles of Garden Designs: English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water garden. Some Famous gardens of India (4 lectures)

Landscaping Places of Public Importance: Landscaping highways and Educational institutions. (4 lectures)

Unit-V: Commercial Floriculture: Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold, Rose, Liliun, Orchids). (6 lectures)

Diseases and Pests of Ornamental Plants. (2 lectures)

Suggested Readings:

Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers.

SEC-V: MEDICAL BOTANY

(Credits-2: Lectures: 30)

THEORY (Each class 1 hr.)-Marks: 50.

Unit-I: History, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences; Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments. (5 lectures)

Unit-II: Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations. (5 lectures)

Unit-III: Conservation of endangered and endemic medicinal plants. Definition: endemic and endangered medicinal plants, Red list criteria; In situ conservation: Biosphere reserves, sacred groves, National Parks; Ex situ conservation: Botanic Gardens, Ethno medicinal plant Gardens. (6 lectures)

Unit-IV: Propagation of Medicinal Plants: Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding. (6 lectures)

Unit-V: Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany. Folk medicines of ethnobotany, ethno medicine, ethno ecology, ethnic communities of India. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases. (8 lectures)

Suggested Readings:

1. Trivedi P C, 2006. Medicinal Plants: Ethno botanical Approach, Agro-bios, India.
2. Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd Edn. Agro-bios, India.

SEC-VI: PLANT DIVERSITY & HUMAN WELFARE

(Credits-2: Lectures: 30)

THEORY (Each class 1 hr.)-Marks: 50.

Unit-I: Plant diversity and its scope- Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agro-bio-diversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Precautionary principle, Methodologies for valuation, Uses of plants, Uses of microbes. (6 lectures)

Unit-II: Loss of Bio-diversity: Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro-bio-diversity, Projected scenario for biodiversity loss, (6 lectures)

Unit-III: Management of Plant Bio-diversity: Organizations associated with bio-diversity management-Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Bio-diversity legislation and conservations, Bio-diversity information management and communication. (6 lectures)

Unit-IV: Conservation of Bio-diversity: Conservation of genetic diversity, species diversity and ecosystem diversity, In situ and ex situ conservation, Social approaches to conservation, Bio-diversity awareness programmes, Sustainable development. (6 lectures)

Unit-V: Role of plants in relation to Human Welfare: (a) Importance of forestry their utilization and commercial aspects (b) Avenue trees. (c) Ornamental plants of India. (d) Alcoholic beverages through ages. Fruits and nuts: Important fruit crops their commercial importance. Wood and its uses. (6 lectures)

Suggested Readings:

Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi

SEC-VII: ETHNOBOTANY

(Credits-2: Lectures: 30)

THEORY (Each class 1 hr.)-Marks: 50.

Unit-I: Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context; Major and minor ethnic groups or Tribals of India, and their life styles. Plants used by the tribals: (a) Food plants. (b) intoxicants and beverages c) Resins and oils and miscellaneous uses. (6 lectures)

Unit-II: Methodology of Ethnobotanical studies: (a) Field work. (b) Herbarium. (c) Ancient Literature. (d) Archaeological findings. (e) Temples and sacred places. (6 lectures)

Unit-III: Role of ethnobotany in modern Medicine Medico-ethnobotanical sources in India;Significance of the following plants in ethno botanical practices (along with their habitat and morphology) (a) *Azadirachta indica*. (b) *Ocimum sanctum*. (c) *Vitex negundo*. (d) *Gloriosa superba* e) *Tribulus terrestris*. (f) *Pongamia pinnata*. (g) *Cassia auriculata*. (h) *Indigofera tinctoria*. Role of ethnobotany in modern medicine with special example *Rauvolfia serpentina*, *Trichopus zeylanicus*, *Artemisia*, *Withania*. (8 lectures)

Unit-IV: Role of ethnic groups in conservation of plant genetic resources.Endangered taxa and forest management (participatory forest management). (4 lectures)

Unit-V: Ethnobotany and legal aspects Ethnobotany as a tool to protect interests of ethnic groups. Sharing of wealth concept with few examples from India. Biopiracy, Intellectual Property Rights and Traditional Knowledge. (6 lectures)

Suggested Readings:

1. S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
2. S.K. Jain (ed.) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi 1981
3. Lone et al,. Palaeoethnobotany

4. S.K. Jain (ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, Lucknow, India.
5. S.K. Jain, 1990. Contributions of Indian ethnobotany. Scientific publishers, Jodhpur.
6. Colton C.M. 1997. Ethnobotany Principles and applications. John Wiley and sons Chichester
7. Rama Rao, N and A.N. Henry (1996). The Ethnobotany of Eastern Ghats in Andhra Pradesh, India. Botanical Survey of India. Howrah.
8. Rajiv K. Sinha Ethnobotany The Renaissance of Traditional Herbal Medicine INA SHREE Publishers, Jaipur-1996
9. Faulks, P.J. 1958. An introduction to Ethnobotany, Moredale pub. Ltd.

SEC-VIII: MUSHROOM CULTURE TECHNOLOGY

(Credits-2: Lectures: 30)

THEORY (Each class 1 hr.)-Marks: 50.

Unit-I: Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea*, *Pleurotus citrinopileatus*, *Agaricus bisporus*. (5 lectures)

Unit-II: Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. (6 Lectures)

Unit-III: Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production. (6 lectures)

Unit-IV: Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins. (8 lectures)

Unit-V: Food Preparation: Types of foods prepared from mushroom. Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value. (5 lectures)

Suggested Readings:

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.

4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

SEC-IX: INTELLECTUAL PROPERTY RIGHTS

(Credits-2: Lectures: 30)

THEORY (Each class 1 hr.)-Marks: 50.

Unit-I: Introduction to intellectual property right (IPR) : Concept and kinds. Economic importance. IPR in India and world: Genesis and scope, some important examples. IPR and WTO (TRIPS, WIPO). (2 lectures)

Patents: Objectives, Rights, Patent Act 1970 and its amendments. Procedure of obtaining patents, Working of patents. Infringement. (3 Lectures)

Copyrights: Introduction, Works protected under copyright law, Rights, Transfer of Copyright, Infringement. (3 Lectures)

Unit-II: Trademarks: Objectives, Types, Rights, Protection of goodwill, Infringement, Passing off, Defences, Domain name. (3 Lectures)

Geographical Indications : Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position. (3 Lectures)

Unit-III: Protection of Traditional Knowledge : Objective, Concept of Traditional Knowledge, Holders, Issues concerning, Bio-Propecting and Bio-Piracy, Alternative ways, Protectability, need for a Sui-Generis regime, Traditional Knowledge on the International Arena, at WTO, at National level, Traditional Knowledge Digital Library. (4 Lectures)

Unit-IV: Protection of Plant Varieties : Plant Varieties Protection-Objectives, Justification, International Position, Plant varieties protection in India. Rights of farmers, Breeders and Researchers. National gene bank, Benefit sharing. Protection of Plant Varieties and Farmers Rights Act, 2001. (2 Lectures)

Unit-V: Industrial Designs: Objectives, Rights, Assignments, Infringements, Defences of Design Infringement (2 Lectures)

BOTANY(PASS)

SEMESTER-I

C-1: MICROBIOLOGY & PHYCOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Introduction to microbial world, microbial nutrition, growth and metabolism. (2 lectures)

Viruses:-Discovery,physiochemical and biological characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication (general account), DNA virus (T-phage), lytic and lysogenic cycle; RNA virus (TMV). Economic importance of viruses with reference to vaccine production. (5 lectures)

UnitII: Bacteria: - Discovery, general characteristics, types-archaebacteria, eubacteria), cell structure, reproduction-vegetative, asexual and recombination (conjugation, transformation and transduction). Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine). (5 lectures)

Unit-III: Algae:- General characteristics; Ecology and distribution; range of thallus organization; Cell structure and components; cell wall, pigment system, reserve food (of only groups represented in the syllabus), flagella; and methods of reproduction. (6 lectures)

Unit-IV: Cyanophyta:- Ecology and occurrence, range of thallus organization, cell structure, heterocyst, reproduction.economic importance; role in biotechnology. (5 lectures)

Chlorophyta:- General characteristics, occurrence, cell structure and reproduction. Morphology and life-cycles of Chlamydomonas, Volvox, Oedogonium. (5 lectures)

Unit-V: Charophyta:- General characteristics; occurrence, morphology, cell structure and life-cycle of Chara. (2 lectures)

Xanthophyta:- General characteristics; Occurrence, morphology and lifecycle of Vaucheria. (3 lectures)

Phaeophyta:- Characteristics, occurrence, cell structure and reproduction. Morphology and life-cycles of Ectocarpus and Fucus. (3 lectures)

Rhodophyta:- General characteristics, occurrence, cell structure and reproduction. Morphology and life-cycle of Polysiphonia. 4 lectures

PRACTICAL

Microbiology:

1. Electron micrographs/Models of viruses T-Phage and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle.

2. Types of Bacteria to be observed from temporary/permanent slides/photographs. Electron micrographs of bacteria, binary fission, endospore, conjugation, root Nodule.
3. Gram staining.
4. Endospore staining with malachite green using the (endospores taken from soil bacteria).

Phycology:

5. Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Volvox, Oedogonium, Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus and Polysiphonia, Prochloron through electron micrographs, temporary preparations and permanent slides.

Suggested Readings:

1. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
2. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.
3. Sahoo, D. (2000). Farming the ocean: seaweeds cultivation and utilization. Aravali International, New Delhi.
4. Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson R.B. (2008). Biology, Pearson Benjamin Cummings, USA. 8th edition.
5. Pelczar, M.J. (2001) Microbiology, 5th edition, Tata McGraw-Hill Co, New Delhi.

C-2: BIOMOLECULES & CELL BIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Biomolecules:- Types and significance of chemical bonds; Structure and properties of water; pH and buffers. (2 lectures)

Carbohydrates: Nomenclature and classification; Role of monosaccharides (glucose, fructose, sugar alcohols mannitol and sorbitol); Disaccharides (sucrose, maltose, lactose), Oligosaccharides and polysaccharides. (3 lectures)

Lipids: Definition and major classes of storage and structural lipids. Storage lipids. Fatty acids structure and functions. Essential fatty acids. Triacyl glycerols structure. (2 lectures)

Proteins: Structure of amino acids; Peptide bonds; Levels of protein structure-primary, secondary, tertiary and quaternary. (2 lectures)

Nucleic acids: Structure of nitrogenous bases; Structure and function of nucleotides; Types of nucleic acids; Structure of B, Z types of DNA; Types of RNA. (4 lectures)

Unit-II: Bioenergetics: Laws of thermodynamics, concept of free energy, endergonic and exergonic reactions, coupled reactions, redox reactions. ATP: structure, its role as a energy currency molecule. (3 lectures)

Enzymes: Structure of enzyme: holoenzyme, apoenzyme, cofactors, coenzymes and prosthetic group; Classification of enzymes; Features of active site, substrate specificity, mechanism of action (activation energy, lock and key hypothesis, induced - fit theory), Michaelis Menten equation, enzyme inhibition and factors affecting enzyme activity. (4 lectures)

Unit-III: The cell: Cell as a unit of structure and function; Characteristics of prokaryotic and eukaryotic cells. (2 lectures)

Cell wall and plasma membrane: Chemistry, structure and function of Plant Cell Wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport Passive, active and facilitated transport, endocytosis and exocytosis. (3 lectures)

Unit-IV: Cell organelles: Nucleus; Structure-nuclear envelope, nuclear pore complex, nuclear lamina, nucleolus. 3 lectures Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament. (2 lectures)

Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. (2 lectures)

Endoplasmic Reticulum, Golgi Apparatus, Lysosomes (2 lectures)

Unit-V: Cell division: Eukaryotic cell cycle, different stages of mitosis and meiosis. Cell cycle, Regulation of cell cycle. (6 lectures)

PRACTICAL

1. Qualitative tests for carbohydrates, reducing sugars, non-reducing sugars, lipids and proteins.
2. Study of plant cell structure with the help of epidermal peel mount of Onion/Rhoeo/Crinum.
3. Demonstration of the phenomenon of protoplasmic streaming in Hydrilla leaf.
4. Measurement of cell size by the technique of micrometry.
5. Counting the cells per unit volume with the help of haemocytometer. (Yeast/pollen grains).
6. Study of cell and its organelles with the help of electron micrographs.
7. Study the phenomenon of plasmolysis and deplasmolysis.
8. Study different stages of mitosis and meiosis using aceto carmine and aceto orcin method.

Suggested Readings:

1. Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning
2. Campbell, PN and Smith AD (2011) Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone.
3. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman
4. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company

5. Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.
6. Karp, G. (2010). Cell Biology, John Wiley & Sons, U.S.A. 6th edition.
7. Hardin, J., Becker, G., Skliensmith, L.J. (2012). Beckers World of the Cell, Pearson Education Inc. U.S.A. 8th edition.
8. Cooper, G.M. and Hausman, R.E. 2009 The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
9. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009 The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

C-3: MYCOLOGY & PHYTOPATHOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Introduction to true fungi: Definition, General characteristics; Affinities with plants and animals; Thallus organization; Cellwall composition; Nutrition; Classification. Chytridiomycetes: General account (5 lectures)

Zygomycota: General characteristics; Ecology; Thallus organisation; Life cycle with reference to Rhizopus. (4 lectures)

Ascomycota: General characteristics (asexual and sexual fruiting bodies); Ecology; Life cycle, Heterokaryosis and parasexuality; life cycle and classification with reference to Saccharomyces, Aspergillus, Penicillium, Alternaria and Neurospora, Peziza. (5 lectures)

Unit-II: Basidiomycota: General characteristics; Ecology; Life cycle and Classification with reference to black stem rust on wheat Puccinia (Physiological Specialization), loose and covered smut (symptoms only), Agaricus; Bioluminescence, Fairy Rings and Mushroom Cultivation. (8 lectures)

Oomycota: General characteristic; Ecology; Life cycle and classification with reference to Phytophthora, Albugo. (4 lectures)

Unit-III: Symbiotic associations: Lichen Occurrence; General characteristics; Nature of associations of algal and fungal partners; Reproduction. (4 lectures)

Unit-IV: Applied Mycology: Role of fungi in biotechnology, Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control. (5 Lectures)

Unit-V: Phytopathology: General symptoms; Geographical distribution of diseases; etiology; symptomatology; Host- Pathogen relationships; prevention and control of plant diseases, and role of quarantine. Bacterial diseases Citrus canker and angular leaf spot disease of Cotton. Viral diseases Tobacco Mosaic viruses, vein clearing. Fungal diseases Early blight of potato, white rust of crucifers. (5 lectures)

PRACTICAL

1. Introduction to the world of fungi (Unicellular, coenocytic/septate mycelium, asocarps & basidiocarps).
2. Rhizopus: study of asexual stage from temporary mounts and sexual structures through permanent slides.
3. Aspergillus and Penicillium: study of asexual stage from temporary mounts. Study of Sexual stage from permanent slides/photographs.
4. Peziza: sectioning through ascocarp.
5. Alternaria: Specimens/photographs and temporary mounts.
6. Puccinia: Herbarium specimens of Black Stem Rust of Wheat and infected Barberryleaves; sections/mounts of spores on wheat and permanent slides of both the hosts.
7. Agaricus: Specimens of button stage and full grown mushroom; sectioning of gills of Agaricus, fairy rings and bioluminescent mushrooms to be shown.
8. Albugo: Study of symptoms of plants infected with Albugo; asexual phase study through section/temporary mounts and sexual structures through permanent slides.
9. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose) on different substrates. Study of thallus and reproductive structures (soredia and apothecium) through permanent slides. Mycorrhizae: ectomycorrhiza and endo mycorrhiza (Photographs)
10. Phytopathology: Herbarium specimens of bacterial diseases; Citrus Canker; Viral diseases: TMV, Fungal diseases: Early blight of potato, and White rust of crucifers.

Suggested Readings:

1. Agrios, G.N. 1997 Plant Pathology, 4th edition, Academic Press, U.K.
2. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley & Sons (Asia) Singapore. 4th edition.
3. Webster, J. and Weber, R. (2007). Introduction to Fungi, Cambridge University Press, Cambridge. 3rd edition.
4. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies, Macmillan Publishers India Ltd.
5. Sharma, P.D. (2011). Plant Pathology, Rastogi Publication, Meerut, India.

C-4: ARCHEGONIATE

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Introduction: Unifying features of archegoniates; Transition to land habit; Alternation of generations. (2 lectures)

Unit-II: Bryophytes: General characteristics; Adaptations to land habit; Classification; Range of thallus organization. Classification (up to family). Riccia, Marchantia, Anthoceros, Sphagnum and Funaria; Reproduction and evolutionary trends in Riccia, Marchantia, Anthoceros and Funaria (developmental stages not included). (12 lectures)

Unit-III: Pteridophytes: General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of Psilotum, Selaginella, Equisetum and Pteris. (Developmental details not to be included). Apogamy, and apospory, heterospory and seed habit, telome theory, stelar evolution. (10 lectures)

Unit-IV: Gymnosperms: General characteristics, classification (up to family), morphology, anatomy and reproduction of Cycas, Pinus, Ginkgo and Gnetum. (8 lectures)

Unit-V: Fossils: Geographical time scale, fossils and fossilization process. Morphology, anatomy and affinities of Rhynia, Calamites, Lepidodendron, Lyginopteris and Cycadeoidea. (8 lectures)

PRACTICAL

1. Riccia Morphology of thallus.
2. Marchantia- Morphology of thallus, whole mount of rhizoids & Scales, vertical section of thallus through Gemma cup, whole mount of Gemmae (all temporary slides), vertical section of Antheridiophore, Archegoniophore, longitudinal section of Sporophyte (all permanent slides).
3. Anthoceros- Morphology of thallus, dissection of sporophyte (to show stomata, spores, pseudolaters, columella) (temporary slide), vertical section of thallus (permanent slide).
4. Sphagnum- Morphology of plant, whole mount of leaf (permanent slide only).
5. Funaria- Morphology, whole mount of leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, longitudinal section of capsule and protonema.
6. Psilotum- Study of specimen, transverse section of synangium (permanent slide).
7. Selaginella- Morphology, whole mount of leaf with ligule, transverse section of stem, whole mount of strobilus, whole mount of micro sporophyll and megasporophyll (temporary slides), longitudinal section of strobilus (permanent slide).
8. Equisetum- Morphology, transverse section of internode, longitudinal section of strobilus, transverse section of strobilus, whole mount of sporangiophore, whole mount of spores (wet and dry) (temporary slide), transverse section of rhizome (permanent slide).
9. Pteris- Morphology, transverse section of rachis, vertical section of sporophyll, whole mount of sporangium, whole mount of spores (temporary slides), transverse section of rhizome, whole mount of prothallus with sex organs and young sporophyte (permanent slide).

10. Cycas- Morphology (coralloid roots, bulbil, leaf), whole mount of microsporophyll, transverse section of coralloid root, transverse section of rachis, vertical section of leaflet, vertical section of microsporophyll, whole mount of spores (temporary slides), longitudinal section of ovule, transverse section of root (permanent slide).
11. Pinus- Morphology (long and dwarf shoots, whole mount of dwarf shoot, male and female cones), transverse section of Needle, transverse section of stem, longitudinal section of transverse section of male cone, whole mount of microsporophyll, whole mount of Microspores (temporary slides), longitudinal section of female cone, tangential longitudinal section & radial longitudinal sections stem (permanent slide).
12. Gnetum- Morphology (stem, male & female cones), transverse section of stem, vertical section of ovule (permanent slide).

Suggested Readings:

1. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. Delhi, India.
2. Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
3. Parihar, N.S. (1991). An introduction to Embryophyta: Vol. I. Bryophyta. Central Book Depot. Allahabad.
4. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi.
5. Vander-Poorteri 2009 Introduction to Bryophytes. COP.

C-5: ANATOMY OF ANGIOSPERMS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Introduction, types of tissue. Tissues: Classification of tissues; Simple and complex tissues (no phylogeny); cyto-differentiation of tracheary elements and sieve elements; Pits and plasmodesmata; Wall ingrowths and transfer cells, adcrustation and incrustation, Ergastic substances. (7 Lectures)

Unit-II: Stem: Organization of shoot apex (Apical cell theory, Histogen theory, Tunica Corpus theory, continuing meristematic residue, cytohistological zonation); Types of vascular bundles; Structure of dicot and monocot stem. (5 Lectures)

Leaf: Structure of dicot and monocot leaf, Kranz anatomy. 4 Lectures Root: Organization of root apex (Apical cell theory, Histogen theory, Korper-Kappe theory); Quiescent centre; Root cap; Structure of dicot and monocot root; Endodermis, exodermis and origin of lateral root. (4 Lectures)

Unit-III: Vascular Cambium: Structure, function and seasonal activity of cambium; Secondary growth in root and stem. (4 Lectures)

Wood: Types of rays and axial parenchyma; Sapwood and heartwood; Ring and diffuse porous wood; Early and late wood; Dendrochronology. (5 Lectures)

Periderm: Development and composition of periderm and lenticels. (3 Lectures)

Unit IV: Adaptive and Protective Systems Epidermal tissue system, cuticle, epicuticular waxes, trichomes(uni-and multicellular, glandular and nonglandular, two examples of each), stomata (classification); Anatomical adaptations of xerophytes and hydrophytes. (5 Lectures)

Unit-V: Secretory System: Hydathodes, cavities, lithocysts and laticifers. (3 Lectures)

PRACTICAL

1. Study of anatomical details through permanent slides/temporary stain mounts/macerations/museum specimens with the help of suitable examples.
2. Apical meristem of root, shoot and vascular cambium.
3. Distribution and types of parenchyma, collenchyma and sclerenchyma.
4. Xylem: Tracheary elements-tracheids, vessel elements; thickenings; perforation plates; xylem fibres.
5. Wood: ring porous; diffuse porous; tyloses; heart- and sapwood.
6. Phloem: Sieve tubes-sieve plates; companion cells; phloem fibres.
7. Epidermal system: cell types, stomata types; trichomes: non-glandular and glandular.
8. Root: monocot, dicot, secondary growth.
9. Stem: monocot, dicot - primary and secondary growth; periderm; lenticels.
10. Leaf: isobilateral, dorsiventral, C4 leaves (Kranz anatomy).
11. Adaptive Anatomy: xerophytes, hydrophytes.

Suggested Readings:

1. Dickison, W.C. (2000). Integrative Plant Anatomy. Harcourt Academic Press, USA.
2. Fahn, A. (1974). Plant Anatomy. Pergmon Press, USA.
3. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.
4. Esau, K. (1977). Anatomy of Seed Plants. John Wiley & Sons, Inc., Delhi.

C-6: ECONOMIC BOTANY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Origin of Cultivated Plants: Concept of Centres of Origin, their importance with reference to Vavilovs work. Examples of major plant introductions; Crop domestication and loss of genetic diversity. (3 lectures)

Unit-II: Cereals : Wheat and Rice (origin, morphology, processing & uses). (3 lectures) Legumes: General account, importance to man and ecosystem. (3 lectures)

Sugars & Starches: Morphology and processing of sugarcane, products and by-products of sugarcane industry. Potato morphology, propagation & uses. (3 lectures)

Unit-III: Spices: Listing of important spices, their family and part used, economic importance with special reference to fennel, saffron, clove and black pepper (4 lectures)

Beverages: Tea, Coffee (morphology, processing & uses) 4 lectures Drug-yielding plants: Therapeutic and habit-forming drugs with special reference to Cinchona, Digitalis, Papaver and Cannabis. (4 lectures)

Tobacco: Tobacco (Morphology, processing, uses and health hazards) (2 lectures)

Unit-IV: Oils & Fats: General description, classification, extraction, their uses and health implications groundnut, coconut, linseed and Brassica and Coconut (Botanical name, family & uses) (4 lectures)

Essential Oils: General account, extraction methods, comparison with fatty oils & their uses. (4 lectures)

Unit-V: Natural Rubber: Para-rubber: tapping, processing and uses. (2 lectures)

Timber plants: General account with special reference to teak and pine. (2 Lectures)

Fibres: Classification based on the origin of fibres, Cotton and Jute (morphology, extraction and uses). (2 lectures)

PRACTICAL

1. Cereals: Rice (habit sketch, study of paddy and grain, starch grains, micro-chemical tests).
2. Legumes: Soya bean, Groundnut, (habit, fruit, seed structure, micro-chemical tests).
3. Sugars & Starches: Sugarcane (habit sketch; cane juice- micro-chemical tests), Potato(habit sketch, tuber morphology, T.S. tuber to show localization of starch grains, w.m. starch grains, micro-chemical tests).
4. Spices: Black pepper, Fennel and Clove (habit and sections).
5. Beverages: Tea (plant specimen, tea leaves), Coffee (plant specimen, beans).
6. Oils & Fats: Coconut- T.S. nut, Mustard plant specimen, seeds; tests for fats in crushed seeds.

7. Essential oil-yielding plants: Habit sketch of Rosa, Vetiveria, Santalum and Eucalyptus (specimens/photographs).
8. Rubber: specimen, photograph/model of tapping, samples of rubber products.
9. Drug-yielding plants: Specimens of Digitalis, Papaver and Cannabis.
10. Tobacco: specimen and products of Tobacco. 11. Woods: Tectona, Pinus: Specimen, Section of young stem. 12. Fibre-yielding plants: Cotton (specimen, whole mount of seed to show lint and fuzz; whole mount of fibre and test for cellulose), Jute (specimen, transverse section of stem, test for lignin on transverse section of stem and fibre).

Suggested Readings:

1. Kochhar, S.L. (2012). Economic Botany in Tropics, MacMillan & Co. New Delhi, India.
2. Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.
3. Chrispeels, M.J. and Sadava, D.E. (2003). Plants, Genes and Agriculture. Jones & Bartlett Publishers.

C-7: GENETICS & PLANT BIO-TECHNOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Mendelian genetics and its extension Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; Probability and pedigree analysis; Incomplete dominance and codominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy. (4 lectures)

The Structures of DNA and RNA / Genetic Material: DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation; Organization of DNA- Prokaryotes, Viruses, Eukaryotes. (6 lectures)

Unit-II: The replication of DNA: Chemistry of DNA synthesis (Kornbergs discovery); General principles bidirectional, semi-conservative and semi discontinuous replication (4 lectures)

Central dogma and genetic code: Key experiments establishing-The Central Dogma, Genetic code. Transcription in prokaryotes; Transcription in eukaryotes. (4 lectures)

Translation (Prokaryotes and eukaryotes): Ribosome structure and assembly, mRNA; aminoacyl tRNA synthetases; Various steps in protein synthesis. (4 lectures)

Unit-III: Linkage, crossing over and chromosome mapping: Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, two factor and three factor crosses; Numerical based on gene mapping; Sex Linkage. (6 lectures)

Unit-IV: Variation in chromosome number and structure: Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy (8 lectures)

Gene mutations: Types of mutations; Molecular basis of Mutations; Mutagens physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CIB method. (6 lectures)

Unit-V: Fine structure of gene: Classical vs molecular concepts of gene; Cis-Trans complementation test for functional allelism; Structure of Phage T4, rII Locus. (6 lectures)

Plant Tissue Culture: Historical perspective; Aseptic tissue culture techniques, Composition of media; Nutrient and hormone requirements (role of vitamins and hormones). (6 lectures)

Totipotency; Organogenesis; Embryogenesis (somatic and zygotic); Protoplast isolation, culture and fusion; Tissue culture applications (micropropagation, androgenesis, virus elimination, secondary metabolite production, haploids, triploids and hybrids; Cryopreservation; Germplasm Conservation). (6 lectures)

PRACTICAL

1. Meiosis through temporary squash preparation.
2. Mendel's laws through seed ratios. Laboratory exercises in probability and chi-square analysis.
3. Chromosome mapping using test cross data.
4. Pedigree analysis for dominant and recessive autosomal and sex linked traits with floral chart.
5. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4).
6. Blood Typing: ABO groups & Rh factor.
7. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.
8. Photographs/Permanent Slides showing Translocation Ring, Laggard's and Inversion Bridge.

Suggested Readings:

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics, John Wiley & Sons, India. 8th edition.
2. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics, John Wiley & Sons Inc., India. 5th edition.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. Benjamin Cummings, U.S.A. 10th edition.
4. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freeman and Co., U.S.A. 10th edition.
5. Watson J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M., Losick, R. (2007). Molecular Biology of the Gene, Pearson Benjamin Cummings, CSHL Press, New York, U.S.A. 6th edition.

6. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons Inc., U.S.A. 5th edition.
7. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. Benjamin Cummings. U.S.A. 9th edition.
8. Russell, P. J. (2010). iGenetics- A Molecular Approach. Benjamin Cummings, U.S.A. 3rd edition.

C-8: PLANT ECOLOGY & PHYTOGEOGRAPHY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Introduction Concept of ecology, Autoecology, Synecology, system ecology, Levels of organization. Inter-relationships between the living world and the environment, the components of environment. (2 lectures)

Unit-II: Soil: Importance; Origin; Formation; Composition; Physical; Chemical and Biological components; Soil profile. (5 lectures)

Water: Importance: States of water in the environment; Atmospheric moisture; Precipitation types (rain, fog, snow, hail, dew); Hydrological Cycle. (2 lectures)

Light, temperature, wind and fire: Variations; adaptations of plants to their variation. (4 lectures)

Unit-III: Biotic interactions: 2 lectures Population ecology: Characteristics and Dynamics .Ecological Speciation. (4 lectures)

Plant communities: Concept of ecological amplitude; Habitat and niche; Characters: analytical and synthetic; Ecotone and edge effect; succession- types. (4 lectures)

Unit-IV: Ecosystems: Trophic organisation; Food chains and Food webs; Ecological pyramids. (4 lectures)

Functional aspects of ecosystem: Principles and models of energy flow; Production and productivity; Biogeochemical cycles; Cycling of Carbon, Nitrogen and Phosphorus. (5 lectures)

Unit-V: Phytogeography: Principles; Theory of tolerance; Endemism; Brief description of major terrestrial biomes (one each from tropical, temperate & tundra). (8 lectures)

PRACTICAL

1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.
2. Determination of pH of various soil and water samples (pH meter, universal indicator/Lovibond comparator and pH paper)

3. Analysis for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency from two soil samples by rapid field tests.
4. Determination of organic matter of different soil samples by Walkley & Black rapid titration method.
5. Comparison of bulk density, porosity and rate of infiltration of water in soils of three habitats.
6. Determination of dissolved oxygen of water samples from polluted and unpolluted sources.
7. (a). Study of morphological adaptations of hydrophytes and xerophytes (four each).
(b). Study of biotic interactions of the following: Stem parasite (*Cuscuta*), Root parasite (*Orobancha*) Epiphytes, Predation (Insectivorous plants).
8. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus, by species area curve method (species to be listed).
9. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaers frequency distribution law.
10. Quantitative analysis of herbaceous vegetation for density and abundance in the college campus.
11. Field visit to familiarise students with ecology of different sites.

Suggested Readings:

1. Odum, E.P. (2005). Fundamentals of ecology. Cengage Learning India Pvt. Ltd., New Delhi. 5th edition.
2. Singh, J.S., Singh, S.P., Gupta, S. (2006). Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi, India.
3. Sharma, P.D. (2010). Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
4. Wilkinson, D.M. (2007). Fundamental Processes in Ecology: An Earth Systems Approach. Oxford University Press. U.S.A.
5. Kormondy, E.J. (1996). Concepts of ecology. PHI Learning Pvt. Ltd., Delhi, India. 4th edition.

C-9: PLANT SYSTEMATICS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Plant identification, Classification, Nomenclature; Biosystematics. (2 lectures)

Identification: Field inventory; Functions of Herbarium; Important herbaria and botanical gardens of the world and India; Virtual herbarium. (5 lectures)

Unit-II: Taxonomic hierarchy: Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concept (taxonomic, biological, evolutionary). (5 lectures)

Botanical nomenclature: Principles and rules (ICN); principle of priority and its limitations. (5 lectures)

Unit-III: Systematics- an interdisciplinary science: Evidence from palynology, cytology, phytochemistry and molecular data. (6 lectures)

Systems of classification: Major contributions of Hutchinson, Takhtajan and Cronquist; Classification systems of Bentham and Hooker (upto series) and Engler and Prantl (upto series); Brief reference of Angiosperm Phylogeny Group (APG III) classification. (6 lectures)

Unit-IV: Biometrics, numerical taxonomy and cladistics: Characters; Variations; cluster analysis; Phenograms, cladograms. (4 lectures)

Unit-V: Phylogeny of Angiosperms: Homology and analogy, parallelism and convergence, monophyly, Paraphyly, polyphyly and clades).origin & evolution of angiosperms; co-evolution of angiosperms and animals. (7 lectures)

PRACTICAL

1. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hookers system of classification): Ranunculaceae - Ranunculus, Delphinium
Brassicaceae - Brassica, Alyssum / Iberis
Myrtaceae - Eucalyptus, Callistemon
Umbelliferae - Coriandrum /Anethum / Foeniculum
Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax
Solanaceae - Solanum nigrum/Withania
Lamiaceae - Salvia/Ocimum
Euphorbiaceae - Euphorbia hirta/E.milii, Jatropha
Liliaceae - Asphodelus/Lilium/Allium
Poaceae - Triticum/Hordeum/Avena
2. Field visit (local) Subject to grant of funds from the university.
3. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label. (to be submitted in the record book)

Suggested Readings:

1. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.

2. Jeffrey, C. (1982). An Introduction to Plant Taxonomy. Cambridge University Press, Cambridge.
3. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Plant Systematics-A Phylogenetic Approach. Sinauer Associates Inc., U.S.A. 2nd edition.
4. Maheshwari, J.K. (1963). Flora of Delhi. CSIR, New Delhi.
5. Radford, A.E. (1986). Fundamentals of Plant Systematics. Harper and Row, New York.

C-10: REPRODUCTIVE BIOLOGY OF ANGIOSPERMS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Introduction: History (contributions of G.B. Amici, W. Hofmeister, E. Strasburger, S.G. Nawaschin, P. Maheshwari, B.M. Johri, W.A. Jensen, J. Heslop-Harrison) and scope. (2 lectures)

Unit-II: Anther: Anther wall: Structure and functions, microsporogenesis. (2 lectures)

Pollen biology: Microgametogenesis; Pollen wall structure, MGU (male germ unit) structure, NPC system; Palynology and scope (a brief account); Pollen wall proteins; Pollen viability, storage and germination. (5 lectures)

Unit-III: Ovule: Structure; Types; Special structures endothelium; Female gametophyte megasporogenesis (monosporic, bisporic and tetrasporic) and megagametogenesis (details of Polygonum type); Organization and ultrastructure of mature embryo sac. (5 lectures)

Endosperm: Types, development, structure and functions. (3 lectures)

Embryo: Six types of embryogeny; General pattern of development of dicot and monocot embryo. (6 lectures)

Unit-IV: Pollination and fertilization: Pollination types and significance; double fertilization. (4 lectures)

Self incompatibility: Basic concepts; Methods to overcome self incompatibility: Intraovarian and in vitro pollination; Cybrids, in vitro fertilization. (5 lectures)

Unit-V: Seed: Structure, importance and dispersal mechanisms 3 lectures Polyembryony and apomixes: Introduction; Classification; Causes and applications. (4 lectures)

Germline transformation: Pollen grain and ovules through pollen tube pathway method/ Agrobacterium/ biolistic. (4 lectures)

PRACTICAL

1. Anther: Wall and its ontogeny; Tapetum (amoeboid and glandular); MMC, spore tetrads, uninucleate, bicelled and dehiscent anther stages through slides/micrographs, male germ unit (MGU) through photographs and schematic representation.

2. Pollen grains: Fresh and acetolyzed showing ornamentation and aperture, psuedomonads, polyads, pollinia (slides/photographs,fresh material), ultrastructure of pollen wall(micrograph); Pollen viability: Tetrazolium test.germination: Calculation of percentage germination in different media using hanging drop method.
3. Ovule: Types-anatropous, orthotropous, amphitropous/campylotropous, circinotropous, unitegmic, bitegmic; Tenuinucellate and crassinucellate; Special structures: Endothelium, obturator, hypostase, caruncle and aril (permanent slides/specimens/photographs).
4. Female gametophyte through permanent slides/ photographs: Types, ultrastructure of mature egg apparatus.
5. Embryogenesis: Study of development of dicot embryo through permanent slides; dissection of developing seeds for embryos at various developmental stages; Study of suspensor through electron micrographs.

Suggested Readings:

1. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, Vikas Publishing House. Delhi. 5th edition.
2. Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd. Delhi.
3. Raghavan, V. (2000). Developmental Biology of Flowering plants, Springer, Netherlands.
4. Johri, B.M. I (1984). Embryology of Angiosperms, Springer-Verlag, Netherlands.

C-11: PLANT PHYSIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Plant water relationship:Water Potential and its components, water absorption by roots, pathway of water movement, symplast, apoplast, transmembrane pathways, root pressure, guttation. Ascent of sapcohesion-tension theory.Transpiration and factors affecting transpiration, antitranspirants, mechanism of stomatal movement. (6 lectures)

Translocation in the phloem: Pressure-Flow Model; Phloem loading and unloading; Source-sink relationship. (5 lectures)

Unit-II: Mineral nutrition: Essential and beneficial elements, macro and micronutrients, methods of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents. (5 lectures)

Unit-III: Nutrient Uptake: Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, facilitated diffusion, active absorption, role of ATP, carrier systems,proton ATPase pump and ion flux, uniport, cotransport, symport, antiport. (5 lectures)

Unit-IV: Plant growth regulators: Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Absciscic acid, Ethylene. (10 lectures)

Unit-V: Physiology of flowering: Photoperiodism, flowering stimulus, florigen concept, vernalization, seed dormancy. (4 lectures)

Phytochrome: Discovery, chemical nature, role of phytochrome in photomorphogenesis. (5 lectures)

PRACTICAL

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. Determination of water potential of given tissue (potato tuber) by weight method.
3. Study of the effect of wind velocity and light on the rate of transpiration in excised twig/leaf.
4. Calculation of stomatal index and stomatal frequency from the two surfaces of leaves of a mesophyte and xerophyte.
5. To calculate the area of an open stoma and percentage of leaf area open through stomata in a mesophyte and xerophyte (both surfaces).
6. To study the phenomenon of seed germination (effect of light).
7. To study the induction of amylase activity in germinating barley grains.

Demonstration experiments:

- (a) To demonstrate suction due to transpiration.
- (b) Fruit ripening/Rooting from cuttings (Demonstration).
- (c) Bolting experiment/Avena coleptile bioassay (demonstration).

Suggested Readings:

1. Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons. U.S.A. 4th edition.
2. Taiz, L., Zeiger, E., Miller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
3. Bajracharya D. (1999). Experiments in Plant Physiology-A Laboratory Manual. Narosa Publishing House, New Delhi.

C-12: PLANT METABOLISM

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Concept of metabolism: Introduction, anabolic and catabolic pathways, regulation of metabolism. (5 lectures)

Carbohydrate metabolism: Synthesis and catabolism of sucrose and starch. (1 lectures)

Unit-II: Carbon assimilation: Historical background, photosynthetic pigments, role of photosynthetic pigments (chlorophylls and accessory pigments), antenna molecules and reaction centres, photochemical reactions, photosynthetic electron transport, PSI, PSII, Q cycle, CO_2 reduction, photorespiration, C4 pathways; Crassulacean acid metabolism; Factors affecting CO_2 reduction. (10 lectures)

Unit-III: Carbon Oxidation: Glycolysis, fate of pyruvate, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate; TCA cycle, amphibolic role, anaplerotic reactions, regulation of the cycle, mitochondrial electron transport, oxidative phosphorylation, cyanide-resistant respiration, factors affecting respiration. (6 lectures)

ATP-Synthesis: Mechanism of ATP synthesis, oxidative and photophosphorylation. (4 lectures)

Unit-IV: Lipid metabolism: Synthesis and breakdown of triglycerides, β -oxidation, glyoxylate cycle, gluconeogenesis and its role in mobilisation of lipids during seed germination, α -oxidation. (5 lectures)

Unit-V: Nitrogen metabolism: Nitrate assimilation, biological nitrogen fixation (examples of legumes and non-legumes); Physiology and biochemistry of nitrogen fixation; Ammonia assimilation and transamination. (5 lectures)

Mechanisms of signal transduction: Calcium, phospholipids, cGMP, NO. (4 lectures)

PRACTICAL

1. Chemical separation of photosynthetic pigments.
2. Experimental demonstration of Hilla reaction.
3. To study the effect of light intensity on the rate of photosynthesis.
4. Effect of carbon dioxide on the rate of photosynthesis.
5. To compare the rate of respiration in different parts of a plant.
6. To demonstrate activity of Nitrate Reductase in germinating leaves of different plant sources.
7. To study the activity of lipases in germinating oilseeds and demonstrate mobilization of lipids during germination.
8. Demonstration of fluorescence by isolated chlorophyll pigments.
9. Demonstration of absorption spectrum of photosynthetic pigments.

Suggested Readings:

1. Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons. U.S.A. 4th edition.

2. Taiz, L., Zeiger, E., Mller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
3. Harborne, J.B. (1973). Phytochemical Methods. John Wiley & Sons. New York.

DISCIPLINE SPECIFIC ELECTIVE COURSES

SEMESTER-I

DSE-1: ANALYTICAL TECHNIQUES IN PLANT SCIENCES

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Imaging and related techniques: Principles of microscopy; Light microscopy; Fluorescence microscopy; Confocal microscopy; Use of fluorochromes: (a) Flow cytometry (FACS); (b) Applications of fluorescence microscopy: Chromosome banding, FISH, chromosome painting; Transmission and Scanning electron microscopy sample preparation for electron microscopy, cryofixation, negative staining, shadow casting, freeze fracture, freeze etching. (10 lectures)

UNIT-II: Cell fractionation: Centrifugation: Differential and density gradient centrifugation, sucrose density gradient, CsCl₂ gradient, analytical centrifugation, ultracentrifugation, marker enzymes. (5 lectures)

UNIT-III: Radioisotopes: Use in biological research, auto-radiography, pulse chase experiment. (3 lectures)

Spectrophotometry: Principle and its application in biological research. 3 lectures Chromatography: Principle; Paper chromatography; Column chromatography, TLC, GLC, HPLC, Ion-exchange chromatography; Molecular sieve chromatography; Affinity chromatography. (6 lectures)

UNIT-IV: Characterization of proteins and nucleic acids: Mass spectrometry; X-ray diffraction; X-ray crystallography; Characterization of proteins and nucleic acids; Electrophoresis: AGE, PAGE, SDS-PAGE (5 lectures)

UNIT-V: Biostatistics: Statistics, data, population, samples, parameters; Representation of Data: Tabular, Graphical; Measures of central tendency: Arithmetic mean, mode, median; Measures of dispersion: Range, mean deviation, variation, standard deviation; Chi-square test for goodness of fit. (8 lectures)

PRACTICAL

1. Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting, DNA sequencing, PCR through photographs.
2. Demonstration of ELISA.
3. To separate nitrogenous bases by paper chromatography.
4. To separate sugars by thin layer chromatography.
5. Isolation of chloroplasts by differential centrifugation.

6. To separate chloroplast pigments by column chromatography.
7. To estimate protein concentration through Lowry's methods.
8. To separate proteins using PAGE.
9. To separate DNA (marker) using AGE.
10. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH).
11. Preparation of permanent slides (double staining).
12. Estimation of plant pigments.

Suggested Readings:

1. Plummer, D.T. (1996). An Introduction to Practical Biochemistry. Tata McGraw-Hill Publishing Co. Ltd. New Delhi. 3rd edition.
2. Ruzin, S.E. (1999). Plant Microtechnique and Microscopy, Oxford University Press, New York. U.S.A.
3. Ausubel, F., Brent, R., Kingston, R. E., Moore, D.D., Seidman, J.G., Smith, J.A., Struhl, K. (1995). Short Protocols in Molecular Biology. John Wiley & Sons. 3rd edition.
4. Zar, J.H. (2012). Biostatistical Analysis. Pearson Publication. U.S.A. 4th ed

SEMESTER-II

DSE-2: INDUSTRIAL & ENVIRONMENTAL MICROBIOLOGY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Scope of microbes in industry and environment: (2 lectures)

Bioreactors/Fermenters and fermentation processes: Solid-state and liquid-state (stationary and submerged) fermentations; Batch and continuous fermentations. Components of a typical bioreactor, Types of bioreactors laboratory, pilot scale and production fermenters; Constantly stirred tank fermenter, tower fermenter, fixed bed and fluidized bed bioreactors and airlift fermenter. A visit to any educational institute/ industry to see an industrial fermenter, and other downstream processing operations. (8 lectures)

UNIT-II: Microbial production of industrial products: Microorganisms involved, media, fermentation conditions, downstream processing and uses; Filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, lyophilization, spray drying; Hands on microbial fermentations for the production and estimation (qualitative and quantitative) of Enzyme: amylase or lipase activity, Organic acid (citric acid or glutamic acid), alcohol (Ethanol) and antibiotic (Penicillin) (8

lectures)

Microbial enzymes of industrial interest and enzyme immobilization: Microorganisms for industrial applications and hands on screening microorganisms for casein hydrolysis; starch hydrolysis; cellulose hydrolysis. Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase). (6 lectures)

UNIT-III: Microbes and quality of environment: Distribution of microbes in air; Isolation of microorganisms from soil, air and water. (4 lectures)

UNIT-IV: Microbial flora of water: Water pollution, role of microbes in sewage and domestic waste water treatment systems. Determination of BOD, COD, TDS and TOC of water samples; Microorganisms as indicators of water quality, check coliform and fecal coliform in water samples. (6 lectures)

UNIT-V: Microbes in agriculture and remediation of contaminated soils: Biological fixation; Mycorrhizae; Bioremediation of contaminated soils. Isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots. (6 lectures)

PRACTICAL

1. Principles and functioning of instruments in microbiology laboratory.
2. Hands on sterilization techniques and preparation of culture media.

Suggested Readings:

1. Pelzar, M.J. Jr., Chen E.C. S., Krieg, N.R. (2010). Microbiology: An application based approach. Tata McGraw Hill Education Pvt. Ltd., Delhi.
2. Tortora, G.J., Funke, B.R., Case. C.L. (2007). Microbiology. Pearson Benjamin Cummings, San Francisco, U.S.A. 9th edition.

SEMESTER-III

DSE-3: PLANT BREEDING

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Plant Breeding : Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding. (6 lectures)

UNIT-II; Methods of crop improvement: Introduction: Centres of origin and domestication of crop plants, plant genetic resources; Acclimatization; Selection methods: For self pollinated, cross pollinated and vegetatively propagated plants; Hybridization: For self, cross and vegetatively propagated plants Procedure, advantages and limitations. (15 lectures)

UNIT-III: Quantitative inheritance: Concept, mechanism, examples of inheritance of Kernel colour in wheat, Skin colour in human beings. Monogenic vs polygenic Inheritance. (6 lectures)

UNIT-IV: Inbreeding depression and heterosis: History, genetic basis of inbreeding depression and heterosis; Applications. (6 lectures)

UNIT-V: Crop improvement and breeding: Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement. (7 lectures)

PRACTICAL

Practical Practical related to theory.

Suggested Readings:

1. Singh, B.D. (2005). Plant Breeding: Principles and Methods. Kalyani Publishers. 7th edition.
2. Chaudhari, H.K. (1984). Elementary Principles of Plant Breeding. Oxford IBH. 2nd edition.
3. Acquaah, G. (2007). Principles of Plant Genetics & Breeding. Blackwell Publishers.

SEMESTER-IV

DSE-4: NATURAL RESOURCE MANAGEMENT

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Natural resources: Definition and types. (2 lectures)

Sustainable utilization : Concept, approaches (economic, ecological and socio-cultural). (5 lectures)

UNIT-II: Land: Utilization (agricultural, pastoral, horticultural, silvicultural); Soil degradation and management. (5 lectures)

Water: Fresh water (rivers, lakes, groundwater, aquifers, watershed); Marine; Estuarine; Wetlands; Threats and management strategies. (4 lectures)

UNIT-III: Biological Resources: Biodiversity-definition and types; Significance; Threats; Management strategies; Bioprospecting; IPR; CBD; National Biodiversity Action Plan). (8 lectures)

Forests: Definition, Cover and its significance (with special reference to India); Major and minor forest products; Depletion; Management. (4 lectures)

UNIT-IV: Energy: Renewable and non-renewable sources of energy 4 lectures Contemporary practices in resource management: EIA, GIS, Participatory Resource Appraisal, Ecological Footprint with emphasis on carbon footprint. (6 lectures)

UNIT-V: Resource Accounting; Waste management. National and international efforts in resource management and conservation (4 lectures)

PRACTICAL

1. Estimation of solid waste generated by a domestic system (biodegradable and non-biodegradable) and its impact on land degradation.

2. Collection of data on forest cover of specific area.
3. Measurement of dominance of woody species by DBH (diameter at breast height) method.
4. Calculation and analysis of ecological footprint.
5. Ecological modeling.

Suggested Readings:

1. Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House, New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.
3. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

SEMESTER-V **DSE-5: HORTICULTURAL PRACTICES & POST-HARVEST TECHNOLOGY**

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Introduction: Scope and importance, Branches of horticulture; Role in rural economy and employment generation; Importance in food and nutritional security; Urban horticulture and ecotourism. (2 lectures)

Ornamental plants: Types, classification (annuals, perennials, climbers and trees); Identification and salient features of some ornamental plants [rose, marigold, gladiolus, carnations, orchids, poppies, gerberas, tuberose, sages, cacti and succulents (opuntia, agave and spurges)] Ornamental flowering trees (Indian laburnum, gulmohar, Jacaranda, Lagerstroemia, fishtail and areca palms, semul, Coral tree). (3 lectures)

UNIT-II: Fruit and vegetable crops: Production, origin and distribution; Description of plants and their economic products; Management and marketing of vegetable and fruit crops; Identification of some fruits and vegetable varieties (citrus, banana, mango, chillies and cucurbits). (4 lectures)

Horticultural techniques: Application of manure, fertilizers, nutrients and PGRs; Weed control; Biofertilizers, biopesticides; Irrigation methods (drip irrigation, surface irrigation, furrow and border irrigation); Hydroponics; Propagation Methods: asexual (grafting, cutting, layering, budding), sexual (seed propagation), Scope and limitations. (6 lectures)

UNIT-III: Landscaping and garden design : Planning and layout (parks and avenues); gardening traditions - Ancient Indian, European, Mughal and Japanese Gardens; Urban forestry; policies and practices. (4 lectures)

Floriculture: Cut flowers, bonsai, commerce (market demand and supply); Importance of flower shows and exhibitions. (4 lectures)

UNIT-IV: Post-harvest technology: Importance of post harvest technology in horticultural crops; Evaluation of quality traits; Harvesting and handling of fruits, vegetables and cut flowers; Principles, methods of preservation and processing; Methods of minimizing losses during storage and transportation; Food irradiation - advantages and disadvantages; food safety. (6 lectures)

Disease control and management : Field and post-harvest diseases; Identification of deficiency symptoms; remedial measures and nutritional management practices; Crop sanitation; IPM strategies (genetic, biological and chemical methods for pest control); Quarantine practices; Identification of common diseases and pests of ornamentals, fruits and vegetable crops. (5 lectures)

UNIT-V: Horticultural crops - conservation and management: Documentation and conservation of germplasm; Role of micropropagation and tissue culture techniques; Varieties and cultivars of various horticultural crops; IPR issues; National, international and professional societies and sources of information on horticulture. (6 lectures)

Field Trip: Field visits to gardens, standing crop sites, nurseries, vegetable gardens and horticultural fields at IARI or other suitable locations.

PRACTICAL

Practical Practical related to theory **Suggested Readings:**

1. Singh, D. & Manivannan, S. (2009). Genetic Resources of Horticultural Crops. Ridhi International, Delhi, India.
2. Swaminathan, M.S. and Kochhar, S.L. (2007). Groves of Beauty and Plenty: An Atlas of Major Flowering Trees in India. Macmillan Publishers, India.
3. NIIR Board (2005). Cultivation of Fruits, Vegetables and Floriculture. National Institute of Industrial Research Board, Delhi.
4. Kader, A.A. (2002). Post-Harvest Technology of Horticultural Crops. UCANR Publications, USA.
5. Capon, B. (2010). Botany for Gardeners. 3rd Edition. Timber Press, Portland, Oregon.

SEMESTER-VI

DSE-6: BIO-INFORMATICS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Introduction to Bioinformatics: Introduction, Branches of Bioinformatics, Aim, Scope and Research areas of Bioinformatics. (3 Lectures)

Databases in Bioinformatics: Introduction, Biological Databases, Classification format of Biological Databases, Biological Database Retrieval System. (4 Lectures)

UNIT-II: Biological Sequence Databases: National Center for Biotechnology Information (NCBI): Tools and Databases of NCBI, Database Retrieval Tool, Sequence Submission to NCBI, Basic local alignment search tool (BLAST), Nucleotide Database, Protein Database, Gene Expression Database. EMBL Nucleotide Sequence Database (EMBL-Bank): Introduction, Sequence Retrieval, Sequence Submission to EMBL, Sequence analysis tools. DNA Data Bank of Japan (DDBJ): Introduction, Resources at DDBJ, Data Submission at DDBJ. Protein Information Resource (PIR): About PIR, Resources of PIR, Databases of PIR, Data Retrieval in PIR. Swiss-Prot: Introduction and Salient Features. (15 Lectures)

UNIT-III: Sequence Alignments: Introduction, Concept of Alignment, Multiple Sequence Alignment (MSA), MSA by CLUSTALW, Scoring Matrices, Percent Accepted Mutation (PAM), Blocks of Amino Acid Substitution Matrix (BLOSUM). (8 Lectures)

UNIT-IV: Molecular Phylogeny: Methods of Phylogeny, Software for Phylogenetic Analyses, Consistency of Molecular Phylogenetic Prediction. (5 Lectures)

UNIT-V: Applications of Bioinformatics: Structural Bioinformatics in Drug Discovery, Quantitative structure-activity relationship (QSAR) techniques in Drug Design, Microbial genome applications, Crop improvement. (5 Lectures)

PRACTICAL

1. Nucleic acid and protein databases.
2. Sequence retrieval from databases.
3. Sequence alignment.
4. Sequence homology and Gene annotation.
5. Construction of phylogenetic tree.

Suggested Readings:

1. Ghosh Z. and Bibekanand M. (2008) Bioinformatics: Principles and Applications. Oxford University Press.
2. Pevsner J. (2009) Bioinformatics and Functional Genomics. II Edition. Wiley-Blackwell.
3. Campbell A. M., Heyer L. J. (2006) Discovering Genomics, Proteomics and Bioinformatics-II Edition. Benjamin Cummings.

SKILL ENHANCEMENT COURSES (SEC)

SEMESTER-III
SEC-I: BIO-FERTILIZERS

(Credits-2: Lectures: 30)

THEORY (Each class 1 hour): Marks: 50

Unit-I: General account about the microbes used as biofertilizer Rhizobium isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis. (4 lectures)

Unit-II: Azospirillum: isolation and mass multiplication carrier based inoculant, associative effect of different microorganisms. Azotobacter: classification, characteristics crop response to Azotobacter inoculum, maintenance and mass multiplication. (8 lectures)

Unit-III: Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation. (4 lectures)

Unit-IV: Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield colonization of VAM isolation and inoculum production of VAM, and its influence on growth and yield of crop plants. (8 lectures)

Unit-V: Organic farming Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes bio-compost making methods, types and method of vermicomposting field Application. (6 lectures)

Suggested Readings:

1. Dubey, R.C., 2005 A Text book of Biotechnology S.Chand & Co, New Delhi.
2. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
3. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay, Publication, New Delhi.
4. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.
5. Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi.
6. Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic, Farming Akta Prakashan, Nadiad

SEMESTER-IV
SEC-II: HERBAL TECHNOLOGY

(Credits-2: Lectures: 30)

THEORY (Each class 1 hour): Marks: 50

Unit-I: Herbal medicines: history and scope - definition of medical terms - role of medicinal plants in Siddha systems of medicine; cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants. (6 lectures)

Unit-II: Pharmacognosy - systematic position m edicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Goose berry and Ashoka. (6 lectures)

Unit-III: Phytochemistry - active principles and methods of their testing - identification and utilization of the medicinal herbs; *Catharanthus roseus* (cardiotonic), *Withania somnifera* (drugs acting on nervous system), *Clerodendron phlomoides* (anti-rheumatic) and *Centella asiatica* (memory booster). (6 lectures)

Unit-IV: Analytical pharmacognosy: Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds) (8 lectures)

Unit-V: Medicinal plant banks micro propagation of important species (*Withania somnifera*, neem and tulsi- Herbal foods-future of pharmacognosy) (4 lectures)

Suggested Readings:

1. Glossary of Indian medicinal plants, R.N.Chopra, S.L.Nayar and I.C.Chopra, 1956. C.S.I.R, New Delhi.
2. The indigenous drugs of India, Kanny, Lall, Dey and Raj Bahadur, 1984. International Book Distributors.
3. Herbal plants and Drugs Agnes Arber, 1999. Mangal Deep Publications.
4. Ayurvedic drugs and their plant source. V.V. Sivarajan and Balachandran Indra 1994. Oxford IBH publishing Co.
5. Ayurveda and Aromatherapy. Miller, Light and Miller, Bryan, 1998. Banarsidass, Delhi.
6. Principles of Ayurveda, Anne Green, 2000. Thomsons, London.
7. Pharmacognosy, Dr.C.K.Kokate et al. 1999. Nirali Prakashan.

SEMESTER-V

SEC-3A: FLORICULTURE

(Credits-2: Lectures: 30)

THEORY (Each class 1 hour): Marks: 50

Unit-I: Introduction: History of gardening; Importance and scope of floriculture and landscape gardening. (2 lectures)

Unit-II: Nursery Management and Routine Garden Operations: Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators. (8 lectures)

Unit-III: Ornamental Plants: Flowering annuals; Herbaceous perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai. (4 lectures)

Unit-IV: Principles of Garden Designs: English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water garden. Some Famous gardens of India (4 lectures)

Landscaping Places of Public Importance: Landscaping highways and Educational institutions. (4 lectures)

Unit-V: Commercial Floriculture: Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold, Rose, Liliun, Orchids). (6 lectures)

Diseases and Pests of Ornamental Plants. (2 lectures)

Suggested Readings:

Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers.

SEMESTER-V

SEC-3B: NURSERY & GARDENING

(Credits-2: Lectures: 30)

THEORY (Each class 1 hour): Marks: 50 Marks

Unit-I: Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants. (4 lectures)

Unit-II: Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion Seed production technology - seed testing and certification. (6 lectures)

Unit-III: Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants green house - mist chamber, shed root, shade house and glass house. (6 lectures)

Unit-IV: Gardening: definition, objectives and scope - different types of gardening landscape and home gardening - parks and its components - plant materials and design computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting. (8 lectures)

Unit-V: Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures. (6 lectures)

Suggested Readings:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

SEMESTER-VI
SEC-6: MUSHROOM CULTURE TECHNOLOGY

(Credits-2: Lectures: 30)

THEORY (Each class 1 hour): Marks: 50

Unit-I: Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea*, *Pleurotus citrinopileatus*, *Agaricus bisporus*. (5 lectures)

Unit-II: Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. (6 Lectures)

Unit-III: Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production. (6 lectures)

Unit-IV: Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins. (8 lectures)

Unit-V: Food Preparation: Types of foods prepared from mushroom. Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value. (5 lectures)

Suggested Readings:

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

CHEMISTRY(HONOURS)

SEMESTER-I

C-1: INORGANIC CHEMISTRY-I

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Atomic structure

Bohrs theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenbergs Uncertainty Principle and its significance, Schrdingers wave equation, significance of ψ and ψ^2 . Quantum numbers and their significance. Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Paulis Exclusion Principle, Hunds rule of maximum multiplicity, Aufbaus principle and its limitations. (14 Lectures)

Unit-II: Periodicity of elements

Periodicity of elements Periodicity of Elements: s, p, d, f block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to s & p-block. (a) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table. (b) Atomic radii (van der Waals) (c) Ionic and crystal radii. (d) Covalent radii (octahedral and tetrahedral) (e) Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy. (f) Electron gain enthalpy, trends of electron gain enthalpy. (g) Electronegativity, Paulings/ Mullikens electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity. Sandersons electron density ratio. (16 Lectures)

Unit-III: Chemical bonding-I

Ionic bond: General characteristics, types of ions, size effects, radius ratio rule and its limitations. Packing of ions in crystals. Born-Land equation with derivation. Madelung constant, Born-Haber cycle and its application, Solvation energy. (ii) Covalent bond: Lewis structure, Valence Bond theory (Heitler-London approach). Energetics of hybridization, equivalent and non-equivalent hybrid orbitals, Resonance and resonance energy, Molecular orbital theory. Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2 , O_2 , C_2 , B_2 , F_2 , CO , NO , and their ions; Valence shell electron pair repulsion theory (VSEPR), shapes of simple molecules and ions containing lone pairs and bond pairs of electrons, multiple bonding (σ and π bond approach) and bond lengths. Covalent character in ionic compounds, polarizing power and polarizability. Fajans rules and consequences of polarization. Ionic character in covalent compounds: Bond moment and dipole moment. Percentage ionic character from dipole moment and electronegativity difference. (16 Lectures)

Unit-IV: Chemical Bonding-II

(i) Metallic Bond: Qualitative idea of valence bond and band theories. Semiconductors and insulators. (ii) Weak Chemical Forces: van der Waals forces, ion-dipole forces, dipole-dipole interactions,

induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces, Hydrogen bonding (theories of hydrogen bonding, valence bond treatment) Effects of chemical force, melting and boiling points, solubility energetics of dissolution process. (10 Lectures)

Oxidation-reduction Redox equations, standard electrode potential and its application to inorganic reactions. Principles involved in some volumetric analyses (iron, copper and manganese). (4 Lectures)

Reference Books:

- Lee, J.D. Concise Inorganic Chemistry, ELBS, 1991.
- Douglas, B.E. and Mc Daniel, D.H., Concepts & Models of Inorganic Chemistry, Oxford, 1970.
- Atkins, P.W. & Paula, J. Physical Chemistry, Oxford Press, 2006.
- Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications 1962.

PRACTICAL: C-1 LAB.

(A) Titrimetric Analysis:

(i) Calibration and use of apparatus. (ii) Preparation of solutions of different Molarity/Normality of titrants.

(B) Acid-Base Titrations:

(i) Estimation of carbonate and hydroxide present together in mixture. (ii) Estimation of carbonate and bicarbonate present together in a mixture. (iii) Estimation of free alkali present in different soaps/detergents.

(C) Oxidation-Reduction Titrimetry:

(i) Estimation of Fe(II) and oxalic acid using standardized KMnO_4 solution. (ii) Estimation of oxalic acid and sodium oxalate in a given mixture. (iii) Estimation of Fe(II) with $\text{K}_2\text{Cr}_2\text{O}_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

Reference text:

Vogel, A.I. A Textbook of Quantitative Inorganic Analysis, ELBS.

C-2: PHYSICAL CHEMISTRY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Gaseous state

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity, calculation of σ from η ; variation of viscosity with temperature and pressure. Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Behaviour of real gases: Deviations from ideal gas behaviour, compressibility factor, Z , and its variation with pressure for different gases. Causes of deviation from ideal behaviour. van der Waals

equation of state, its derivation and application in explaining real gas behaviour. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states. (18 Lectures)

Unit-II: Liquid state

(i) Qualitative treatment of the structure of the liquid state; physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Explanation of cleansing action of detergents. Temperature variation of viscosity of liquids and comparison with that of gases. Qualitative discussion of structure of water. (6 Lectures)

Ionic equilibria- I

(ii) Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono- and diprotic acids. (6 Lectures)

Unit- III: Solid state

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Braggs law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals. Glasses and liquid crystals. (16 Lectures)

Unit-IV: Ionic equilibria - II

Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications; buffer capacity, buffer range, buffer action and applications of buffers in analytical chemistry and biochemical processes in the human body. Solubility and solubility product of sparingly soluble salts applications of solubility product principle. Qualitative treatment of acid base titration curves (calculation of pH at various stages). Theory of acidbase indicators; selection of indicators and their limitations. Multistage equilibria in polyelectrolyte systems; hydrolysis and hydrolysis constants. (14 Lectures)

Reference Books:

- Atkins, P. W. & Paula, J. de Atkins Physical Chemistry Ed., Oxford University Press (2006).
- Ball, D. W. Physical Chemistry Thomson Press, India (2007).
- Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).
- Mortimer, R. G. Physical Chemistry 3rd Ed. Elsevier: NOIDA, UP (2009).
- Principles of Physical Chemistry, Puri, Sharma, Pathania, Vishal Pub. Co.

PRACTICAL: C-2 LAB.

Surface tension measurements.

- (a) Determine the surface tension by (i) drop number (ii) drop weight method.
- (b) Study the variation of surface tension of detergent solutions with concentration.

Viscosity measurement using Ostwalds viscometer.

- (a) Determination of viscosity of aqueous solutions of (i) polymer, (ii) ethanol, and (iii) sugar at room temperature.

(b) Study the variation of viscosity of sucrose solution with the concentration of solute.

pH metry.

(a) Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.

(b) Preparation of buffer solutions of different pH (i) Sodium acetate-acetic acid, (ii) Ammonium chloride-ammonium hydroxide.

(c) pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.

(d) Determination of dissociation constant of a weak acid.

Reference Books:

- Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
- Garland, C. W., Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill, New York (2003).
- Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co., New York (2003).

SEMESTER-II

C-3: ORGANIC CHEMISTRY I

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: BASICS OF ORGANIC CHEMISTRY

Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment; Organic acids and bases; their relative strength. Homolytic and Heterolytic fission with suitable examples. Curly arrow rules; Electrophiles and Nucleophiles; Nucleophilicity and basicity; Types, shape and their relative stability of carbocations, carbanions, free radicals and carbenes. Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions.

CARBON-CARBON SIGMA BONDS

Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reactions, Free radical substitutions: Halogenation -relative reactivity and selectivity. (12 Lectures)

Unit-II: STEREOCHEMISTRY

Fischer Projection, Newmann and Sawhorse Projection formulae; Geometrical isomerism: cis-trans and, syn-anti isomerism E/Z notations with C.I.P rules. Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with one and two chiral-centres, Diastereoisomers, meso structures, Racemic mixture and resolution. Relative and absolute configuration: D/L and R/S designations. (18 Lectures)

Unit-III: CHEMISTRY OF ALIPHATIC HYDROCARBONS

A. Carbon-Carbon pi bonds:

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations. Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/ Anti Markownikoff addition), mechanism of oxymercuration-demercuration, hydroborationoxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation). 1,2- and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene. Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes. **B. Cycloalkanes and Conformational Analysis**

Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformation analysis of alkanes (ethane and n-butane): Relative stability with energy diagrams. Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms. (18 Lectures)

Unit-IV: AROMATIC HYDROCARBONS

Aromaticity: Hckels rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Crafts alkylation/acylation with their mechanism. Directing effects of the groups. (12 Lectures)

Reference Books:

- Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 2): Stereochemistry and the Chemistry of Natural Products, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Eliel, E. L. & Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994.
- Kalsi, P. S. Stereochemistry Conformation and Mechanism; New Age International, 2005.

PRACTICAL: C-3 LAB.

1. Checking the calibration of the thermometer.
2. Purification of organic compounds by crystallization using the following solvents:
 - Water
 - Alcohol
 - Alcohol-Water
3. Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus).
4. Effect of impurities on the melting point mixed melting point of two unknown organic compounds.
5. Determination of boiling point of liquid compounds. (boiling point lower than and more than 100C by distillation and capillary method)

6. Chromatography

- Separation of a mixture of two amino acids by ascending and horizontal paper chromatography.
- Separation of a mixture of two sugars by ascending paper chromatography.
- Separation of a mixture of o-and p-nitrophenol or o-and p-aminophenol by thin layer chromatography (TLC).

Reference Books:

- Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
- Furniss, B.S., Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012).

C-4: PHYSICAL CHEMISTRY-II

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Unit-I: Chemical thermodynamics

Intensive and extensive variables; state and path functions; isolated, closed and open systems; zeroth law of thermodynamics. First law: Concept of heat, q , work, w , internal energy, U , and statement of first law; enthalpy, H , relation between heat capacities, calculations of q , w , U and H for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions. Thermochemistry: Heats of reactions: standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, effect of temperature (Kirchhoffs equations) and pressure on enthalpy of reactions. (14 Lectures)

Unit-II: Second Law: Concept of entropy; thermodynamic scale of temperature, statement of the second law of thermodynamics; molecular and statistical interpretation of entropy. Calculation of entropy change for reversible and irreversible processes. Third Law: Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules. Free Energy Functions: Gibbs and Helmholtz energy; variation of S , G , A with T , V , P ; Free energy change and spontaneity. Relation between Joule-Thomson coefficient and other thermodynamic parameters; inversion temperature; Gibbs-Helmholtz equation; Maxwell 17 relations; thermodynamic equation of state. (14 Lectures)

Unit-III: Systems of variable composition

Partial molar quantities, dependence of thermodynamic parameters on composition; Gibbs Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases. Chemical equilibrium, Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases, concept of fugacity. Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient (vant Hoffs reaction). Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Free energy of mixing and spontaneity; thermodynamic derivation of relations between the various equilibrium

constants K_p , K_c and K_x . Le Chatelier principle (quantitative treatment) and its applications. (18 Lectures)

Unit-IV: Solutions and Colligative Properties

Dilute solutions; lowering of vapour pressure, Raoult's and Henry's Laws and their applications. Thermodynamic derivation using chemical potential to derive relations between the four colligative properties [(i) relative lowering of vapour pressure, (ii) elevation of boiling point, (iii) Depression of freezing point, (iv) osmotic pressure] and amount of solute. Applications in calculating molar masses of normal, dissociated and associated solutes in solution. (14 Lectures)

Reference Books:

- Peter, A. & Paula, J. de. Physical Chemistry 9th Ed., Oxford University Press (2011).
- Castellan, G. W. Physical Chemistry 4th Ed., Narosa (2004).
- Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall (2012).
- McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi (2004).
- Assael, M. J.; Goodwin, A. R. H.; Stamatoudis, M.; Wakeham, W. A. & Will, S. Commonly Asked Questions in Thermodynamics. CRC Press: NY (2011).
- Levine, I. N. Physical Chemistry 6th Ed., Tata Mc Graw Hill (2010).
- Metz, C.R. 2000 solved problems in chemistry, Schaum Series (2006).

PRACTICAL: C-4 LAB.

THERMOCHEMISTRY

- (a) Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization).
- (b) Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
- (c) Calculation of the enthalpy of ionization of ethanoic acid.
- (d) Determination of heat capacity of the calorimeter and integral enthalpy (endothermic and exothermic) solution of salts.
- (e) Determination of basicity/proticity of a polyprotic acid by the thermochemical method in terms of the changes of temperatures observed in the graph of temperature versus time for different additions of a base. Also calculate the enthalpy of neutralization of the first step.
- (f) Determination of enthalpy of hydration of copper sulphate.
- (g) Study of the solubility of benzoic acid in water and determination of H .

Reference Books;

- Khosla, B. D.; Garg, V. C. & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
- Athawale, V. D. & Mathur, P. Experimental Physical Chemistry New Age International: New Delhi (2001).

SEMESTER-III

C-5: INORGANIC CHEMISTRY-II

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: General Principles of Metallurgy

Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon and carbon monoxide as reducing agent. Electrolytic Reduction, Hydrometallurgy. Methods of purification of metals: Electrolytic process, Parting process, van Arkel-de Boer process and Mond's process, Zone refining. (8 Lectures)

Acids and Bases

Bronsted-Lowry concept of acid-base reactions, solvated proton, relative strength of acids, types of acid-base reactions, Lewis acid-base concept, Classification of Lewis acids, Hard and Soft Acids and Bases (HSAB) Application of HSAB principle. (8 Lectures)

UNIT-II: Chemistry of s and p Block Elements-I

Inert pair effect, Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation. Complex formation tendency of s and p block elements. Hydrides and their classification ionic, covalent and interstitial. Basic beryllium acetate and nitrate. (14 Lectures)

UNIT-III: Chemistry of s and p Block Elements-II

Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses. Boric acid and borates, boron nitrides, borohydrides (diborane) carboranes and graphitic compounds, silanes. Oxides and oxoacids of nitrogen, Phosphorus and chlorine. Peroxo acids of sulphur, interhalogen compounds, polyhalide ions, pseudohalogens and basic properties of halogens. (14 Lectures)

UNIT-IV: Noble Gases

Occurrence and uses, rationalization of inertness of noble gases, Clathrates; preparation and properties of XeF_2 , XeF_4 and XeF_6 ; Nature of bonding in noble gas compounds (Valence bond treatment and MO treatment for XeF_2). Molecular shapes of noble gas compounds (VSEPR theory). (8 Lectures)

Inorganic Polymers:

Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes, and polysulphates. (8 Lectures)

Reference Books:

- Lee, J.D. Concise Inorganic Chemistry, ELBS, 1991.
- Douglas, B.E; Mc Daniel, D.H. & Alexander, J.J. Concepts & Models of Inorganic Chemistry 3rd Ed., John Wiley Sons, N.Y. 1994.
- Greenwood, N.N. & Earnshaw. Chemistry of the Elements, Butterworth-Heinemann. 1997.

- Cotton, F.A. & Wilkinson, G. Advanced Inorganic Chemistry, Wiley, VCH, 1999.
- Miessler, G. L. & Donald, A. Tarr. Inorganic Chemistry 4th Ed., Pearson, 2010.
- Shriver & Atkins, Inorganic Chemistry 5th Ed.

PRACTICAL: C-5 LAB.

(A) Iodo / Iodimetric Titrations

- Estimation of Cu(II) and $K_2Cr_2O_7$ using sodium thiosulphate solution (Iodimetrically).
- Estimation of available chlorine in bleaching powder iodometrically.

(B) Inorganic preparations

- Cuprous chloride, Cu_2Cl_2 .
- Preparation of manganese(III) phosphate, $MnPO_4.H_2O$.
- Preparation of aluminium potassium sulphate $K_2SO_4.Al_2(SO_4)_3.24H_2O$ (Potash alum).

Reference Books:

- Vogel, A.I. A Textbook of Quantitative Inorganic Analysis, ELBS. 1978

C-6: ORGANIC CHEMISTRY-II

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Chemistry of Halogenated Hydrocarbons

Alkyl halides: Methods of preparation, nucleophilic substitution reactions SN_1 , SN_2 and SN_i mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination. Aryl halides: Preparation, including preparation from diazonium salts, nucleophilic aromatic substitution; SN_{Ar} , Benzyne mechanism. Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions. Organometallic compounds of Mg and Li Use in synthesis of organic compounds. (16 Lectures)

UNIT-II: Alcohols, Phenols, Ethers and Epoxides

Alcohols: preparation, properties and relative reactivity of 1, 2, 3 alcohols, Bouvaelt-Blanc Reduction; Preparation and properties of glycols: Oxidation by periodic acid and lead tetraacetate, Pinacol-Pinacolone rearrangement; Phenols: Preparation and properties; Acidity and factors affecting it, Ring substitution reactions, Reimer-Tiemann and Kolbe-Schmidt Reactions, Fries and Claisen rearrangements with mechanism; Ethers and Epoxides: Preparation and reactions with acids. Reactions of epoxides with alcohols, ammonia derivatives and $LiAlH_4$ (16 Lectures)

UNIT-III: Carbonyl Compounds

Structure, reactivity and preparation: Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Perkin, Cannizzaro and Wittig reaction, Beckmann rearrangements, haloform reaction and Baeyer Villiger oxidation, - substitution reactions, oxidations and reductions (Clemmensen, Wolff-Kishner, $LiAlH_4$, $NaBH_4$, MPV.; Addition reactions of unsaturated carbonyl compounds: Michael addition. Active methylene compounds: Keto-enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate. (14 Lectures)

UNIT-IV: Carboxylic Acids and their Derivatives

Preparation, physical properties and reactions of monocarboxylic acids: Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids: succinic, lactic, malic, tartaric, citric, maleic and fumaric acids; Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group -Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann-bromamide degradation and Curtius rearrangement. (10 Lectures)

Sulphur containing compounds

Preparation and reactions of thiols, thioethers. (4 Lectures)

Reference Books:

- Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Graham Solomons, T.W. Organic Chemistry, John Wiley & Sons, Inc.

PRACTICAL: C-6 LAB.

1. Functional group tests for alcohols, phenols, carbonyl and carboxylic acid group.
2. Organic preparations:
 - (i) Acetylation of one of the following compounds: amines (aniline, o-, m-, p-toluidines and o-, m-, p-anisidine) and phenols (-naphthol, vanillin, salicylic acid) by any one method:
 - (a) Using conventional method.
 - (b) Using green approach.
 - (ii) Benzoylation of one of the following amines (aniline, o-, m-, p-toluidines and o-, m-, p-anisidine) and one of the following phenols (-naphthol, resorcinol, p-cresol) by Schotten-Baumann reaction.
 - (iii) Bromination of any one of the following:
 - (a) Acetanilide by conventional methods.
 - (b) Acetanilide using green approach (Bromate-bromide method).
 - (iv) Nitration of any one of the following:
 - (a) Acetanilide/nitrobenzene by conventional method.
 - (b) Salicylic acid by green approach (using ceric ammonium nitrate).

The above derivatives should be prepared using 0.5-1gm. of the organic compound. The solid samples must be collected and may be used for recrystallization, melting point and TLC.

Reference Books:

- Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
- Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012).
- Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
- Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).

C-7: PHYSICAL CHEMISTRY-III

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes))

UNIT-I:Phase Equilibria-I

Concept of phases, components and degrees of freedom, derivation of Gibbs Phase Rule for nonre-active and reactive systems; Clausius-Clapeyron equation and its applications to solid-liquid, liquid-vapour and solid-vapour equilibria, phase diagram for one component systems, with applications (H_2O and sulphur system). Phase diagrams for systems of solid-liquid equilibria involving eutectic, congruent and incongruent melting points, solid solutions (Pb-Ag system, desilverisation of lead) (14 Lectures)

UNIT-II: Phase Equilibria-II

Three component systems, water-chloroform-acetic acid system, triangular plots. Binary solutions: Gibbs-Duhem-Margules equation, its derivation and applications to fractional distillation of binary

miscible liquids (ideal and non-ideal), azeotropes, partial miscibility of liquids, CST, miscible pairs, steam distillation. Nernst distribution law: its derivation and applications. (14 Lectures)

UNIT-III: Chemical Kinetics

Order and molecularity of a reaction, rate laws in terms of the advancement of a reaction, differential and integrated form of rate expressions up to second order reactions, experimental methods of the determination of orders, kinetics of complex reactions (integrated rate expressions up to first order only): (i) Opposing reactions (ii) parallel reactions and (iii) consecutive reactions and their differential rate equations (steady-state approximation in reaction mechanisms) (iv) chain reactions. Temperature dependence of reaction rates; Arrhenius equation; activation energy. Collision theory of reaction rates, qualitative treatment of the theory of absolute reaction rates. (18 Lectures)

UNIT-IV: Catalysis

Types of catalyst, specificity and selectivity, mechanisms of catalyzed reactions at solid surfaces; effect of particle size and efficiency of nanoparticles as catalysts. Enzyme catalysis, Michaelis-Menten mechanism, acid-base catalysis. (8 Lectures)

Surface chemistry

Physical adsorption, chemisorption, adsorption isotherms (Langmuir, Freundlich and Gibbs isotherms), nature of adsorbed state. (6 Lectures)

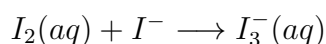
Reference Books:

- Peter Atkins & Julio De Paula, Physical Chemistry 9th Ed., Oxford University Press (2010).
- Castellan, G. W. Physical Chemistry, 4th Ed., Narosa (2004).
- McQuarrie, D. A. & Simon, J. D., Molecular Thermodynamics, Viva Books Pvt. Ltd.: New Delhi (2004).
- Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall (2012).
- Assael, M. J.; Goodwin, A. R. H.; Stamatoudis, M.; Wakeham, W. A. & Will, S.
- Commonly Asked Questions in Thermodynamics. CRC Press: NY (2011).
- Zundhal, S.S. Chemistry concepts and applications Cengage India (2011).
- Ball, D. W. Physical Chemistry Cengage India (2012).
- Mortimer, R. G. Physical Chemistry 3rd Ed., Elsevier: NOIDA, UP (2009).
- Levine, I. N. Physical Chemistry 6th Ed., Tata McGraw-Hill (2011).
- Metz, C. R. Physical Chemistry 2nd Ed., Tata McGraw-Hill (2009).

PRACTICAL: C-7 LAB.

I. Distribution of acetic/ benzoic acid between water and cyclohexane.

II. Study the equilibrium of at least one of the following reactions by the distribution method:



III. Study the kinetics of the following reactions.

(1) Integrated rate method:

a. Acid hydrolysis of methyl acetate with hydrochloric acid.

b. Saponification of ethyl acetate.

(2) Compare the strengths of HCl and H₂SO₄ by studying kinetics of hydrolysis of methyl acetate.

Adsorption

Verify the Freundlich and Langmuir isotherms for adsorption of acetic acid on activated charcoal.

Reference Books:

- Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
- Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
- Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

SEMESTER- IV

C-8: INORGANIC CHEMISTRY-III

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Coordination Chemistry

Werners theory, valence bond theory (inner and outer orbital complexes), electroneutrality principle and back bonding. Crystal field theory, measurement of CFSE weak and strong fields, pairing energies, factors affecting the magnitude of $10 Dq$ in octahedral vs. tetrahedral coordination, tetragonal distortions from octahedral geometry, Jahn-Teller theorem, square planar geometry. Qualitative aspect of ligand field and MO Theory. IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Stereochemistry of complexes with 4 and 6 coordination numbers. Chelate effect, Labile and inert complexes. (20 Lectures)

UNIT-II: Transition Elements-I

General group trends with special reference to electronic configuration, colour, variable valency, magnetic and catalytic properties, ability to form complexes. Stability of various oxidation states and e.m.f. (Latimer & Bsworth diagrams). Difference between the first, second and third transition series. (12 Lectures)

UNIT-III: Transition Elements-II

Chemistry of Ti, V, Cr Mn, Fe and Co in various oxidation states (excluding their metallurgy). (12 Lectures)

UNIT-IV: Lanthanoids and Actinoids

Electronic configuration, oxidation states, colour, spectral and magnetic properties, lanthanide contraction, separation of lanthanides (ion-exchange method only). General features of actinoids, separation of Np, Pm, Am from U. (6 Lectures)

Bioinorganic Chemistry

Metal ions present in biological systems, classification of elements according to their action in biological system. Na/K-pump, carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine. Iron and its application in bio-systems, Haemoglobin; Storage and transfer of iron. (10 Lectures)

Reference Books:

- Purcell, K.F. & Kotz, J.C. Inorganic Chemistry W.B. Saunders Co, 1977.
- Huheey, J.E., Inorganic Chemistry, Prentice Hall, 1993.
- Lippard, S.J. & Berg, J.M. Principles of Bioinorganic Chemistry Panima Publishing Company 1994.
- Cotton, F.A. & Wilkinson, G, Advanced Inorganic Chemistry. Wiley-VCH, 1999.
- Basolo, F, and Pearson, R.C., Mechanisms of Inorganic Chemistry, John Wiley & Sons, NY, 1967.
- Greenwood, N.N. & Earnshaw A., Chemistry of the Elements, Butterworth-Heinemann, 1997.

PRACTICAL: C-8 LAB.

Gravimetric Analysis:

- i. Estimation of nickel(II) using Dimethylglyoxime (DMG).
- ii Estimation of copper as CuSCN .
- iii. Estimation of iron as Fe_2O_3 by precipitating iron as $\text{Fe}(\text{OH})_3$.
- iv. Estimation of Al(III) by precipitating with oxine and weighing as $\text{Al}(\text{oxine})_3$ (aluminium oxinate).

Chromatography of metal ions

Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions:

- i. Ni(II) and Co(II)
- ii. Fe(III) and Al(III)

Reference Book:

- Vogel, A.I. A text book of Quantitative Analysis, ELBS 1986.

C-9: ORGANIC CHEMISTRY-III

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Nitrogen Containing Functional Groups

Preparation and important reactions of nitro and compounds, nitriles. Amines: Effect of substituent and solvent on basicity; Preparation and properties: Gabriel phthalimide synthesis, Carbylamine reaction, Mannich reaction, Hoffmanns exhaustive methylation, Hofmann-elimination reaction; Distinction between 1, 2 and 3 amines with Hinsberg reagent and nitrous acid. (14 Lectures)

UNIT-II: Diazonium Salts

Preparation and their synthetic applications.

Polynuclear Hydrocarbons

Reactions of naphthalene and anthracene Structure, Preparation and structure elucidation and important derivatives of naphthalene and anthracene. Polynuclear hydrocarbons. (12 Lectures)

UNIT-III: Heterocyclic Compounds

Classification and nomenclature, Structure, aromaticity in 5-numbered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of: Furan,

Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis), Pyrimidine. Fischer indole synthesis and Madelung synthesis, structure of quinoline and isoquinoline. Derivatives of furan: Furfural and furoic acid (preparation only). (18 Lectures)

UNIT-IV: Alkaloids

Natural occurrence, General structural features, Isolation and their physiological action Hoffmanns exhaustive methylation, Emde's modification, Structure elucidation and synthesis of Hygrine and Nicotine. Medicinal importance of Nicotine, Hygrine, Quinine, Morphine, Cocaine, and Reserpine. (8 Lectures) Terpenes Occurrence, classification, isoprene rule; Elucidation of structure and synthesis of Citral, Neral and -terpineol. (8 Lectures)

Reference Books:

- Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Acheson, R.M. Introduction to the Chemistry of Heterocyclic compounds, John Wiley & Sons (1976).
- Graham Solomons, T.W. Organic Chemistry, John Wiley & Sons, Inc.
- Kalsi, P. S. Textbook of Organic Chemistry 1st Ed., New Age International (P) Ltd. Pub.
- Clayden, J.; Greeves, N.; Warren, S.; Wothers, P.; Organic Chemistry, Oxford University Press.
- Singh, J.; Ali, S.M. & Singh, J. Natural Product Chemistry, Prajati Parakashan (2010).

PRACTICAL: C-9 LAB.

1. Detection of extra elements (N, X, S).
2. Functional group test for nitro, amine and amide groups.
3. Qualitative analysis of unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols and carbonyl compounds).

Reference Books:

- Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
- Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012).
- Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
- Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).

C-10: PHYSICAL CHEMISTRY-IV

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70
PRACTICAL (Each class 2 hrs.): Marks-30
Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Conductance-I

Arrhenius theory of electrolytic dissociation. Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Molar conductivity at infinite dilution. Kohlrausch law of independent migration of ions. Debye-Hückel-Onsager equation, Wien effect, Debye-Falkenhagen effect, Waldens rules. (12 Lectures)

UNIT-II: Conductance-II

Ionic velocities, mobilities and their determinations, transference numbers and their relation to ionic mobilities, determination of transference numbers using Hittorf and Moving Boundary methods. Applications of conductance measurement: (i) degree of dissociation of weak electrolytes, (ii) ionic product of water (iii) solubility and solubility product of sparingly soluble salts, (iv) conductometric titrations, and (v) hydrolysis constants of salts. (16 Lectures)

UNIT-III: Electrochemistry-I

Quantitative aspects of Faradays laws of electrolysis, rules of oxidation/reduction of ions based on half-cell potentials, applications of electrolysis in metallurgy and industry. Chemical cells, reversible and irreversible cells with examples. Electromotive force of a cell and its measurement, Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells. Application of EMF measurements in determining free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, using hydrogen, quinone-hydroquinone, glass electrodes. (18 Lectures)

UNIT-IV: Electrochemistry-II

Concentration cells with and without transference, liquid junction potential; determination of activity coefficients and transference numbers. Qualitative discussion of potentiometric titrations (acid-base, redox, precipitation). Electrical properties of atoms and molecules Basic ideas of electrostatics, Electrostatics of dielectric media. Clausius-Mosotti equation and Lorenz-Laurentz equation (no derivation), Dipole moment and molecular polarizabilities and their measurements. (14 Lectures)

Reference Books:

- Atkins, P.W & Paula, J.D. Physical Chemistry, 9th Ed., Oxford University Press (2011).
- Castellan, G. W. Physical Chemistry 4th Ed., Narosa (2004).
- Mortimer, R. G. Physical Chemistry 3rd Ed., Elsevier: NOIDA, UP (2009).
- Barrow, G. M., Physical Chemistry 5th Ed., Tata McGraw Hill: New Delhi (2006).
- Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall (2012).
- Rogers, D. W. Concise Physical Chemistry Wiley (2010).
- Silbey, R. J.; Alberty, R. A. & Bawendi, M. G. Physical Chemistry 4th Ed., John Wiley & Sons, Inc. (2005).

PRACTICAL: C-10 LAB.

Conductometry

- I. Determination of cell constant.
- II. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
- III. Perform the following conductometric titrations:
 - i. Strong acid vs. strong base
 - ii. Weak acid vs. strong base
 - iii. Strong acid vs. weak base

Potentiometry

- I. Perform the following potentiometric titrations:
 - i. Strong acid vs. strong base
 - ii. Weak acid vs. strong base
 - iii. Dibasic acid vs. strong base

Reference Books:

- Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
- Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
- Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

SEMESTER- V

C-11: ORGANIC CHEMISTRY-IV

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Nucleic Acids

Components of nucleic acids, Nucleosides and nucleotides; Structure, synthesis and reactions of: Adenine, Guanine, Cytosine, Uracil and Thymine; Structure of polynucleotides. (9 Lectures)

Enzymes

Introduction, classification and characteristics of enzymes. Salient features of active site of enzymes. Mechanism of enzyme action (taking trypsin as example), factors affecting enzyme action, coenzymes and cofactors and their role in biological reactions, specificity of enzyme action (including stereospecificity), enzyme inhibitors and their importance, phenomenon of inhibition (competitive, uncompetitive and non-competitive inhibition including allosteric inhibition). (8 Lectures)

UNIT-II: Amino Acids, Peptides and Proteins

Amino acids, peptides and their classification. -Amino acids - Synthesis, ionic properties and reactions. Zwitterions, pKa values, isoelectric point and electrophoresis. Study of peptides: determination of their primary structures-end group analysis, methods of peptide synthesis. Synthesis

of peptides using N-protecting, C-protecting and C-activating groups -Solid-phase synthesis (16 Lectures)

UNIT-III: Lipids

Introduction to oils and fats; common fatty acids present in oils and fats, Hydrogenation of fats and oils, Saponification value, acid value, iodine number. Reversion and rancidity. (8 Lectures)

Concept of Energy in Biosystems

Cells obtain energy by the oxidation of foodstuff (organic molecules). Introduction to metabolism (catabolism and anabolism). Overview of catabolic pathways of fat and protein. Interrelationship in the metabolic pathways of protein, fat and carbohydrate. Caloric value of food, standard caloric content of food types. (7 Lectures)

UNIT-IV: Pharmaceutical Compounds: Structure and Importance

Classification, structure and therapeutic uses of antipyretics: Paracetamol (with synthesis), Analgesics: Ibuprofen (with synthesis), Antimalarials: Chloroquine (with synthesis). An elementary treatment of Antibiotics and detailed study of chloramphenicol, Medicinal values of curcumin (haldi), azadirachtin (neem), vitamin C and antacid (ranitidine). (12 Lectures)

Reference Books:

- Berg, J.M., Tymoczko, J.L. and Stryer, L. (2006) Biochemistry. VIth Edition. W.H. Freeman and Co.
- Nelson, D.L., Cox, M.M. and Lehninger, A.L. (2009) Principles of Biochemistry. IV Edition. W.H. Freeman and Co.
- Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009) Harpers Illustrated Biochemistry. XXVIII edition. Lange Medical Books/ McGraw-Hill.

PRACTICAL: C-11 LAB.

1. Preparations of the following compounds:
 - i. Aspirine, ii. Phenacetin, iii. Milk of magnesia, iv. Aluminium hydroxide gel, v. Divol.
2. Saponification value of an oil or a fat.
3. Determination of Iodine number of an oil/ fat.

Reference Books:

- Manual of Biochemistry Workshop, 2012, Department of Chemistry, University of Delhi.
- Arthur, I. Vogel, Quantitative Organic Analysis, Pearson.

C-12: PHYSICAL CHEMISTRY-V

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Quantum Chemistry

Postulates of quantum mechanics, quantum mechanical operators, Schrödinger equation and its application to free particle and particle-in-a-box (rigorous treatment), quantization of energy levels,

zero-point energy and Heisenberg Uncertainty principle; wave functions, probability distribution functions, nodal properties. Extension to three dimensional boxes, separation of variables, degeneracy. Qualitative treatment of simple harmonic oscillator model of vibrational motion: Setting up of Schrödinger equation and discussion of solution and wave functions. Vibrational energy of diatomic molecules and zero-point energy. Angular momentum: Commutation rules, quantization of square of total angular momentum and z-component. Rigid rotator model of rotation of diatomic molecule. Schrödinger equation, transformation to spherical polar coordinates. Separation of variables (Preliminary treatment). Qualitative treatment of hydrogen atom and hydrogen-like ions: setting up of Schrödinger equation in spherical polar coordinates, radial part, quantization of energy (only final energy expression). Average and most probable distances of electron from nucleus. (18 Lectures)

UNIT-II: Chemical Bonding

Chemical bonding: Covalent bonding, valence bond and molecular orbital approaches, LCAO-MO treatment of H_2^+ . Bonding and antibonding orbitals. Qualitative extension to H_2 . Comparison of LCAO-MO and VB treatments of H_2 (only wavefunctions, detailed solution not required) and their limitations. Qualitative description of LCAO-MO treatment of homonuclear and heteronuclear diatomic molecules (HF, LiH). Localised and non-localised molecular orbitals treatment of triatomic (BeH_2 , H_2O) molecules. Qualitative MO theory and its application to AH_2 type molecules. (12 Lectures)

UNIT-III: Molecular Spectroscopy-I

Interaction of electromagnetic radiation with molecules and various types of spectra; Born-Oppenheimer approximation. Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

Vibrational spectroscopy: Classical equation of vibration, computation of force constant, amplitude of diatomic molecular vibrations, anharmonicity, Morse potential, dissociation energies, fundamental frequencies, overtones, hot bands, degrees of freedom for polyatomic molecules, modes of vibration. Vibration-rotation spectroscopy: diatomic vibrating rotator, P, Q, R branches.

Raman spectroscopy: Qualitative treatment of Rotational Raman effect; Effect of nuclear spin, Vibrational Raman spectra, Stokes and anti-Stokes lines; their intensity difference, rule of mutual exclusion. (16 Lectures)

UNIT-IV: Molecular Spectroscopy-II

Electronic spectroscopy: Franck-Condon principle, electronic transitions, singlet and triplet states, fluorescence and phosphorescence, dissociation and predissociation. (6 Lectures)

Photochemistry

Characteristics of electromagnetic radiation, Lambert-Beers law and its limitations, physical significance of absorption coefficients. Laws, of photochemistry, quantum yield, actinometry, examples of low and high quantum yields, photochemical equilibrium and the differential rate of photochemical reactions, photosensitised reactions, quenching. Role of photochemical reactions in biochemical processes, photostationary states, chemiluminescence. (8 Lectures)

Reference Books:

- Banwell, C. N. & McCash, E. M. Fundamentals of Molecular Spectroscopy 4th Ed. Tata McGraw-

Hill: New Delhi (2006).

- Chandra, A. K. Introductory Quantum Chemistry Tata McGraw-Hill (2001).
- House, J. E. Fundamentals of Quantum Chemistry 2nd Ed. Elsevier: USA (2004).
- Lowe, J. P. & Peterson, K. Quantum Chemistry, Academic Press (2005).
- Kakkar, R. Atomic & Molecular Spectroscopy, Cambridge University Press (2015).

PRACTICAL: C-12 LAB.

Colourimetry

1. Determine the concentration of HCl against 0.1 N NaOH spectrophotometrically.
2. To find the strength of given ferric ammonium sulfate solution of (0.05 M) by using EDTA spectrophotometrically.
3. To find out the strength of CuSO₄ solution by titrating with EDTA spectrophotometrically.
4. To determine the concentration of Cu(II) and Fe(III) solution photometrically by titrating with EDTA.

Reference Books:

- Khosla, B. D.; Garg, V. C. & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
- Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
- Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).
- Experimental Physical Chemistry by J. N. Gurtu, R. Kapoor.

SEMESTER- VI

C-13: INORGANIC CHEMISTRY-IV

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Organometallic Compounds-I

Definition and classification of organometallic compounds on the basis of bond type. Concept of hapticity of organic ligands. Metal carbonyls: 18 electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3d series. Structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT. π -acceptor behaviour of CO (MO diagram of CO to be discussed), synergic effect and use of IR data to explain extent of back bonding. Zeises salt: Preparation and structure, evidences of synergic effect and comparison of synergic effect with that in carbonyls. (14 Lectures)

UNIT-II: Organometallic Compounds-II

Metal Alkyls: Important structural features of methyl lithium (tetramer) and trialkyl aluminium

(dimer), concept of multicentre bonding in these compounds. Role of triethylaluminium in polymerisation of ethene (Ziegler Natta Catalyst). Species present in ether solution of Grignard reagent and their structures. Ferrocene: Preparation and reactions (acetylation, alkylation, metallation, Mannich Condensation), structure and aromaticity, comparison of aromaticity and reactivity with that of benzene. (14 Lectures)

UNIT-III: Theoretical Principles in Qualitative Analysis (H_2S Scheme)

Basic principles involved in analysis of cations and anions and solubility products, common ion effect. Principles involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride, borate, oxalate and phosphate) and need to remove them after Group II. (10 Lectures)

Catalysis by Organometallic Compounds

Study of the following industrial processes and their mechanism:

1. Alkene hydrogenation (Wilkinsons Catalyst).
2. Hydroformylation (Co salts).
3. Wacker Process.
4. Synthetic gasoline (Fischer Tropsch reaction). (8 Lectures)

UNIT-IV: Reaction Kinetics and Mechanism

Introduction to inorganic reaction mechanisms. Substitution reactions in square planar complexes, Trans-effect and its applications, theories of trans effect, Mechanism of nucleophilic substitution in square planar complexes. Thermodynamic and kinetic stability, Kinetics of octahedral substitution (classification of metal ions based on water exchange rate), General mechanism of substitution in octahedral complexes (D , I , I_d , I_a). (14 Lectures)

Reference Books:

- Vogel, A.I. Qualitative Inorganic Analysis, Longman, 1972.
- Svehla, G. Vogel's Qualitative Inorganic Analysis, 7th Edition, Prentice Hall, 1996-03-07.
- Huheey, J. E.; Keiter, E.A. & Keiter, R.L. Inorganic Chemistry, Principles of Structure and Reactivity 4th Ed., Harper Collins 1993, Pearson, 2006.
- Sharpe, A.G. Inorganic Chemistry, 4th Indian Reprint (Pearson Education) 2005.
- Douglas, B. E.; McDaniel, D.H. & Alexander, J.J. Concepts and Models in Inorganic Chemistry, 3rd Ed., John Wiley and Sons, NY, 1994.
- Greenwood, N.N. & Earnshaw, A. Chemistry of the Elements, Elsevier 2nd Ed, 1997 (Ziegler Natta Catalyst and Equilibria in Grignard Solution).
- Lee, J.D. Concise Inorganic Chemistry 5th Ed., John Wiley and sons 2008.
- Powell, P. Principles of Organometallic Chemistry, Chapman and Hall, 1988.
- Shriver, D.D. & P. Atkins, Inorganic Chemistry 2nd Ed., Oxford University Press, 1994.
- Basolo, F. & Person, R. Mechanisms of Inorganic Reactions: Study of Metal Complexes in Solution 2nd Ed., John Wiley & Sons Inc; NY.
- Purcell, K.F. & Kotz, J.C., Inorganic Chemistry, W.B. Saunders Co. 1977.
- Miessler, G. L. & Donald, A. Tarr, Inorganic Chemistry 4th Ed., Pearson, 2010.
- Collman, James P. et al. Principles and Applications of Organotransition Metal Chemistry. Mill Valley, CA: University Science Books, 1987.

- Crabtree, Robert H. The Organometallic Chemistry of the Transition Metals, New York, NY: John Wiley, 2000.
- Spessard, Gary O., & Gary L. Miessler. Organometallic Chemistry. Upper Saddle River, NJ: Prentice-Hall, 1996.
- Mehrotra R.C. and Singh, A. Organometallic Chemistry, New Age International Publishers, 2nd Edn, 2000.

PRACTICAL: C-13 LAB.

Qualitative semimicro analysis of mixtures containing 3 anions and 3 cations. Emphasis should be given to the understanding of the chemistry of different reactions. The following radicals are suggested:

CO_3^{2-} , NO_2^- , S^- , SO_3^- , $S_2O_3^{2-}$, CH_3COO^- , F^- , Cl^- , Br^- , I^- , NO_3^- , BO_3^- , $C_2O_4^{2-}$, PO_4^{3-} , NH_4^+ , K^+ , Pb_2^+ , Cu_2^+ , Cd_2^+ , Bi_3^+ , Sn^{2+} , Sb^{3+} , Fe^{3+} , Al^{3+} , Cr^{3+} , Zn^{2+} , Mn^{2+} , Co^{2+} , Ni^{2+} , Ba^{2+} , Sr^{2+} , Ca^{2+} , Mg^{2+} . Mixtures should preferably contain one interfering anion, or insoluble component ($BaSO_4$, $SrSO_4$, $PbSO_4$, CaF_2 or Al_2O_3) or combination of anions e.g. CO_3^{2-} and SO_3^{2-} , NO_2^- and NO_3^- , Cl^- and Br^- , Cl^- and I^- , Br^- and I^- , NO_3^- and Br^- , NO_3^- and I^- . Spot tests should be done whenever possible.

Reference Books:

- Vogels Qualitative Inorganic Analysis, Revised by G. Svehla.
- Marr & Rockett Inorganic Preparations.

C-14: ORGANIC CHEMISTRY-IV

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes) Lectures: 60(40 Theory + 20 Practical classes)

UNIT-I: Organic Spectroscopy-I

UV Spectroscopy: Types of electronic transitions, max, Chromophores and Auxochromes, Bathochromic and Hypsochromic shifts, Intensity of absorption; Application of Woodward rules for calculation of max for the following systems: , the unsaturated aldehydes: ketones, carboxylic acids and esters; Conjugated dienes: alicyclic, homoannular and heteroannular; Extended conjugated systems (aldehydes, ketones and dienes); distinction between cis and trans isomers.

IR Spectroscopy: Fundamental and non-fundamental molecular vibrations; IR absorption positions of O, N and S containing functional groups; Effect of H-bonding, conjugation, resonance and ring size on IR absorptions; Fingerprint region and its significance; application in functional group analysis. (18 Lectures)

UNIT-II: Organic Spectroscopy-II

NMR Spectroscopy: Basic principles of Proton Magnetic Resonance, chemical shift and factors influencing it; Spin-spin coupling and coupling constant; Anisotropic effects in alkene, alkyne, aldehydes and aromatics; Interpretation of NMR spectra of simple compounds. Mass Spectroscopy-Basic principle, Fragmentation pattern, Instrumentation, Determination of m/e ratio. Application of Mass Spectroscopy on CH₄, C₂H₆, n-butane and neo-pentane. Applications of IR, UV and NMR for identification of simple organic molecules. (12 Lectures)

UNIT-III: Carbohydrates

Occurrence, classification and their biological importance. Monosaccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani-Fischer synthesis and Ruff degradation; Disaccharides Structure elucidation of maltose. Polysaccharides Elementary treatment of starch, cellulose. (8 Lectures)

Dyes

Classification, colour and constitution; Mordant and Vat dyes; Chemistry of dyeing. Synthesis and applications of: Azo dyes Methyl orange and Congo red (mechanism of Diazo Coupling); Triphenyl methane dyes - Malachite Green, and crystal violet; Phthalein dyes Phenolphthalein and Fluorescein; Natural dyes Alizarin and Indigo; Edible dyes with examples. (8 Lectures)

UNIT-IV: Polymers

Introduction and classification including di-block, tri-block and amphiphilic polymers; Number average molecular weight, Weight average molecular weight, Degree of polymerization, Polydispersity Index. Polymerisation reactions -Addition and condensation -Mechanism of cationic, anionic and free radical addition polymerization; Metallocene-based Ziegler-Natta polymerisation of alkenes; Preparation and applications of plastics thermosetting (phenol-formaldehyde, Polyurethanes) and thermosoftening (PVC, polythene); Fabrics natural and synthetic (acrylic, polyamido, polyester); Rubbers natural and synthetic: Buna-S and Neoprene; Vulcanization; Polymer additives; Biodegrad-

able and conducting polymers with examples. (14 Lectures)

Reference Books:

- Kalsi, P. S. Textbook of Organic Chemistry 1st Ed., New Age International (P) Ltd. Pub.
- Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Billmeyer, F. W. Textbook of Polymer Science, John Wiley & Sons, Inc.
- Gowariker, V. R.; Viswanathan, N. V. & Sreedhar, J. Polymer Science, New Age International (P) Ltd. Pub.
- Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Graham Solomons, T.W. Organic Chemistry, John Wiley & Sons, Inc.
- Clayden, J.; Greeves, N.; Warren, S.; Wothers, P.; Organic Chemistry, Oxford University Press.
- Singh, J.; Ali, S.M. & Singh, J. Natural Product Chemistry, Pragati Prakashan (2010).
- Kemp, W. Organic Spectroscopy, Palgrave.

PRACTICAL: C-14 LAB.

1. Extraction of caffeine from tea leaves.
2. Preparation of sodium polyacrylate.
3. Preparation of urea formaldehyde.
4. Analysis of Carbohydrate: aldoses and ketoses, reducing and non-reducing sugars.
5. Qualitative analysis of unknown organic compounds containing mono-functional groups (carbohydrates, aryl halides, aromatic hydrocarbons, nitro compounds, amines and amides) and simple bifunctional groups, for e.g. salicylic acid, cinnamic acid, nitrophenols etc.

Reference Books:

- Vogel, A.I. Quantitative Organic Analysis, Part 3, Pearson (2012).
- Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
- Furniss, B.S., Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012).
- Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
- Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).

DISCIPLINE SPECIFIC ELECTIVE(DSE)

SEMESTER-V

DSE-1: POLYMER CHEMISTRY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Introduction and history of polymeric materials:

Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers. (4 Lectures)

Functionality and its importance:

Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bi-functional systems, Poly-functional systems. (8 Lectures)

UNIT-II: Kinetics of Polymerization:

Mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques. (8 lectures)

Crystallization and crystallinity:

Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting point. (4 Lectures)

Nature and structure of polymers-Structure property relationships. (2 Lectures)

UNIT-III: Determination of molecular weight of polymers

(M_n , M_w , etc.) by end group analysis, viscometry, light scattering and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index. (8 Lectures)

Glass transition temperature (T_g) and determination of T_g

WLF equation, Factors affecting glass transition temperature (T_g). (8 Lectures)

UNIT-IV: Polymer Solution

Criteria for polymer solubility, Solubility parameter, Thermodynamics of polymer solutions, entropy, enthalpy, and free energy change of mixing of polymers solutions. (8 Lectures)

Properties of Polymers

(Physical, thermal & mechanical properties). Brief introduction to preparation, structure, properties and application of the following polymers: polyolefins, polystyrene and styrene copolymers, poly(vinyl chloride) poly(vinyl acetate), polyacrylamide, fluoro polymers (Teflon), polyamides (nylon-6 and nylon 6,6). Phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, silicone polymers (polysiloxane), Polycarbonates, Conducting Polymers, (polyacetylene, polyaniline). (10 Lectures)

Reference Books:

- Seymours Polymer Chemistry, Marcel Dekker, Inc.

- G. Odian: Principles of Polymerization, John Wiley.
- F.W. Billmeyer: Text Book of Polymer Science, John Wiley.
- P. Ghosh: Polymer Science & Technology, Tata Mcgraw-Hill.
- R.W. Lenz: Organic Chemistry of Synthetic High Polymers.

PRACTICAL: DSE-1 LAB.

Polymer synthesis

1. Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA).
 - (a) Purification of monomer.
 - (b) Polymerization using benzoyl peroxide (BPO) / 2,2-azo-bis-isobutyronitrile (AIBN).
2. Preparation of nylon 66/6.
3. Interfacial polymerization, preparation of polyester from isophthaloyl chloride (IPC) and phenolphthalein.
 - (a) Preparation of IPC.
 - (b) Purification of IPC.
 - (c) Interfacial polymerization.
4. Redox polymerization of acrylamide.
5. Precipitation polymerization of acrylonitrile.
6. Preparation of urea-formaldehyde resin.
7. Preparations of novalac resin/resold resin.
8. Microscale Emulsion Polymerization of poly(methylacrylate).

Polymer characterization

1. Determination of molecular weight by viscometry:
 - (a) Polyacrylamide-aq. NaNO₂ solution
 - (b) (Poly vinyl propylidene (PVP) in water
2. Determination of the viscosity-average molecular weight of poly(vinyl alcohol) (PVOH) and the fraction of head-to-head monomer linkages in the polymer.
3. Determination of molecular wt. by end group analysis: Polyethylene glycol (PEG) (OH group).
4. Determination of hydroxyl number of a polymer using colorimetric method.

Polymer analysis

1. Estimation of the amount of HCHO in the given solution by sodium sulphite method
2. Instrumental Techniques
3. IR studies of polymers

*at least 5 experiments to be carried out.

Reference Books:

- Malcom P. Stevens, Polymer Chemistry: An Introduction, 3rd Ed.
- Harry R. Allcock, Frederick W. Lampe and James E. Mark, Contemporary Polymer Chemistry, 3rd ed. Prentice-Hall (2003).
- Fred W. Billmeyer, Textbook of Polymer Science, 3rd ed. Wiley-Interscience (1984).
- Joel R. Fried, Polymer Science and Technology, 2nd ed. Prentice-Hall (2003).
- Petr Munk and Tejraj M. Aminabhavi, Introduction to Macromolecular Science, 2nd ed. John

Wiley & Sons (2002).

- L.H. Sperling, Introduction to Physical Polymer Science, 4th ed. John Wiley & Sons (2005).
- Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd ed. Oxford University Press (2005).
- Seymour/ Carraher's Polymer Chemistry, 9th ed. by Charles E. Carraher, Jr. (2013).

DSE-2: GREEN CHEMISTRY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

—bf UNIT-I: Introduction to Green Chemistry

What is Green Chemistry? Need for Green Chemistry. Goals of Green Chemistry. Limitations/Obstacles in the pursuit of the goals of Green Chemistry. (4 Lectures)

Principles of Green Chemistry and Designing a Chemical synthesis-I

Twelve principles of Green Chemistry with their explanations and examples with special emphasis on: Designing a Green Synthesis using these principles; Prevention of Waste/ byproducts; maximum incorporation of the materials used in the process into the final products, Atom Economy, calculation of atom economy of the rearrangement, addition, substitution and elimination reactions. Prevention/minimization of hazardous/ toxic products reducing toxicity. $\text{risk} = (\text{function}) \text{hazard} \text{exposure}$; waste or pollution prevention hierarchy. Green solvents supercritical fluids, water as a solvent for organic reactions, ionic liquids, fluoruous biphasic solvent, PEG, solventless processes, immobilized solvents and how to compare greenness of solvents. (12 Lectures)

UNIT-II: Principles of Green Chemistry and Designing a Chemical synthesis-II

Explanation of principles with special emphasis on: Energy requirements for reactions alternative sources of energy: use of microwaves and ultrasonic energy. Selection of starting materials; avoidance of unnecessary derivatization careful use of blocking/protecting groups. Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents; catalysis and green chemistry, comparison of heterogeneous and homogeneous catalysis, biocatalysis, asymmetric catalysis and photocatalysis. Prevention of chemical accidents designing greener processes, inherent safer design, principle of ISD What you dont have cannot harm you, greener alternative to Bhopal Gas Tragedy (safer route to carcarbaryl) and Flixiborough accident (safer route to cyclohexanol) subdivision of ISD, minimization, simplification, substitution, moderation and limitation. Strengthening/ development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes. (14 Lectures)

UNIT-III: Examples of Green Synthesis/ Reactions and some real world cases-I

Green Synthesis of the following compounds: adipic acid, catechol, disodium iminodiacetate (alternative to Strecker synthesis) Microwave assisted reactions in water: Hofmann Elimination, methyl benzoate to benzoic acid, oxidation of toluene and alcohols; microwave assisted reactions in organic solvents: Diels-Alder reaction and Decarboxylation reaction. Ultrasound assisted reactions: sonochemical Simmons-Smith Reaction (Ultrasonic alternative to Iodine). Surfactants for carbon dioxide replacing smog producing and ozone depleting solvents with CO₂ for precision cleaning and dry cleaning of garments. Designing of Environmentally safe marine antifoulant. (14 Lectures)

UNIT-IV: Examples of Green Synthesis/ Reactions and some real world cases-II

Rightfit pigment: synthetic azopigments to replace toxic organic and inorganic pigments. An efficient, green synthesis of a compostable and widely applicable plastic (poly lactic acid) made from corn. Healthier Fats and oil by Green Chemistry: Enzymatic Inter esterification for production of

no Trans-Fats and Oils Development of Fully Recyclable Carpet: Cradle to Cradle Carpeting (6 Lectures)

Future Trends in Green Chemistry

Oxidation reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solventless reactions; co crystal controlled solid state synthesis (C2S3); Green chemistry in sustainable development. (10 Lectures)

Reference Books:

- V.K. Ahluwalia & M.R. Kidwai: New Trends in Green Chemistry, • Anamalaya Publishers (2005).
- P.T. Anastas & J.K. Warner: Oxford Green Chemistry- Theory and Practical, University Press (1998).
- A.S. Matlack: Introduction to Green Chemistry, Marcel Dekker (2001).
- M.C. Cann & M.E. Connely: Real-World cases in Green Chemistry, American Chemical Society, Washington (2000).
- M.A. Ryan & M. Tinnesand, Introduction to Green Chemistry, American Chemical Society, Washington (2002).

PRACTICAL: DSE-2

1. Safer starting materials.
 - The Vitamin C clock reaction using Vitamin C tablets, tincture of iodine, hydrogen peroxide and liquid laundry starch.
 - Effect of concentration on clock reaction.
 - Preparation and characterization of nanoparticles (Ag, Au) using plant extract.
 2. Using renewable resources
 - Preparation of biodiesel from vegetable oil.
 3. Avoiding waste
 - Principle of atom economy.
 - Use of molecular model kit to stimulate the reaction to investigate how the atom economy can illustrate Green Chemistry.
 - Preparation of propene by two methods can be studied.
- (I) Triethylamine ion + $\text{OH}^- \xrightarrow{\text{H}_2\text{SO}_4/\Delta}$ propene + trimethylpropene + water
- (II) 1-propanol \longrightarrow propene + water
- The other types of reactions, like addition, elimination, substitution and rearrangement should also be studied for the calculation of atom economy.
4. Use of enzymes as catalysts
 - Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide
 5. Alternative Green solvents
 - Diels Alder reaction in water
 - Reaction between furan and maleic acid in water and at room temperature rather than in benzene and reflux.
 - Extraction of D-limonene from orange peel using liquid CO_2 prepared from dry ice.
 - Mechanochemical solvent free synthesis of azomethines
 4. Alternative sources of energy
 - Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of Cu(II).

- Photoreduction of benzophenone to benzopinacol in the presence of sunlight.

Reference Books:

- Anastas, P.T & Warner, J.C. Green Chemistry: Theory and Practice, Oxford University Press (1998).
- Kirchoff, M. & Ryan, M.A. Greener approaches to undergraduate chemistry experiment. American Chemical Society, Washington DC (2002).
- Ryan, M.A. Introduction to Green Chemistry, Tinnesand; (Ed), American Chemical Society, Washington DC (2002).
- Sharma, R.K.; Sidhwani, I.T. & Chaudhari, M.K. I.K. Green Chemistry Experiment: A monograph International Publishing House Pvt Ltd. New Delhi. Bangalore CISBN 978-93-81141-55-7 (2013).
- Cann, M.C. & Connelly, M. E. Real world cases in Green Chemistry, American Chemical Society (2008).
- Cann, M. C. & Thomas, P. Real world cases in Green Chemistry, American Chemical Society (2008).

DSE-3: INDUSTRIAL CHEMICALS AND ENVIRONMENT

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Industrial Gases and Inorganic Chemicals

Industrial Gases: Large scale production, uses, storage and hazards in handling of the following gases: oxygen, nitrogen, argon, neon, helium, hydrogen, acetylene, carbon monoxide, chlorine, sulphur dioxide. Inorganic Chemicals: Manufacture, application and hazards in handling the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, bleaching powder, sodium thiosulphate, hydrogen peroxide, potash alum, potassium dichromate and potassium permanganate. (10 Lectures)

bf Industrial Metallurgy

Preparation of metals (ferrous and nonferrous) and ultrapure metals for semiconductor technology. (4 Lectures)

UNIT-II: Environment and its segments

Ecosystems. Biogeochemical cycles of carbon, nitrogen and sulphur. Air Pollution: Major regions of atmosphere. Chemical and photochemical reactions in atmosphere. Air pollutants: types, sources, particle size and chemical nature; Photochemical smog: its constituents and photochemistry. Environmental effects of ozone. Major sources of air pollution. Pollution by SO_2 , CO_2 , CO , NO_x , and H_2S and control procedures. Effects of air pollution on living organisms and vegetation. Greenhouse effect and global warming, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and halogens, removal of sulphur from coal. (14 Lectures)

UNIT-III: Water Pollution: Hydrological cycle, water resources, aquatic ecosystems, Sources and nature of water pollutants, Techniques for measuring water pollution, Impacts of water pollution on hydrological and ecosystems. Water purification methods. Effluent treatment plants (primary, sec-

ondary and tertiary treatment). Industrial effluents from the following industries and their treatment: electroplating, textile, tannery, dairy, petroleum and petrochemicals, fertilizer. Sludge disposal. Industrial waste management, incineration of waste. Water treatment and purification (reverse osmosis, ion exchange). Water quality parameters for waste water, industrial water and domestic water. (16 Lectures)

UNIT-IV: Energy & Environment

Sources of energy: Coal, petrol and natural gas. Nuclear fusion/fission, solar energy, hydrogen, geothermal, tidal and hydel. Nuclear Pollution: Disposal of nuclear waste, nuclear disaster and its management. (10 Lectures)

Biocatalysis: Introduction to biocatalysis: Importance in green chemistry and chemical industry. (6 Lectures)

Reference Books:

- E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
- R.M. Felder, R.W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
- A. Kent: Riegels Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
- S. S. Dara: A Textbook of Engineering Chemistry, S. Chand & Company Ltd. New Delhi.
- De, Environmental Chemistry: New Age International Pvt., Ltd, New Delhi.
- S. M. Khopkar, Environmental Pollution Analysis: Wiley Eastern Ltd, New Delhi.
- S.E. Manahan, Environmental Chemistry, CRC Press (2005).
- G.T. Miller, Environmental Science 11th edition. Brooks/ Cole (2006).
- Mishra, Environmental Studies. Selective and Scientific Books, New Delhi (2005).

PRACTICAL: DSE-3

1. Determination of dissolved oxygen in water.
2. Determination of Chemical Oxygen Demand (COD).
3. Determination of Biological Oxygen Demand (BOD).
4. Percentage of available chlorine in bleaching powder.
5. Measurement of chloride, sulphate and salinity of water samples by simple titration method ($AgNO_3$ and potassium chromate).
6. Estimation of total alkalinity of water samples (CO_3^{2-} , HCO_3^-) using double titration method.
7. Measurement of dissolved CO_2 .
8. Study of some of the common bio-indicators of pollution.
9. Estimation of SPM in air samples.
10. Preparation of borax/ boric acid.

- Reference Books:**
- E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
 - R.M. Felder, R.W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
 - A. Kent: Riegels Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
 - S. S. Dara: A Textbook of Engineering Chemistry, S. Chand & Company Ltd. New Delhi.
 - De, Environmental Chemistry: New Age International Pvt., Ltd, New Delhi.
 - S. M. Khopkar, Environmental Pollution Analysis: Wiley Eastern Ltd, New Delhi.

DSE-4: DISSERTATION/PROJECT WORK

Marks:100

SKILL ENHANCEMENT COURSES (SEC)

SEMESTER- III

SEC-I: PESTICIDE CHEMISTRY

(Credits: 02)- Max. Marks: 50
30 Lectures(Each Lecture 1 hr.)

General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, structure activity relationship, synthesis and technical manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene,); Organophosphates (Malathion, Parathion); Carbamates (Carbofuran and carbaryl); Quinones (Chloranil), Anilides (Alachlor and Butachlor).

Practical

- To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications.
- Preparation of simple organophosphates, phosphonates and thiophosphates.

Reference Book:

- R. Cremlyn: Pesticides, John Wiley.

SEMESTER- IV

SEC-II: FUEL CHEMISTRY

(Credits: 02)- Max. Marks: 50
30 Lectures(Each Lecture 1 hr.)

Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value Coal: Uses of coal (fuel and non-fuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas and water gas composition and uses. Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro gasification and Catalytic gasification), Coal liquefaction and Solvent Refining.

Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications. Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels. Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene.

Lubricants: Classification of lubricants, lubricating oils (conducting and non-conducting) Solid and semisolid lubricants, synthetic lubricants. Properties of lubricants (viscosity index, cloud point, pore point) and their determination.

large Reference Books:

- E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK.
- P.C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
- B.K. Sharma: Industrial Chemistry, Goel Publishing House, Meerut.

GENERIC ELECTIVE(GE)

B.Sc.(Hons.) Students other than Chemistry Honours will opt four Chemistry GE Papers.

SEMESTER-I

GE-I: ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

SECTION A: INORGANIC CHEMISTRY-1 (30 Periods)

Unit-I: Atomic Structure

Review of: Bohrs theory and its limitations, dual behaviour of matter and radiation, de-Broglies relation, Heisenberg Uncertainty principle. Hydrogen atom spectra.

What is Quantum mechanics ? Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ^2 , Schrödinger equation for hydrogen atom. Radial and angular parts of the hydrogenic wave functions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation). Significance of quantum numbers, orbital angular momentum and quantum numbers m_l and m_s . Shapes of s, p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (m_s). Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations. (14 Lectures)

Unit-II: Chemical Bonding and Molecular Structure

Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Land equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajans rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.

Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. Concept of resonance and resonating structures in various inorganic and organic compounds.

MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for s-s, s-p and p-p combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules (N_2 , O_2) and heteronuclear diatomic molecules (CO, NO). Comparison of VB and MO approaches. (16 Lectures)

Section B: Organic Chemistry-1 (30 Periods)

Unit- III: Fundamentals of Organic Chemistry

Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis.

Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Hckels rule. (8 Lectures)

Stereochemistry

Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). D and L; cis-trans nomenclature; CIP Rules: R/S (for one chiral carbon atoms) and E/Z Nomenclature (for up to two C=C systems). (10 Lectures)

Unit- IV: Aliphatic Hydrocarbons

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. Alkanes: (Upto 5 Carbons). Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbes synthesis, from Grignard reagent. Reactions: Free radical Substitution: Halogenation.

Alkenes: (Upto 5 Carbons) Preparation: Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeffs rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis-addition (alk. $KMnO_4$) and trans-addition (bromine), Addition of HX (Markownikoffs and anti-Markownikoffs addition), Hydration, Ozonolysis, Alkynes: (Upto 5 Carbons) Preparation: Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides.

Reactions: formation of metal acetylides, addition of bromine and alkaline $KMnO_4$, ozonolysis. (12 Lectures)

Reference Books:

- J. D. Lee: A new Concise Inorganic Chemistry, E L. B. S.
- F. A. Cotton & G. Wilkinson: Basic Inorganic Chemistry, John Wiley.
- Douglas, McDaniel and Alexader: Concepts and Models in Inorganic Chemistry, John Wiley.
- T. W. Graham Solomon: Organic Chemistry, John Wiley and Sons.
- Peter Sykes: A Guide Book to Mechanism in Organic Chemistry, Orient Longman.
- E. L. Eliel: Stereochemistry of Carbon Compounds, Tata McGraw Hill. I. L. Finar: Organic Chemistry (Vol. I & II), E. L. B. S.
- R. T. Morrison & R. N. Boyd: Organic Chemistry, Prentice Hall.
- Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand.

PRACTICAL: GE-I LAB.

Section A: Inorganic Chemistry-Volumetric Analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Estimation of oxalic acid by titrating it with $KMnO_4$.
3. Estimation of water of crystallization in Mohrs salt by titrating with $KMnO_4$.

4. Estimation of Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator.
5. Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.

Section B: Organic Chemistry

1. Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing upto two extra elements).
2. Separation of mixtures by Chromatography: Measure the R_f value in each case (combination of two compounds to be given).
 - (a) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography.
 - (b) Identify and separate the sugars present in the given mixture by paper chromatography.

large Reference Books:

- Vogels Qualitative Inorganic Analysis, A.I. Vogel, Prentice Hall, 7th Edition.
- Vogels Quantitative Chemical Analysis, A.I. Vogel, Prentice Hall, 6th Edition.
- Textbook of Practical Organic Chemistry, A.I. Vogel, Prentice Hall, 5th edition.
- Practical Organic Chemistry, F. G. Mann. & B. C. Saunders, Orient Longman, 1960.

SEMESTER-II

GE-II: CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY-I

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Section A: Physical Chemistry-1 (30 Lectures)

Unit-I: Chemical Energetics

Review of thermodynamics and the Laws of Thermodynamics. Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature Kirchhoffs equation. Statement of Third Law of thermodynamics (10 Lectures)

Chemical Equilibrium:

Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between G and G_0 , Le Chateliers principle. Relationships between K_p , K_c and K_x for reactions involving ideal gases. (8 Lectures)

Unit- II: Ionic Equilibria

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different

salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts applications of solubility product principle. (12 Lectures)

Section B: Organic Chemistry-2 (30 Lectures)

Unit- III:

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. Aromatic hydrocarbons: Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Crafts reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (up to 4 carbons on benzene). (8 Lectures)

Alkyl and Aryl Halides

Alkyl Halides (Up to 5 Carbons) Types of Nucleophilic Substitution (SN_1 , SN_2 and SN_i) reactions. Preparation: from alkenes and alcohols.

Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamsons ether synthesis: Elimination vs substitution.

Aryl Halides Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions. Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$). (8 Lectures)

Unit- IV: Alcohols, Phenols and Ethers (Upto 5 Carbons)

Alcohols: Preparation: Preparation of 1, 2 and 3 alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes and ketones, carboxylic acid and esters.

Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. $KMnO_4$, acidic dichromate, conc. HNO_3). Oppeneauer oxidation Diols: (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.

Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Gattermann-Koch Reaction,

Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

Aldehydes and ketones (aliphatic and aromatic): Formaldehyde, acetaldehyde, acetone and benzaldehyde

Preparation: from acid chlorides and from nitriles.

Reactions Reaction with HCN, ROH, $NaHSO_3$, $NH_2 - G$ derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. (14 Lectures)

Reference Books:

- T. W. Graham Solomons: Organic Chemistry, John Wiley and Sons.
- Peter Sykes: A Guide Book to Mechanism in Organic Chemistry, Orient Longman.
- I.L. Finar: Organic Chemistry (Vol. I & II), E. L. B. S.
- R. T. Morrison & R. N. Boyd: Organic Chemistry, Prentice Hall.
- Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand.

- G. M. Barrow: Physical Chemistry Tata McGraw-Hill (2007).
- G. W. Castellan: Physical Chemistry 4th Edn. Narosa (2004).
- C. Kotz, P. M. Treichel & J. R. Townsend: General Chemistry Cengage Lening India Pvt. Ltd., New Delhi (2009).
- H. Mahan: University Chemistry 3rd Ed. Narosa (1998).
- R. H. Petrucci: General Chemistry 5th Ed. Macmillan Publishing Co.: New York (1985).

PRACTICAL: GE-II LAB.

Section A: Physical Chemistry

Thermochemistry

1. Determination of heat capacity of calorimeter for different volumes.
2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Determination of enthalpy of ionization of acetic acid.
4. Determination of integral enthalpy of solution of salts (KNO₃, NH₄Cl).
5. Determination of enthalpy of hydration of copper sulphate.
6. Study of the solubility of benzoic acid in water and determination of H. **Ionic equilibria**
pH measurements a) Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.
b) Preparation of buffer solutions:
(i) Sodium acetate-acetic acid.
(ii) Ammonium chloride-ammonium hydroxide.
Measurement of the pH of buffer solutions and comparison of the values with theoretical values.

Section B: Organic Chemistry

1. Purification of organic compounds by crystallization (from water and alcohol) and distillation.
2. Criteria of Purity: Determination of melting and boiling points.
3. Preparations: Mechanism of various reactions involved to be discussed. Recrystallisation, determination of melting point and calculation of quantitative yields to be done.
(a) Bromination of Phenol/Aniline.
(b) Benzoylation of amines/phenols.
(c) Oxime and 2,4 dinitrophenylhydrazone of aldehyde/ketone.

Reference Books:

- A.I. Vogel: Textbook of Practical Organic Chemistry, 5th edition, Prentice-Hall.
- F. G. Mann & B. C. Saunders, Practical Organic Chemistry, Orient Longman (1960).
- B.D. Khosla, Senior Practical Physical Chemistry, R. Chand & Co.

SEMESTER-III

GE-III: CHEMISTRY OF S- AND P-BLOCK ELEMENTS, STATES OF MATTER & CHEMICAL KINETICS

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30
Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: General Principles of Metallurgy

Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon as reducing agent. Hydrometallurgy, Methods of purification of metals (Al, Pb, Fe, Cu, Ni, Zn): electrolytic, oxidative refining, Parting process, van Arkel-de Boer process and Mond's process. (4 Lectures)

s- and p-Block Elements

Periodicity in s- and p-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electronegativity (Pauling & Mulliken scales). Allotropy in C, S, and P.

Oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides), inert pair effect, diagonal relationship and anomalous behaviour of first member of each group. (11 Lectures)

UNIT-II: Compounds of s- and p-Block Elements

Hydrides and their classification (ionic, covalent and interstitial), structure and properties with respect to stability of hydrides of p- block elements. Concept of multicentre bonding (diborane).

Structure, bonding and their important properties like oxidation/reduction, acidic/basic nature of the following compounds and their applications in industrial, organic and environmental chemistry.

Hydrides of nitrogen (NH_3 , N_2H_4 , N_3H , NH_2OH)

Oxoacids of P, S and Cl.

Halides and oxohalides: PCl_3 , PCl_5 , $SOCl_2$. (15 Lectures)

Section B: Physical Chemistry-3 (30 Lectures)

UNIT-III: Kinetic Theory of Gases

Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation. Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. van der Waals equation of state for real gases. Boyle temperature (derivation not required). Critical phenomena, critical constants and their calculation from van der Waals equation. Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation derivation not required) and their importance.

Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation). Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules. Viscosity of gases and effect of temperature and pressure on coefficient of viscosity (qualitative treatment only). (10 Lectures)

Liquids

Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only). (5 Lectures)

UNIT-IV: Solids

Forms of solids. Symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes. Laws of Crystallography - Law of constancy of interfacial angles, Law of

rational indices. Miller indices. XRay diffraction by crystals, Braggs law. Structures of NaCl, and CsCl (qualitative treatment only). Defects in crystals. (7 Lectures)

Chemical Kinetics

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction. Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half-life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only). (8 Lectures)

Reference Books:

- G. M. Barrow: Physical Chemistry Tata McGraw-Hill (2007).
- G. W. Castellan: Physical Chemistry 4th Edn. Narosa (2004).
- C. Kotz, P. M. Treichel & J. R. Townsend: General Chemistry Cengage Learning India Pvt. Ltd., New Delhi (2009).
- H. Mahan: University Chemistry 3rd Ed. Narosa (1998).
- R. H. Petrucci: General Chemistry 5th Ed. Macmillan Publishing Co.: New York (1985).
- D. Lee: A New Concise Inorganic Chemistry, E.L.B.S.
- F.A. Cotton & G. Wilkinson: Basic Inorganic Chemistry, John Wiley.
- F. Shriver and P. W. Atkins: Inorganic Chemistry, Oxford University Press.
- Gary Wulfsberg: Inorganic Chemistry, Viva Books Pvt. Ltd.

PRACTICAL: GE-III LAB.

Section A: Inorganic Chemistry

Semi-micro qualitative analysis using H_2S of mixtures- not more than four ionic species (two anions and two cations and excluding insoluble salts) out of the following:

Cations : NH_4^+ , Pb^{2+} , Ag^+ , Bi^{3+} , Cu^{2+} , Cd^{2+} , Sn^{2+} , Fe^{3+} , Al^{3+} ,
 Co , Cr^{3+} , Ni^{2+} , Mn^{2+} , Zn^{2+} , Ba^{2+} , Sr^{2+} , Ca^{2+} , K^+

Anions: CO_3^{2-} , S^{2-} , SO_3^{2-} , NO_3^- , Cl^- , Br^- , I^- , NO_2^- , SO_4^{2-} , PO_4^{3-} , F^- (Spot tests should be carried out wherever feasible)

Section B: Physical Chemistry

Chemical Kinetics

Study the kinetics of the following reactions.

3. Initial rate method: Iodide-persulphate reaction.

4. Integrated rate method:

a) Acid hydrolysis of methyl acetate with hydrochloric acid.

b) Saponification of ethyl acetate.

c) Compare the strengths of HCl and H_2SO_4 by studying kinetics of hydrolysis of methyl acetate.

Reference Books:

- A.I. Vogel, Qualitative Inorganic Analysis, Prentice Hall, 7th Edn
- A.I. Vogel, Quantitative Chemical Analysis, Prentice Hall, 6th Edn.
- B.D. Khosla, Senior Practical Physical Chemistry, R. Chand & Co.

SEMESTER- IV

GE:IV ORGANOMETALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

Section A: Inorganic Chemistry-4 (30 Lectures)

UNIT-I: Chemistry of 3d metals

Oxidation states displayed by Cr, Fe, Co, Ni and Cu. A study of the following compounds (including preparation and important properties); Peroxo compounds of Cr, $K_2Cr_2O_7$, $KMnO_4$, $K_4[Fe(CN)_6]$, sodium nitroprusside, $[Co(NH_3)_6]Cl_3$, $Na_3[Co(NO_2)_6]$. (6 Lectures)

Organometallic Compounds Definition and Classification with appropriate examples based on nature of metal-carbon bond (ionic, s, p and multicentre bonds). Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls. Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals. π -acceptor behaviour of carbon monoxide. Synergic effects (VB approach). (12 Lectures)

UNIT-II: Bio-Inorganic Chemistry

A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na^+ , K^+ and Mg^{2+} ions: Na/K pump; Role of Mg^{2+} ions in energy production and chlorophyll. Role of Ca^{2+} in blood clotting, stabilization of protein structures and structural role (bones). (12 Lectures)

Section B: Organic Chemistry-4 (30 Lectures)

UNIT-III: Polynuclear and heteronuclear aromatic compounds

Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Naphthalene, Anthracene, Furan, Pyrrole, Thiophene, and Pyridine. (6 Lectures)

Active methylene compounds

Preparation: Claisen ester condensation. Keto-enol tautomerism. Reactions: Synthetic uses of ethylacetoacetate (preparation of non-heteromolecules having upto 6 carbon). (6 Lectures)

UNIT-IV: Application of Spectroscopy to Simple Organic Molecules

Applications of visible, ultraviolet and Infrared spectroscopy in organic molecules. Electromagnetic radiations, electronic transitions, λ_{max} and ϵ_{max} , chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating λ_{max} of conjugated dienes and α, β -unsaturated compounds. Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on $>C=O$ stretching absorptions). (18 Lectures)

Reference Books:

- James E. Huheey, Ellen Keiter & Richard Keiter: Inorganic Chemistry: Principles of Structure and

Reactivity, Pearson Publication.

- G.L. Miessler & Donald A. Tarr: Inorganic Chemistry, Pearson Publication.
- J.D. Lee: A New Concise Inorganic Chemistry, E.L.B.S.
- F.A. Cotton & G. Wilkinson: Basic Inorganic Chemistry, John Wiley & Sons.
- I.L. Finar: Organic Chemistry (Vol. I & II), E.L.B.S.
- John R. Dyer: Applications of Absorption Spectroscopy of Organic Compounds, • Prentice Hall.
- R.M. Silverstein, G.C. Bassler & T.C. Morrill: Spectroscopic Identification of Organic Compounds, John Wiley & Sons.
- R.T. Morrison & R.N. Boyd: Organic Chemistry, Prentice Hall.
- Peter Sykes: A Guide Book to Mechanism in Organic Chemistry, Orient Longman.
- Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand.

PRACTICAL: GE-IV LAB.

Section A: Inorganic Chemistry

1. Separation of mixtures by chromatography: Measure the R_f value in each case. (Combination of two ions to be given).

Paper chromatographic separation of Fe^{3+} , Al^{3+} and Cr^{3+} or Paper chromatographic separation of Ni^{2+} , Co^{2+} , Mn^{2+} and Zn^{2+}

Section B: Organic Chemistry

Systematic Qualitative Organic Analysis of Organic Compounds possessing mono-functional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of one derivative.

Reference Books:

- A.I. Vogel: Qualitative Inorganic Analysis, Prentice Hall, 7th Edn.
- A.I. Vogel: Quantitative Chemical Analysis, Prentice Hall, 6th Edn.
- A.I. Vogel: Textbook of Practical Organic Chemistry, Prentice Hall, 5th Edn.
- F. G. Mann & B. C. Saunders: Practical Organic Chemistry, Orient Longman (1960).

SEMESTER- IV(CBZ Students)

GE:IV- MOLECULES OF LIFE

(Credits-6: Theory-4, Practical-2)-Max. Marks: 100

THEORY (Each class 1 hr.): Marks-70

PRACTICAL (Each class 2 hrs.): Marks-30

Lectures: 60 (40 Theory + 20 Practical classes)

UNIT-I: Carbohydrates

Classification of carbohydrates, reducing and non reducing sugars, General Properties of Glucose and Fructose, their open chain structure. Epimers, mutarotation and anomers. Determination of configuration of Glucose (Fischer proof). Cyclic structure of glucose. Haworth projections. Cyclic structure of fructose. Linkage between monosachharides, structure of disacharrides (sucrose, maltose, lactose) and polysacharrides (starch and cellulose) excluding their structure elucidation. (12 Periods)

UNIT-II Amino Acids, Peptides and Proteins

Classification of Amino Acids, Zwitterion structure and Isoelectric point. Overview of Primary, Secondary, Tertiary and Quaternary structure of proteins. Determination of primary structure of peptides, determination of N-terminal amino acid (by DNFB and Edman method) and C-terminal amino acid (by thiohydantoin and with carboxypeptidase enzyme). Synthesis of simple peptides (upto dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) & C-activating groups and Merrifield solid phase synthesis. (12 Periods)

UNIT-III: Enzymes and correlation with drug action

Mechanism of enzyme action, factors affecting enzyme action, Coenzymes and cofactors and their role in biological reactions, Specificity of enzyme action(Including stereospecificity) , Enzyme inhibitors and their importance, phenomenon of inhibition(Competitive and Non competitive inhibition including allosteric inhibition). Drug action-receptor theory. Structure activity relationships of drug molecules, binding role of OH group, $-NH_2$ group, double bond and aromatic ring, (10 Periods)

Nucleic Acids

Components of Nucleic acids: Adenine, guanine, thymine and Cytosine (Structure only), other components of nucleic acids, Nucleosides and nucleotides (nomenclature), Structure of polynucleotides; Structure of DNA (Watson-Crick model) and RNA(types of RNA), Genetic Code, Biological roles of DNA and RNA: Replication, Transcription and Translation. (8 Periods)

UNIT-IV: Lipids

Introduction to lipids, classification. Oils and fats: Common fatty acids present in oils and fats, Omega fatty acids, Trans fats, Hydrogenation, Saponification value, Iodine number. Biological importance of triglycerides, phospholipids, glycolipids, and steroids (cholesterol). (8 Periods)

Concept of Energy in Biosystems

Calorific value of food. Standard caloric content of carbohydrates, proteins and fats. Oxidation of foodstuff (organic molecules) as a source of energy for cells. Introduction to Metabolism (catabolism, anabolism), ATP: the universal currency of cellular energy, ATP hydrolysis and free energy change. Conversion of food into energy. Outline of catabolic pathways of Carbohydrate- Glycolysis, Fermentation, Krebs Cycle. Overview of catabolic pathways of Fats and Proteins. Interrelationships in the metabolic pathways of Proteins, Fats and Carbohydrates. (10 Lectures)

Recommended Texts:

- Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 2), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Nelson, D. L. & Cox, M. M. Lehningers Principles of Biochemistry 7th Ed., W. H. Freeman.
- Berg, J. M., Tymoczko, J. L. & Stryer, L. Biochemistry 7th Ed., W. H. Freeman.

PRACTICAL: GE-IV(CBZ) LAB.

1. Separation of amino acids by paper chromatography.

2. To determine the concentration of glycine solution by formylation method.
3. Study of titration curve of glycine.
4. Action of salivary amylase on starch.
5. Effect of temperature on the action of salivary amylase on starch.
6. To determine the saponification value of an oil/fat.
7. To determine the iodine value of an oil/fat.
8. Differentiate between a reducing/ nonreducing sugar.
9. Extraction of DNA from onion/cauliflower.
10. To synthesise aspirin by acetylation of salicylic acid and compare it with the ingredient of an aspirin tablet by TLC.

Recommended Texts:

- Furniss, B.S.; Hannaford, A.J.; Rogers, V.; Smith, P.W.G.; Tatchell, A.R. *Vogels Textbook of Practical Organic Chemistry*, ELBS.
- Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry*, Universities Press.

CHEMISTRY(PASS)

SEMESTER-I

DSE 2A: CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY

(Credits:6 Theory-04, Practicals-02)

THEORY (Each class 1 hour):70 Marks

PRACTICAL (Each class 2 hours):30 Marks

Lectures: 60(40 Theory + 20 Practical classes)

SECTION A: INORGANIC CHEMISTRY-1 (30 Periods)

Unit-I: Atomic Structure

Review of: Bohrs theory and its limitations, dual behaviour of matter and radiation, de-Broglies relation, Heisenberg Uncertainty principle. Hydrogen atom spectra.

What is Quantum mechanics ? Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ^2 , Schrdinger equation for hydrogen atom. Radial and angular parts of the hydrogenic wave functions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation). Significance of quantum numbers, orbital angular momentum and quantum numbers ml and ms. Shapes of s, p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (ms). Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations. (14 Lectures)

Unit-II: Chemical Bonding and Molecular Structure

Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Land equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajans rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.

Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. Concept of resonance and resonating structures in various inorganic and organic compounds.

MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for s-s, s-p and p-p combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules (N_2, O_2) and heteronuclear diatomic molecules (CO, NO). Comparison of VB and MO approaches. (16 Lectures)

Section B: Organic Chemistry-1 (30 Periods)

Unit- III: Fundamentals of Organic Chemistry

Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and

Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis.

Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Hckels rule. (8 Lectures)

Stereochemistry

Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). D and L; cis-trans nomenclature; CIP Rules: R/S (for one chiral carbon atoms) and E/Z Nomenclature (for up to two C=C systems). (10 Lectures)

Unit- IV: Aliphatic Hydrocarbons

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. Alkanes: (Upto 5 Carbons). Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbes synthesis, from Grignard reagent. Reactions: Free radical Substitution: Halogenation.

Alkenes: (Upto 5 Carbons) Preparation: Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeffs rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis-addition (alk. $KMnO_4$) and trans-addition (bromine), Addition of HX (Markownikoffs and anti-Markownikoffs addition), Hydration, Ozonolysis, Alkynes: (Upto 5 Carbons) Preparation: Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides.

Reactions: formation of metal acetylides, addition of bromine and alkaline $KMnO_4$, ozonolysis. (12 Lectures)

Reference Books:

- J. D. Lee: A new Concise Inorganic Chemistry, E L. B. S.
- F. A. Cotton & G. Wilkinson: Basic Inorganic Chemistry, John Wiley.
- Douglas, McDaniel and Alexader: Concepts and Models in Inorganic Chemistry, John Wiley.
- T. W. Graham Solomon: Organic Chemistry, John Wiley and Sons.
- Peter Sykes: A Guide Book to Mechanism in Organic Chemistry, Orient Longman.
- E. L. Eliel: Stereochemistry of Carbon Compounds, Tata McGraw Hill. I. L. Finar: Organic Chemistry (Vol. I & II), E. L. B. S.
- R. T. Morrison & R. N. Boyd: Organic Chemistry, Prentice Hall.
- Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand.

PRACTICAL: DSC 2A LAB.

Section A: Inorganic Chemistry-Volumetric Analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Estimation of oxalic acid by titrating it with $KMnO_4$.
3. Estimation of water of crystallization in Mohrs salt by titrating with $KMnO_4$.
4. Estimation of Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator.

5. Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.

Section B: Organic Chemistry

1. Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing upto two extra elements).
2. Separation of mixtures by Chromatography: Measure the R_f value in each case (combination of two compounds to be given).
 - (a) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography.
 - (b) Identify and separate the sugars present in the given mixture by paper chromatography.

large Reference Books:

- Vogels Qualitative Inorganic Analysis, A.I. Vogel, Prentice Hall, 7th Edition.
- Vogels Quantitative Chemical Analysis, A.I. Vogel, Prentice Hall, 6th Edition.
- Textbook of Practical Organic Chemistry, A.I. Vogel, Prentice Hall, 5th edition.
- Practical Organic Chemistry, F. G. Mann. & B. C. Saunders, Orient Longman, 1960.

SEMESTER-II

DSE-2B: CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY

(Credits:6 Theory-04, Practicals-02)

THEORY (Each class 1 hour):70 Marks

PRACTICAL (Each class 2 hours):30 Marks

Lectures: 60(40 Theory + 20 Practical classes)

Section A: Physical Chemistry-1 (30 Lectures)

Unit-I: Chemical Energetics

Review of thermodynamics and the Laws of Thermodynamics. Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature Kirchhoffs equation. Statement of Third Law of thermodynamics (10 Lectures)

Chemical Equilibrium:

Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between G and G° , Le Chateliers principle. Relationships between K_p , K_c and K_x for reactions involving ideal gases. (8 Lectures)

Unit- II: Ionic Equilibria

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts applications of solubility product principle. (12 Lectures)

Section B: Organic Chemistry-2 (30 Lectures)

Unit- III:

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. Aromatic hydrocarbons: Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Crafts reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (up to 4 carbons on benzene). (8 Lectures)

Alkyl and Aryl Halides

Alkyl Halides (Up to 5 Carbons) Types of Nucleophilic Substitution (SN_1 , SN_2 and SN_i) reactions. Preparation: from alkenes and alcohols.

Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamsons ether synthesis: Elimination vs substitution.

Aryl Halides Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions. Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$). (8 Lectures)

Unit- IV: Alcohols, Phenols and Ethers (Upto 5 Carbons)

Alcohols: Preparation: Preparation of 1, 2 and 3 alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes and ketones, carboxylic acid and esters.

Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. $KMnO_4$, acidic dichromate, conc. HNO_3). Oppeneauer oxidation Diols: (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.

Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. ReimerTiemann Reaction, Gattermann-Koch Reaction,

Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

Aldehydes and ketones (aliphatic and aromatic): Formaldehyde, acetaldehyde, acetone and benzaldehyde

Preparation: from acid chlorides and from nitriles.

Reactions Reaction with HCN, ROH, $NaHSO_3$, $NH_2 - G$ derivatives. Iodoform test. Aldol Condensation, Cannizzaros reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. (14 Lectures)

Reference Books:

- T. W. Graham Solomons: Organic Chemistry, John Wiley and Sons.
- Peter Sykes: A Guide Book to Mechanism in Organic Chemistry, Orient Longman.
- I.L. Finar: Organic Chemistry (Vol. I & II), E. L. B. S.
- R. T. Morrison & R. N. Boyd: Organic Chemistry, Prentice Hall.
- Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand.
- G. M. Barrow: Physical Chemistry Tata McGraw-Hill (2007).
- G. W. Castellan: Physical Chemistry 4th Edn. Narosa (2004).

- C. Kotz, P. M. Treichel & J. R. Townsend: General Chemistry Cengage Lening India Pvt. Ltd., New Delhi (2009).
- H. Mahan: University Chemistry 3rd Ed. Narosa (1998).
- R. H. Petrucci: General Chemistry 5th Ed. Macmillan Publishing Co.: New York (1985).

PRACTICAL: DSE-2B LAB.

Section A: Physical Chemistry

Thermochemistry

1. Determination of heat capacity of calorimeter for different volumes.
2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Determination of enthalpy of ionization of acetic acid.
4. Determination of integral enthalpy of solution of salts (KNO₃, NH₄Cl).
5. Determination of enthalpy of hydration of copper sulphate.
6. Study of the solubility of benzoic acid in water and determination of H. **Ionic equilibria**
pH measurements a) Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.
b) Preparation of buffer solutions:
(i) Sodium acetate-acetic acid.
(ii) Ammonium chloride-ammonium hydroxide.
Measurement of the pH of buffer solutions and comparison of the values with theoretical values.

Section B: Organic Chemistry

1. Purification of organic compounds by crystallization (from water and alcohol) and distillation.
2. Criteria of Purity: Determination of melting and boiling points.
3. Preparations: Mechanism of various reactions involved to be discussed. Recrystallisation, determination of melting point and calculation of quantitative yields to be done.
(a) Bromination of Phenol/Aniline.
(b) Benzoylation of amines/phenols.
(c) Oxime and 2,4 dinitrophenylhydrazone of aldehyde/ketone.

Reference Books:

- A.I. Vogel: Textbook of Practical Organic Chemistry, 5th edition, Prentice-Hall.
- F. G. Mann & B. C. Saunders, Practical Organic Chemistry, Orient Longman (1960).
- B.D. Khosla, Senior Practical Physical Chemistry, R. Chand & Co.

SEMESTER-III

DSC-2C: SOLUTIONS, PHASE EQUILIBRIUM, CONDUCTANCE, ELECTROCHEMISTRY & FUNCTIONAL GROUP ORGANIC CHEMISTRY-II

(Credits:6 Theory-04, Practicals-02)

THEORY (Each class 1 hour):70 Marks

PRACTICAL (Each class 2 hours):30 Marks

Lectures: 60(40 Theory + 20 Practical classes)

Section A: Physical Chemistry-2 (30 Lectures)

UNIT-I: Solutions

Thermodynamics of ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law non-ideal solutions. Vapour pressure-composition and temperature-composition curves of ideal and non-ideal solutions. Distillation of solutions. Lever rule. Azeotropes.

Partial miscibility of liquids: Critical solution temperature; effect of impurity on partial miscibility of liquids. Immiscibility of liquids- Principle of steam distillation. Nernst distribution law and its applications, solvent extraction. (8 Lectures)

Phase Equilibrium

Phases, components and degrees of freedom of a system, criteria of phase equilibrium. Gibbs Phase Rule and its thermodynamic derivation. Derivation of Clausius Clapeyron equation and its importance in phase equilibria. Phase diagrams of one-component systems (water and sulphur) and two component systems involving eutectics, congruent and incongruent melting points (lead-silver, $FeCl_3 - H_2O$ and Na-K only). (7 Lectures)

UNIT-II: Conductance

Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions. Transference number and its experimental determination using Hittorf and Moving boundary methods. Ionic mobility. Applications of conductance measurements: determination of degree of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of a salt. Conductometric titrations (only acid-base). (7 Lectures)

Electrochemistry

Reversible and irreversible cells. Concept of EMF of a cell. Measurement of EMF of a cell. Nernst equation and its importance. Types of electrodes. Standard electrode potential. Electrochemical series. Thermodynamics of a reversible cell, calculation of thermodynamic properties: G , H and S from EMF data. Calculation of equilibrium constant from EMF data. Concentration cells with transference and without transference. Liquid junction potential and salt bridge. pH determination using hydrogen electrode and quinhydrone electrode. Potentiometric titrations -qualitative treatment (acid-base and oxidation-reduction only). (8 Lectures)

Section B: Organic Chemistry-3 (30 Lectures)

UNIT-III: Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Carboxylic acids and their derivatives.

Carboxylic acids (aliphatic and aromatic)

Preparation: Acidic and Alkaline hydrolysis of esters.

Reactions: Hell Vohlard - Zelinsky Reaction.

Carboxylic acid derivatives (aliphatic): (Upto 5 carbons)

Preparation: Acid chlorides, Anhydrides, Esters and Amides from acids and their interconversion.

Reactions: Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation. (6 Lectures)

Amines and Diazonium Salts

Amines (Aliphatic and Aromatic): (Upto 5 carbons) Preparation: from alkyl halides, Gabriels Phthalimide synthesis, Hofmann bromamide reaction. Reactions: Hofmann vs. Saytzeff elimination, Carbylamine test, Hinsberg test, with HNO_2 , Schotten Baumann Reaction. Electrophilic substitution (case aniline): nitration, bromination, sulphonation. **Diazonium salts:** Preparation: from aromatic amines. Reactions: conversion to benzene, phenol, dyes. (6 Lectures)

UNIT-IV: Amino Acids, Peptides and Proteins:

Preparation of Amino Acids: Strecker synthesis using Gabriels phthalimide synthesis. Zwitterion, Isoelectric point and Electrophoresis. Reactions of Amino acids: ester of COOH group, acetylation of NH_2 group, complexation with Cu^{2+} ions, ninhydrin test.

Overview of Primary, Secondary, Tertiary and Quaternary Structure of proteins. Determination of Primary structure of Peptides by degradation Edmann degradation (Nterminal) and Cterminal (thiohydantoin and with carboxypeptidase enzyme). Synthesis of simple peptides (upto dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) & C-activating groups and Merrifield solid-phase synthesis. (10 Lectures)

Carbohydrates: Classification, and General Properties, Glucose and Fructose (open chain and cyclic structure), Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose, Mutarotation, ascending and descending in monosaccharides. Structure of disaccharides (sucrose, cellobiose, maltose, lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation.

Reference Books:

- G. M. Barrow: Physical Chemistry Tata McGraw-Hill (2007).
- G. W. Castellan: Physical Chemistry 4th Ed. Narosa (2004).
- J. C. Kotz, P. M. Treichel, J. R. Townsend, General Chemistry, Cengage Learning India Pvt. Ltd.: New Delhi (2009).
- B. H. Mahan: University Chemistry, 3rd Edn. Narosa (1998).
- R. H. Petrucci, General Chemistry, 5th Edn., Macmillan Publishing Co.: New York (1985).
- Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 2), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Nelson, D. L. & Cox, M. M. Lehningers Principles of Biochemistry 7th Ed., W. H. Freeman.
- Berg, J. M., Tymoczko, J. L. & Stryer, L. Biochemistry 7th Ed., W. H. Freeman.

PRACTICAL: DSE-2C LAB.

Section A: Physical Chemistry

Distribution

Study of the equilibrium of one of the following reactions by the distribution

method: $\text{I}_2(\text{aq}) + \text{I}^-(\text{aq}) \longrightarrow \text{I}_3^-(\text{aq})$, $\text{Cu}_2 + (\text{aq}) + x\text{NH}_2(\text{aq}) \longrightarrow [\text{Cu}(\text{NH}_3)_x]^{2+}$.

Conductance

- I. Determination of cell constant.
- II. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
- III. Perform the following conductometric titrations:
 - i. Strong acid vs. strong base.
 - ii. Weak acid vs. strong base.

Potentiometry

Perform the following potentiometric titrations:

- i. Strong acid vs. strong base.
- ii. Weak acid vs. strong base.
- iii. Potassium dichromate vs. Mohr's salt.

Section B: Organic Chemistry

- I. Systematic Qualitative Organic Analysis of Organic Compounds possessing monofunctional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of one derivative.
- II. Separation of amino acids by paper chromatography.
2. Determination of the concentration of glycine solution by formylation method.
3. Titration curve of glycine.
4. Action of salivary amylase on starch.
5. Effect of temperature on the action of salivary amylase on starch.
6. Differentiation between a reducing/nonreducing sugar.

Reference Books:

- A.I. Vogel: Textbook of Practical Organic Chemistry, Prentice Hall, 5th Edn.
- F. G. Mann & B. C. Saunders: Practical Organic Chemistry, Orient Longman, 1960.
- B.D. Khosla: Senior Practical Physical Chemistry, R. Chand & Co.
- Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry, Universities Press.

SEMESTER-IV

DSC-2D: CHEMISTRY OF S- AND P-BLOCK ELEMENTS, STATES OF MATTER & CHEMICAL KINETICS

THEORY (Each class 1 hour):70 Marks

PRACTICAL (Each class 2 hours):30 Marks

Lectures: 60(40 Theory + 20 Practical classes)

UNIT-I: General Principles of Metallurgy

Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon as reducing agent. Hydrometallurgy, Methods of purification of metals (Al, Pb, Fe, Cu, Ni, Zn): electrolytic, oxidative refining, Parting process, van Arkel-de Boer process and Mond's process. (4 Lectures)

s- and p-Block Elements

Periodicity in s- and p-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electronegativity (Pauling & Mulliken scales). Allotropy in C, S, and P.

Oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides), inert pair effect, diagonal relationship and anomalous behaviour of first member of each group. (11 Lectures)

UNIT-II: Compounds of s- and p-Block Elements

Hydrides and their classification (ionic, covalent and interstitial), structure and properties with respect to stability of hydrides of p- block elements. Concept of multicentre bonding (diborane).

Structure, bonding and their important properties like oxidation/reduction, acidic/basic nature of the following compounds and their applications in industrial, organic and environmental chemistry.

Hydrides of nitrogen (NH_3 , N_2H_4 , N_3H , NH_2OH)

Oxoacids of P, S and Cl.

Halides and oxohalides: PCl_3 , PCl_5 , $SOCl_2$. (15 Lectures)

Section B: Physical Chemistry-3 (30 Lectures)

UNIT-III: Kinetic Theory of Gases

Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation. Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. van der Waals equation of state for real gases. Boyle temperature (derivation not required). Critical phenomena, critical constants and their calculation from van der Waals equation. Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation derivation not required) and their importance.

Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation). Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules. Viscosity of gases and effect of temperature and pressure on coefficient of viscosity (qualitative treatment only). (10 Lectures)

Liquids

Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only). (5 Lectures)

UNIT-IV: Solids

Forms of solids. Symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes. Laws of Crystallography - Law of constancy of interfacial angles, Law of rational indices. Miller indices. XRay diffraction by crystals, Braggs law. Structures of NaCl, and CsCl (qualitative treatment only). Defects in crystals. (7 Lectures)

Chemical Kinetics

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction. Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half-life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory

and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only). (8 Lectures)

Reference Books:

- G. M. Barrow: Physical Chemistry Tata McGraw-Hill (2007).
- G. W. Castellan: Physical Chemistry 4th Edn. Narosa (2004).
- C. Kotz, P. M. Treichel & J. R. Townsend: General Chemistry Cengage Learning India Pvt. Ltd., New Delhi (2009).
- H. Mahan: University Chemistry 3rd Ed. Narosa (1998).
- R. H. Petrucci: General Chemistry 5th Ed. Macmillan Publishing Co.: New York (1985).
- D. Lee: A New Concise Inorganic Chemistry, E.L.B.S.
- F.A. Cotton & G. Wilkinson: Basic Inorganic Chemistry, John Wiley.
- F. Shriver and P. W. Atkins: Inorganic Chemistry, Oxford University Press.
- Gary Wulfsberg: Inorganic Chemistry, Viva Books Pvt. Ltd.

PRACTICAL: DSE-2D LAB.

Section A: Inorganic Chemistry

Semi-micro qualitative analysis using H_2S of mixtures- not more than four ionic species (two anions and two cations and excluding insoluble salts) out of the following:

Cations : NH_4^+ , Pb^{2+} , Ag^+ , Bi^{3+} , Cu^{2+} , Cd^{2+} , Sn^{2+} , Fe^{3+} , Al^{3+} ,
 Co , Cr^{3+} , Ni^{2+} , Mn^{2+} , Zn^{2+} , Ba^{2+} , Sr^{2+} , Ca^{2+} , K^+

Anions: CO_3^{2-} , S^{2-} , SO_3^{2-} , NO_3^- , Cl^- , Br^- , I^- , NO_2^- , SO_4^{2-} , PO_4^{3-} , F^- (Spot tests should be carried out wherever feasible)

Section B: Physical Chemistry

Chemical Kinetics

Study the kinetics of the following reactions.

3. Initial rate method: Iodide-persulphate reaction.

4. Integrated rate method:

a) Acid hydrolysis of methyl acetate with hydrochloric acid.

b) Saponification of ethyl acetate.

c) Compare the strengths of HCl and H_2SO_4 by studying kinetics of hydrolysis of methyl acetate.

Reference Books:

- A.I. Vogel, Qualitative Inorganic Analysis, Prentice Hall, 7th Edn
- A.I. Vogel, Quantitative Chemical Analysis, Prentice Hall, 6th Edn.
- B.D. Khosla, Senior Practical Physical Chemistry, R. Chand & Co.

SEMESTER-V

DSE-1(2A): POLYMER CHEMISTRY

(Credits-6, Theory-4, Practicals-2)

THEORY (Each class 1 hour):70 Marks

PRACTICAL (Each class 2 hours):30 Marks

Lectures: 60(40 Theory + 20 Practical classes)

UNIT-I: Introduction and history of polymeric materials:

Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers. (4 Lectures)

Functionality and its importance:

Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bi-functional systems, Poly-functional systems. (8 Lectures)

UNIT-II: Kinetics of Polymerization: Mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques. (8 lectures)

Crystallization and crystallinity:

Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting point. (4 Lectures)

Nature and structure of polymers-Structure property relationships. (2 Lectures)

UNIT-III: Determination of molecular weight of polymers

(M_n , M_w , etc.) by end group analysis, viscometry, light scattering and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index. (8 Lectures)

Glass transition temperature (T_g) and determination of T_g

WLF equation, Factors affecting glass transition temperature (T_g). (8 Lectures)

UNIT-IV: Polymer Solution

Criteria for polymer solubility, Solubility parameter, Thermodynamics of polymer solutions, entropy, enthalpy, and free energy change of mixing of polymers solutions. (8 Lectures)

Properties of Polymers

(Physical, thermal & mechanical properties). Brief introduction to preparation, structure, properties and application of the following polymers: polyolefins, polystyrene and styrene copolymers, poly(vinyl chloride) poly(vinyl acetate), polyacrylamide, fluoro polymers (Teflon), polyamides (nylon-6 and nylon 6,6). Phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, silicone polymers (polysiloxane), Polycarbonates, Conducting Polymers, (polyacetylene, polyaniline). (10 Lectures)

Reference Books:

- Seymours Polymer Chemistry, Marcel Dekker, Inc.
- G. Odian: Principles of Polymerization, John Wiley.
- F.W. Billmeyer: Text Book of Polymer Science, John Wiley.
- P. Ghosh: Polymer Science & Technology, Tata Mcgraw-Hill.
- R.W. Lenz: Organic Chemistry of Synthetic High Polymers.

PRACTICAL: DSE-1(2A) LAB.

Polymer synthesis

1. Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA).
 - (a) Purification of monomer.
 - (b) Polymerization using benzoyl peroxide (BPO) / 2,2-azo-bis-isobutyronitrile (AIBN).

2. Preparation of nylon 66/6.
3. Interfacial polymerization, preparation of polyester from isophthaloyl chloride (IPC) and phenolphthalein.
 - (a) Preparation of IPC.
 - (b) Purification of IPC.
 - (c) Interfacial polymerization.
4. Redox polymerization of acrylamide.
5. Precipitation polymerization of acrylonitrile.
6. Preparation of urea-formaldehyde resin.
7. Preparations of novalac resin/resold resin.
8. Microscale Emulsion Polymerization of poly(methylacrylate).

Polymer characterization

1. Determination of molecular weight by viscometry:
 - (a) Polyacrylamide-aq. NaNO_2 solution
 - (b) (Poly vinyl propylidene (PVP) in water
2. Determination of the viscosity-average molecular weight of poly(vinyl alcohol) (PVOH) and the fraction of head-to-head monomer linkages in the polymer.
3. Determination of molecular wt. by end group analysis: Polyethylene glycol (PEG) (OH group).
4. Determination of hydroxyl number of a polymer using colorimetric method.

Polymer analysis

1. Estimation of the amount of HCHO in the given solution by sodium sulphite method
2. Instrumental Techniques
3. IR studies of polymers

*at least 5 experiments to be carried out.

Reference Books:

- Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd Ed.
- Harry R. Allcock, Frederick W. Lampe and James E. Mark, Contemporary Polymer Chemistry, 3rd ed. Prentice-Hall (2003).
- Fred W. Billmeyer, Textbook of Polymer Science, 3rd ed. Wiley-Interscience (1984).
- Joel R. Fried, Polymer Science and Technology, 2nd ed. Prentice-Hall (2003).
- Petr Munk and Tejraj M. Aminabhavi, Introduction to Macromolecular Science, 2nd ed. John Wiley & Sons (2002).
- L.H. Sperling, Introduction to Physical Polymer Science, 4th ed. John Wiley & Sons (2005).
- Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd ed. Oxford University Press (2005).
- Seymour/ Carraher's Polymer Chemistry, 9th ed. by Charles E. Carraher, Jr. (2013).

DSE-2B: INDUSTRIAL CHEMICALS AND ENVIRONMENT

(Credits-6, Theory-4, Practicals-2)

THEORY (Each class 1 hour):70 Marks

PRACTICAL (Each class 2 hours):30 Marks

Lectures: 60(40 Theory + 20 Practical classes)

UNIT-I: Industrial Gases and Inorganic Chemicals

Industrial Gases: Large scale production, uses, storage and hazards in handling of the following gases: oxygen, nitrogen, argon, neon, helium, hydrogen, acetylene, carbon monoxide, chlorine, sulphur dioxide. Inorganic Chemicals: Manufacture, application and hazards in handling the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, bleaching powder, sodium thiosulphate, hydrogen peroxide, potash alum, potassium dichromate and potassium permanganate. (10 Lectures)

bf Industrial Metallurgy

Preparation of metals (ferrous and nonferrous) and ultrapure metals for semiconductor technology. (4 Lectures)

UNIT-II: Environment and its segments

Ecosystems. Biogeochemical cycles of carbon, nitrogen and sulphur. Air Pollution: Major regions of atmosphere. Chemical and photochemical reactions in atmosphere. Air pollutants: types, sources, particle size and chemical nature; Photochemical smog: its constituents and photochemistry. Environmental effects of ozone. Major sources of air pollution. Pollution by SO_2 , CO_2 , CO , NO_x , and H_2S and control procedures. Effects of air pollution on living organisms and vegetation. Greenhouse effect and global warming, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and halogens, removal of sulphur from coal. (14 Lectures)

UNIT-III: Water Pollution: Hydrological cycle, water resources, aquatic ecosystems, Sources and nature of water pollutants, Techniques for measuring water pollution, Impacts of water pollution on hydrological and ecosystems. Water purification methods. Effluent treatment plants (primary, secondary and tertiary treatment). Industrial effluents from the following industries and their treatment: electroplating, textile, tannery, dairy, petroleum and petrochemicals, fertilizer. Sludge disposal. Industrial waste management, incineration of waste. Water treatment and purification (reverse osmosis, ion exchange). Water quality parameters for waste water, industrial water and domestic water. (16 Lectures)

UNIT-IV: Energy & Environment

Sources of energy: Coal, petrol and natural gas. Nuclear fusion/fission, solar energy, hydrogen, geothermal, tidal and hydel. Nuclear Pollution: Disposal of nuclear waste, nuclear disaster and its management. (10 Lectures)

Biocatalysis: Introduction to biocatalysis: Importance in green chemistry and chemical industry. (6 Lectures)

Reference Books:

- E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
- R.M. Felder, R.W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
- A. Kent: Riegels Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
- S. S. Dara: A Textbook of Engineering Chemistry, S. Chand & Company Ltd. New Delhi.
- De, Environmental Chemistry: New Age International Pvt., Ltd, New Delhi.
- S. M. Khopkar, Environmental Pollution Analysis: Wiley Eastern Ltd, New Delhi.
- S.E. Manahan, Environmental Chemistry, CRC Press (2005).

- G.T. Miller, Environmental Science 11th edition. Brooks/ Cole (2006).
- Mishra, Environmental Studies. Selective and Scientific Books, New Delhi (2005).

PRACTICAL: DSE-2B LAB.

1. Determination of dissolved oxygen in water.
2. Determination of Chemical Oxygen Demand (COD).
3. Determination of Biological Oxygen Demand (BOD).
4. Percentage of available chlorine in bleaching powder.
5. Measurement of chloride, sulphate and salinity of water samples by simple titration method ($AgNO_3$ and potassium chromate).
6. Estimation of total alkalinity of water samples (CO_3^{2-} , HCO_3^-) using double titration method.
7. Measurement of dissolved CO_2 .
8. Study of some of the common bio-indicators of pollution.
9. Estimation of SPM in air samples.
10. Preparation of borax/ boric acid.

Reference Books: • E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.

- R.M. Felder, R.W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
- A. Kent: Riegels Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
- S. S. Dara: A Textbook of Engineering Chemistry, S. Chand & Company Ltd. New Delhi.
- De, Environmental Chemistry: New Age International Pvt., Ltd, New Delhi.
- S. M. Khopkar, Environmental Pollution Analysis: Wiley Eastern Ltd, New Delhi.

DSE-2B: MOLECULES OF LIFE (For CBZ Students)

THEORY (Each class 1 hour):70 Marks

PRACTICAL (Each class 2 hours):30 Marks

Lectures: 60(40 Theory + 20 Practical classes)

UNIT-I: Carbohydrates

Classification of carbohydrates, reducing and non reducing sugars, General Properties of Glucose and Fructose, their open chain structure. Epimers, mutarotation and anomers. Determination of configuration of Glucose (Fischer proof). Cyclic structure of glucose. Haworth projections. Cyclic structure of fructose. Linkage between monosachharides, structure of disacharrides (sucrose, maltose, lactose) and polysacharrides (starch and cellulose) excluding their structure elucidation. (12 Periods)

UNIT-II Amino Acids, Peptides and Proteins

Classification of Amino Acids, Zwitterion structure and Isoelectric point. Overview of Primary, Secondary, Tertiary and Quaternary structure of proteins. Determination of primary structure of peptides, determination of N-terminal amino acid (by DNFB and Edman method) and Cterminal amino acid (by thiohydantoin and with carboxypeptidase enzyme). Synthesis of simple peptides (upto dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) & C-activating groups and Merrifield solid phase synthesis. (12 Periods)

UNIT-III: Enzymes and correlation with drug action

Mechanism of enzyme action, factors affecting enzyme action, Coenzymes and cofactors and their role in biological reactions, Specificity of enzyme action(Including stereospecificity) , Enzyme inhibitors and their importance, phenomenon of inhibition(Competitive and Non competitive inhibition including allosteric inhibition). Drug action-receptor theory. Structure activity relationships of drug molecules, binding role of OH group, $-NH_2$ group, double bond and aromatic ring, (10 Periods)

Nucleic Acids

Components of Nucleic acids: Adenine, guanine, thymine and Cytosine (Structure only), other components of nucleic acids, Nucleosides and nucleotides (nomenclature), Structure of polynucleotides; Structure of DNA (Watson-Crick model) and RNA(types of RNA), Genetic Code, Biological roles of DNA and RNA: Replication, Transcription and Translation. (8 Periods)

UNIT-IV: Lipids

Introduction to lipids, classification. Oils and fats: Common fatty acids present in oils and fats, Omega fatty acids, Trans fats, Hydrogenation, Saponification value, Iodine number. Biological importance of triglycerides, phospholipids, glycolipids, and steroids (cholesterol). (8 Periods)

Concept of Energy in Biosystems

Calorific value of food. Standard caloric content of carbohydrates, proteins and fats. Oxidation of foodstuff (organic molecules) as a source of energy for cells. Introduction to Metabolism (catabolism, anabolism), ATP: the universal currency of cellular energy, ATP hydrolysis and free energy change. Conversion of food into energy. Outline of catabolic pathways of Carbohydrate- Glycolysis, Fermentation, Krebs Cycle. Overview of catabolic pathways of Fats and Proteins. Interrelationships in the metabolic pathways of Proteins, Fats and Carbohydrates. (10 Lectures)

Recommended Texts:

- Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 2), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Nelson, D. L. & Cox, M. M. Lehningers Principles of Biochemistry 7th Ed., W. H. Freeman.
- Berg, J. M., Tymoczko, J. L. & Stryer, L. Biochemistry 7th Ed., W. H. Freeman.

PRACTICAL: DSE-2B(CBZ) LAB.

1. Separation of amino acids by paper chromatography.
2. To determine the concentration of glycine solution by formylation method.
3. Study of titration curve of glycine.
4. Action of salivary amylase on starch.
5. Effect of temperature on the action of salivary amylase on starch.
6. To determine the saponification value of an oil/fat.
7. To determine the iodine value of an oil/fat.
8. Differentiate between a reducing/ nonreducing sugar.

9. Extraction of DNA from onion/cauliflower.
10. To synthesise aspirin by acetylation of salicylic acid and compare it with the ingredient of an aspirin tablet by TLC.

Recommended Texts:

- Furniss, B.S.; Hannaford, A.J.; Rogers, V.; Smith, P.W.G.; Tatchell, A.R. *Vogels Textbook of Practical Organic Chemistry*, ELBS.
- Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry*, Universities Press.

SKILL ELECTIVE COURSES (SEC)

SEMESTER-III

SEC:1-CHEMICAL TECHNOLOGY & SOCIETY (Credits: 02, F.M.: 50, End Sem: 40, Mid Sem: 10) Theory: 30 Lectures

Chemical Technology

Basic principles of distillation, solvent extraction, solid-liquid leaching and liquid-liquid extraction, separation by absorption and adsorption. An introduction into the scope of different types of equipment needed in chemical technology, including reactors, distillation columns, extruders, pumps, mills, emulgators. Scaling up operations in chemical industry. Introduction to clean technology. (15 Lectures)

Society

Exploration of societal and technological issues from a chemical perspective. Chemical and scientific literacy as a means to better understand topics like air and water (and the trace materials found in them that are referred to as pollutants); energy from natural sources (i.e. solar and renewable forms), from fossil fuels and from nuclear fission; materials like plastics and polymers and their natural analogues, proteins and nucleic acids, and molecular reactivity and interconversions from simple examples like combustion to complex instances like genetic engineering and the manufacture of drugs. (15 Lectures)

Reference Book:

- John W. Hill, Terry W. McCreary & Doris K. Kolb, Chemistry for changing times 13th Ed.

SEMESTER-IV

SEC:2-PHARMACEUTICAL CHEMISTRY (Credits: 02, F.M.: 50, End Sem: 40, Mid Sem: 10) (Theory: 30 Lectures)

UNIT-I: Drugs & Pharmaceuticals

Drug discovery, design and development; Basic Retrosynthetic approach. Synthesis of the representative drugs of the following classes: analgesics agents, antipyretic agents, anti-inflammatory agents (Aspirin, paracetamol, Ibuprofen); antibiotics (Chloramphenicol); antibacterial and antifungal agents (Sulphonamides; Sulphanethoxazol, Sulphacetamide, Trimethoprim); antiviral agents (Acyclovir), Central Nervous System agents (Phenobarbital, Diazepam), Cardiovascular (Glyceryl trinitrate), antiloprosy (Dapsone), HIV-AIDS related drugs (AZT- Zidovudine). (20 Lectures)

UNIT-II: Fermentation

Aerobic and anaerobic fermentation. Production of (i) Ethyl alcohol and citric acid, (ii) Antibiotics; Penicillin, Cephalosporin, Chloromycetin and Streptomycin, (iii) Lysine, Glutamic acid, Vitamin B₂, Vitamin B₁₂ and Vitamin C. (10 Lectures)

PRACTICAL

1. Preparation of Aspirin and its analysis.
2. Preparation of magnesium bisilicate (Antacid).

Reference Books:

- G.L. Patrick: Introduction to Medicinal Chemistry, Oxford University Press, UK.
- Hakishan, V.K. Kapoor: Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan, Pitampura, New Delhi.
- William O. Foye, Thomas L., Lemke, David A. William: Principles of Medicinal Chemistry, B.I. Waverly Pvt. Ltd. New Delhi.
- Jayashree Ghosh, Fundamental concepts of Applied Chemistry, 1st Edition, S. Chand & Co Ltd., New Delhi, 2006.

SEC:3-PESTICIDE CHEMISTRY

(Credits: 02, F.M.: 50, End Sem: 40, Mid Sem: 10)

Theory: 30 Lectures

General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, structure activity relationship, synthesis and technical manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene,); Organophosphates (Malathion, Parathion); Carbamates (Carbofuran and carbaryl); Quinones (Chloranil), Anilides (Alachlor and Butachlor).

PRACTICAL

1. To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications.
2. Preparation of simple organophosphates, phosphonates and thiophosphates.

Reference Books:

- R. Cremllyn: Pesticides, John Wiley.
- B.K. Sharma, Industrial Chemistry, 15th Edn, Goel publishing house, Meerut, 2006.

SEC:4-FUEL CHEMISTRY

(Credits: 02, F.M.: 50, End Sem: 40, Mid Sem: 10)

Theory: 30 Lectures

UNIT-I:

Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value.

Coal: Uses of coal (fuel and nonfuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas and water gas composition and uses. Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro gasification and Catalytic gasification), Coal liquefaction and Solvent Refining.

Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications. (15 Lectures)

UNIT-II:

Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels. Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene.

Lubricants: Classification of lubricants, lubricating oils (conducting and non-conducting) Solid and semisolid lubricants, synthetic lubricants.

Properties of lubricants (viscosity index, cloud point, pour point) and their determination. (15 Lectures)

Reference Books:

- E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK.
- P.C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
- B.K. Sharma: Industrial Chemistry, Goel Publishing House, Meerut.

COMPUTER SCIENCE(HONOURS)

SEMESTER-I

C:1-PROGRAMMING USING C

(Credit:6, Theory:4, Practical: 2)

UNIT- I

Introduction to Programming Language, Introduction to C Programming , Character Set, C Tokens, Keywords & Identifiers, Constants, Variables, Data Types, Variables , Storage Classes, Operators (Arithmetic, Relational, Logical , Assignment, Increment & Decrement, Conditional , Bitwise), Expressions , Input and Output Operations.

UNIT- II

Decision Making and Branching: Simple IF Statement, IF .. ELSE Statement, Nesting IF . ELSE Statement, ELSE IF Ladder, Switch Statement, Operator, GOTO Statement. Decision Making and Looping: The WHILE Statement, The DO Statement, The FOR Statement, Jumps in LOOPS. Arrays, Character Arrays and Strings.

UNIT- III

User-defined Functions: Need, Elements & Definition, Function Calls, Function Definition, Category of Functions, Recursion. Structures and Unions: Defining, Declaring, Accessing, Initialization Structure, Arrays of Structures, Arrays within Structures, Structures and Functions, Unions.

UNIT- IV

Pointers: Accessing the Address of a Variable, Declaring Pointer Variables, Initializations of Pointer Variable, Accessing a Variable through its Pointer, Chain of Pointers, Pointer Expressions, Pointer Increments and Scale Factor, Pointers and Arrays,, Pointers and Character Strings, Array of Pointers, Pointers as Function Arguments, Functions Returning Pointers, Pointers to Functions, Pointers to Structures, Troubles with Pointers.

UNIT- V

File Management in C: Defining and Opening a File, Closing a File, Input/ Output Operations on Files, Error Handling During I/O Operations, Random Access to Files, Command Line Arguments, Dynamic Memory Allocation.

Recommended Books:

1. E. Balaguruswamy, Programming in ANSI C,4/e, (TMH).
2. Paul Deitel, Harvey Deitel, C: How to Program, 8/e, Prentice Hall.
3. J. R. Hanly, Problem Solving & Program Design in C, 7/e, Pearson.
4. B. Kernighan & D.M. Ritchie, The C Programming Language, 2/e PHI.

C: 2-COMPUTER ORGANIZATION

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Character Codes, Decimal System, Binary System, Decimal to Binary Conversion, Hexadecimal

Notation, Boolean Algebra, Basic Logic Functions: Electronic Logic Gates, Synthesis of Logic Functions, Minimization of Logic Expressions, Minimization using Karnaugh Maps, Synthesis with NAND and NOR Gates.

UNIT-II

Flip-Flops, Gated Latches, Master-Slave Flip-Flops, Edge-Triggering, T Flip-Flops, JK Flip-Flops. Registers and Shift Registers, Counters, Decoders, Multiplexers, Programmable Logic Devices (PLDs), Programmable Array Logic (PAL), Complex Programmable Logic Devices (CPLDs), Field-Programmable Gate Array (FPGA), Sequential Circuits, Timing Diagrams, The Finite State Machine Model, Synthesis of Finite State Machines.

UNIT-III

Basic Structure of Computers: Computer Types, Functional Units, Input Unit, Memory Unit, Arithmetic and Logic Unit, Output Unit, Control Unit, Basic Operational Concepts, Bus Structures, Software. Machine Instructions and Programs: Numbers, Arithmetic Operations, and Characters: Number Representation, Addition of Positive Numbers, Addition and Subtraction of Signed Numbers, Overflow of Integer Arithmetic, Characters, Memory Locations and Addresses, Byte Addressability, Word Alignment, Accessing Numbers, Characters, and Character Strings, Memory Operations, Instructions and Instruction Sequencing, Register Transfer Notation, Basic Instruction Types, Instruction Execution and Straight-Line Sequencing, Branching, Condition Codes, Generating Memory Addresses, Addressing Modes, Implementation of Variables and Constants, Indirection and Pointers, Indexing and Arrays, Relative Addressing.

UNIT-IV

THE ARM EXAMPLE: Registers, Memory Access, and Data Transfer, Register Structure, Memory Access Instructions and Addressing Modes, Register Move Instructions, Arithmetic and Logic Instructions: Arithmetic Instructions, Logic Instructions, Branch Instructions, Setting Condition Codes, Assembly Language, Pseudo-Instructions, I/O Operations, Subroutines, Vector Dot Product Program, Byte-Sorting Program, Linked-List Insertion and Deletion Subroutines. Basic Input-Output Operations, Stacks and Queues, Subroutines. PowerPC Example: Basic PowerPC Processor Organization, Load and Store Instructions, Arithmetic and Logic Instructions, Flow Control Instructions, Compare Instructions, Logic Instructions, Subroutines.

UNIT-V

Memory System: Semiconductor RAM Memories, Internal Organization of Memory Chips, Static Memories, Asynchronous DRAMS, Synchronous DRAMS, Structure of Large Memories, Memory System Considerations, RAMBUS Memory. Read-Only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size, and Cost of Memory. Secondary Storage: Magnetic Hard Disks, Optical Disks, Magnetic Tape Systems.

Recommended Books:

1. Carl Hamacher, Z. Vranesic, S. Zaky: Computer Organization, 5/e (TMH)
2. William Stallings: Computer Organization and Architecture (Design for Performance), 9/e
3. S. Brown, & Z. Vranesic, Fundamentals of Digital Logic Design with VHDL, 2/e, McGraw-Hill
4. J. P. Uyemura, A First Course in Digital System Design, An Integrated Approach, Cengage Learning.

Credits;4

UNIT-I

Probability and Probability Distribution: Events and the Sample Space, Calculating Probabilities using Simple events, Useful counting rules, Probability rules: Addition rule, Conditional probability and multiplication rule, Bayes rule.

UNIT-II

Probability Distributions: Random Variable, Discrete random variable, Mean and Standard deviation of discrete random variable, Discrete Probability Distributions: Binomial, Poisson and Hypergeometric probability distribution, Continuous Probability distribution: Normal distribution.

UNIT-III

Sampling Distribution: sampling plans and experimental designs, Sampling distribution of a statistic, Central Limit theorem, Sampling distribution of the Sample mean and Proportion. Large Sample Estimation: Point estimation, Interval estimation, Confidence interval of population mean, Population proportion, difference between two population means, difference between two population proportions.

UNIT-IV

Large Sample Tests of Hypothesis: Test of a Population mean, Test of difference of two population means, Test of hypothesis for a binomial proportion, Test of hypothesis for the difference between two binomial proportions. Inference from Small Samples: Students t Distribution, Small Sample inferences concerning a population mean and difference between two population means, Inferences concerning a population variance and difference between two population variances.

UNIT-V

Analysis of Variance: One-way classification, Two-way classification. Linear regression and Correlation: Method of least squares, Analysis of variance for linear regression, Testing the usefulness of the linear regression model, Estimation and Prediction using the fitted line. Carl Pearsons coefficient of Correlation, Test of hypothesis concerning the Correlation coefficient.

Recommended Books: 1. William Mendenhall, Robert J. Beaver, Barbara M. Beaver, Probability and Statistics 14/e, CENGAGE Learning. 2. W. W. Hines, D.C. Montgomery, D.M. Goldsman, & C.M. Borror, Probability & Statistics in Engineering".

C: 3-PROGRAMMING USING C++ (Credit:6, Theory:4, Practical: 2)

UNIT-I

Principles of Object-Oriented Programming: Object-Oriented Programming (OOP) Paradigm, Basic Concepts of OOP, Benefits of OOP, Object Oriented Languages, Applications of OOP. Beginning with C++: Applications of C++, C++ statements, Example with Class, Structure of C++ Program, Creating the Source File, Compiling and Linking. Tokens, Expressions and Control Structures: Tokens, Keywords, Identifiers & Constants, Basic Data Types, User-Defined Data Types, Derived Data Types, Symbolic Constants, Type Compatibility, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Defereencing Operators, Memory Management Operators, Manipulators, Type Cast Operators, Expressions and

their Types, Special Assignment Expressions, Implicit Conversions, Operator Overloading, Operator Precedence, Control Structures.

UNIT- II

Functions in C++: The Main Function, Function Prototyping, Call By Reference, Return by Reference, Inline Functions, Default Arguments, Const. Arguments, Function Overloading, Friend & Virtual Functions, Math. Library Functions. Classes and Objects: Specifying a Class, Defining Member Functions, Making an outside Function Inline, Nested Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects, Const. Member Functions, Pointer to Members, Local Classes.

UNIT- III

Constructors & Destructors: Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructors, Constructing Two-Dimensional Arrays, Const. Objects, Destructors. Operator Overloading and Type Conversions: Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overloading Binary Operators using Friends, Manipulation of Strings using Operators, Rules for Overloading Operators, Type Conversions.

UNIT- IV

Inheritance : Defining Derived Classes, Single Inheritance, Making a Private Member Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Member Classes, Nesting of Classes. Pointers, Virtual Functions and Polymorphism: Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.

UNIT- V

Managing Console I/O Operations: C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators. Files: Classes for File Stream Operations, Opening and Closing a File, Detecting end-of-file, File Modes, File Pointers and their Manipulations, Sequential Input and Output Operations, Updating a File: Random Access, Error Handling During File Operations, Command-line Arguments.

Recommended Books:

1. E. Balgurusamy, Object Oriented Programming with C++ :, 4/e (TMH).
2. Paul Deitel, Harvey Deitel, "C++: How to Program",9/e. Prentice Hall.
3. J. Farrell, Object-Oriented Programming, Cengage Learning.
4. BjarneStroustrup, "Programming – Principles and Practice using C++", 2/e, Addison-Wesley 2014.

C: 4-DATA STRUCTURES **(Credit:6, Theory:4, Practical: 2)**

UNIT-I

Introduction and Overview: Definitions, Concept of Data Structures, Overview of Data Structures, Implementation of Data Structures. Arrays: Terminology, One-Dimensional Array, Multi-Dimensional Arrays, Pointer Arrays.

UNIT-II

Linked Lists: Single Linked List, Circular Linked List, Double Linked List, Circular Double Linked List, Application of Linked Lists, Memory Representation, Boundary Tag System, De-allocation Strategy, Buddy System, Compaction.

UNIT-III

Stacks: Definition, Representation of Stack (Array, Linked List), Operations on Stacks, Applications of Stack (Evaluation of Arithmetic Expressions, Code Generation, Implementation of Recursion, Factorial Calculation, Quick Sort, Tower of Hanoi, Activation Record Management).

UNITIV

Queues: Definition, Representation of Queues (Array, Linked List), Circular Queue, Deque, Priority Queue, Application of Queues (Simulation, CPU Scheduling in Multiprogramming Environment, Round Robin Algorithm).

UNITV

Tree: Binary Trees, Properties of Binary Tree, Linear Representation of Binary a Binary Tree, Linked Representation of a Binary Tree, Physical Implementation of Binary Tree in Memory, Operations on Binary Tree (Insertion, Deletion, Traversal, Merging of two Binary Trees), Types of Binary Trees (Expression Tree, Binary Search Tree, Heap Tree, Threaded Binary Trees, Height Balanced Binary Tree, Weighted Binary Tree, Decision Trees).

Recommended Books:

1. D. Samanta, Classic Data Structures:, 2/e (PHI).
2. D.S Malik, Data Structure using C++, 2/e, Cengage Learning, 2010.
3. Adam Drozdek, "Data Structures and algorithm in C++", 3/e, Cengage Learning, 2012.
4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.

GE: 2-NUMERICAL TECHNIQUES

Credits;4

UNIT-I

Introduction: Numbers and their accuracy, Chopping and Rounding off, Errors: Absolute and Relative errors, Floating point representations of numbers, Loss of significance. Solution of Algebraic and Transcendental Equations: Bisection Method, Newton-Raphson Method, Secant Method, Method of false position, Rate of convergence and comparison of iterative methods.

UNIT-II

Interpolation and Numerical Differentiation: Polynomial Interpolation, Interpolating polynomial: Lagrange form, Newton form, Nested form, Divided difference Interpolation, Inverse Interpolation, Errors in polynomial Interpolation. First derivative and second derivative via Taylor Series, Richardson Extrapolation.

UNIT-III

Numerical Integration: Trapezoidal Rule, Composite Trapezoidal rule, Simpsons 1/3 rule, Simpsons 3/8 rule, Gaussian Quadrature formulae (1-point, 2-point, 3-point)

UNIT-IV

Solution of System of Linear Equations: Gaussian Elimination method and Pivoting, LU factorization method, ill Conditioning, Iterative Methods: Jacobi iterative method, Gauss Seidel iterative method. Eigen Values and Eigen Vectors: Eigen value properties, Computation Eigen values by Power method.

UNIT-V

Solution of Ordinary Differential Equations: Taylor Series method, Runge-Kutta method of order 2 and order 4, Predictor-Corrector method: Adams-Bashforth-Moulton method. Smoothing of Data and the Method of Least Squares: Linear and non-linear least square method.

Recommended Books:

1. E. Ward Cheney and David R. Kincaid ,Numerical Methods and Applications CENGAGE Learning India Private Ltd., New Delhi.
2. S.R.K. Iyengar, R.K. Jain, & M.K. Jain, Numerical Methods for Scientific & Engineering Computation, 6/e, New Age Int. Pub.
3. S.S. Sastry, Introductory Methods of Numerical Analysis, 5/e, EEE
4. Steven C. Chapra, Applied Numerical Methods with MATLAB, 2/e, McGraw-Hill.

SEMESTER-III

C: 5-OPERATING SYSTEMS (Credit:6, Theory:4, Practical: 2)

UNIT-I

Operating System, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special Purpose Systems, Computing Environments, Open-Source Operating Systems. Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating System Structure, Virtual Machines, Operating System Debugging, Operating System Generations. System Boot.

UNIT-II

Process: Process Concept, Process Scheduling, Operations on Processes, Inter-Process Communication, Examples of IPC Systems, Communication in Client-Server Systems. Multithreaded Programming: Multithreading Models, Thread Libraries, Threading Issues, Operating-System Examples.

UNIT-III

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling. Multiple-Process Scheduling. Synchronization: The Critical Section Problem, Petersons Solution, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Monitors, Synchronization Examples, Atomic Transactions.

UNIT-IV

Deadlocks: System Model, Deadlock Characterization, Methods of Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Recovery from Deadlock. Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Example: The Intel Pentium.

UNIT-V

Virtual-Memory Management: Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory. File System: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.

Recommended Books:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8/e, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3/e, Pearson Education 2007.
3. W. Stallings, Operating Systems, Internals & Design Principles, 5/e, Prentice Hall of India. 2008.
4. G. Nutt, Operating Systems: A Modern Perspective, 2/e, Pearson Education 1997.

C: 6-DATABASE MANAGEMENT SYSTEM
(Credit:6, Theory:4, Practical: 2)

UNIT-I

Databases and Database Users, Database System Concepts and Architecture, Data Modelling using the Entity-Relationship(ER) Model, The Enhanced Entity-Relationship (EER) Model.

UNIT-II

Relational Model: The Relational Data Model and Relational Database Constraints, The Relational Algebra and Relational Calculus.

UNIT-III

Relational Database Design by ER- and EER-to-Relational Mapping, SQL-99: Schema Definition, Constraints, Queries, and Views, Introduction to SQL Programming Techniques.

UNIT-IV

Functional Dependencies and Normalization for Relational Databases, Relational Database Algorithms and Further Dependencies, Practical Database Design Methodology and use of UML Diagrams.

UNIT-V

Disk Storage, Basic File Structures, and Hashing, Indexing Structures for Files, Algorithms for Query Processing and Optimization, Physical Database Design and Tuning.

Recommended Books:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems, 6/e, Pearson Education, 2010.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6/e, McGraw Hill, 2010.
3. R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw-Hill.
4. C. Coronel, S. Morris, & P. Rob, Database Principles (Fundamentals of Design, Implementation, and Management), 9/e, Cengage Learning.

C: 7-DISCRETE STRUCTURES
(Credit:6, Theory:4, Practical: 2)

UNIT-I Logic and Proofs: Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Normal Forms, Proof Methods and Strategy, Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms.

UNIT-II

Basic Structures: Sets, Set Operations, Functions, Recursive Functions, Sequences and Summations. Relations: Relations and their Properties, n-ary Relations and their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Ordering. Boolean.

UNIT-III

Algebra: Boolean Functions, Representing Boolean Functions, Logic Gates, Minimization of Circuits. Algebraic Structures & Coding Theory: The Structure of Algebras, Semi-groups, Monoids and Groups, Homomorphism, Normal Subgroups, and Congruence Relations, Rings, Integral Domains and Fields, Quotient and Product Algebras, Coding Theory. Polynomial Rings and Polynomial Codes.

UNIT-IV

Counting: Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations. Advanced Counting Techniques, Applications of Inclusion-Exclusion, Discrete probability, Conditional probability, Bayes Theorem.

UNIT-V

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Havel-Hakimi Theorem, Representing Graphs and Graph Isomorphism, Connectivity, Cut-Sets, Euler and Hamiltonian Paths, Shortest-Path Problem, Planar Graphs, Graph Coloring, Network Flows.

Recommended Books:

1. Kenneth H Rosen, Discrete Mathematics & Its Applications, McGraw-Hill. 7/e.
2. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009
3. C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition , Tata McGraw Hill, 1985
4. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988

GE:3-ELECTRICITY & MAGNETISM

(Credit: 06, Theory:04, Practical:02)

UNIT-I

Electric Field and Electric Potential: Electric field: Electric field lines. Electric flux. Gauss Law with applications to charge distributions with spherical, cylindrical and planar symmetry. Conservative nature of Electrostatic Field. Electrostatic Potential. Laplaces and Poisson, equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole.

UNIT-II

Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet, and (2) Sphere.

UNIT-III

Dielectric Properties of Matter: Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector D. Relations between E, P and D. Gauss Law in dielectrics.

UNIT-IV

Magnetic Field: Magnetic force between current elements and definition of Magnetic Field B . Biot-Savarts Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic

Dipole and its Dipole Moment (Analogy with Electric Dipole). Amperes Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field.

UNIT-V

Magnetic Properties of Matter: Magnetization vector (M). Magnetic Intensity(H). Magnetic Susceptibility and permeability. Relation between B, H, M. Ferromagnetism. B-H curve and hysteresis. Electromagnetic Induction: Faradays Law. Lenzs Law. Self Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. Introduction to Maxwells Equations. Charge Conservation and Displacement current. Electrical Circuits: AC Circuits: Kirchhoffs laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit. Network theorems: Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits.

Recommended Books:

1. S. Mahajan & Choudhury, Electricity, Magnetism & Electromagnetic Theory, 2012, Tata McGraw Hill
2. Edward M. Purcell, Electricity and Magnetism, 1986 McGraw-Hill Education
3. M.N.O. Sadiku, Elements of Electromagnetics, 2010, Oxford University Press.
4. J.H.Fewkes & J.Yarwood , Electricity and Magnetism,. Vol. I, 1991, Oxford Univ. Press

SEMESTER-IV

C: 8-JAVA PROGRAMMING **(Credit:6, Theory:4, Practical: 2)**

UNIT-I

Introduction to Java: Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods).

UNIT-II

Arrays, Strings and I/O: Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files. Object-Oriented Programming Overview: Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.

UNIT-III

Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata: Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.

UNIT-IV

Exception Handling, Threading, Networking and Database Connectivity: Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

UNIT-V

Applets and Event Handling: Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, text fields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. Overview of servlets.

Recommended Books:

1. E. Balagurusamy, Programming with Java, 4/e, TMH
2. Bruce Eckel, "Thinking Java", 8/e, Pearson India, 2010.
3. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2/e, 2004.
4. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 1", 9/e, Printice Hall, 2012.

C: 9-COMPUTER NETWORK (Credit:6, Theory:4, Practical: 2)

UNIT-I

Introduction: Data Communications, Networks, The Internet, Protocols and Standards. Network Models: Layered Tasks, The OSI Model, Layers in the OSI Model, TCP/ IP Protocol Suite, Addressing.

UNIT-II

Data and Signals: Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data Rate Limits, Performance. Digital Transmission: Digital-To-Digital Conversion, Analog-To-Digital Conversion, Transmission Modes. Analog Transmission: Digital-To-Analog Conversion, Analog-To-Analog Conversion.

UNIT-III

Multiplexing and Spreading: Multiplexing, Spread Spectrum. Transmission Media: Guided Media, Unguided Media (Wireless). Switching: Circuit Switched, Datagrams, Virtual Circuit Networks, Structure of a Switch. Telephone Network, Dial-Up MODEMS, Digital Subscriber Line (DSL), Cable TV Networks, Cable TV for Data Transfer.

UNIT-IV

Error Detection and Correction: Introduction, Block Coding, Linear Block Codes, Cyclic Codes,

Checksum. Data Link Control: Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC, Point-To-Point Protocol. Multiple Access: Random Access, Controlled Access, Channelization. Wired LANs: IEEE Standards, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet: Wireless LANs: IEEE 802.11, Bluetooth.

UNIT-V

Connecting LANs: Connecting Devices, Backbone Networks, Virtual LANs. Wireless LANs: Cellular Telephony, Satellite Networks. SONET: Architecture, SONET Layers, SONET Frames, STS Multiplexing, SONET Networks, Virtual Tributaries. Virtual-Circuit Networks. Frame Relay, ATM, ATM LANs,

Recommended Books:

1. B. A. Forouzan, Data Communications and Networking, 4/e, THM ,2007
2. A. S. Tanenbaum, & David J. Wetherall, Computer Networks, 5/e, Pearson

C: 10-COMPUTER GRAPHICS (Credit:6, Theory:4, Practical: 2)

UNIT-I

Computer Graphics: A Survey of Computer graphics, Overview of Graphics System: Video Display Devices, Raster-Scan Systems, Input Devices, Hard-Copy Devices, Graphics Software, Introduction to OpenGL. Graphics Output Primitives: Point and Lines, Algorithms for line, circle & ellipse generation, Filled-Area Primitives. Attributes of Graphics Primitives: Point, line, curve attributes, fill area attributes, fill methods for areas with irregular boundaries, Antialiasing.

UNIT-II

Geometric Transformations (both 2-D & 3-D): Basic Geometric Transformations, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Inverse Transformations, Other Transformations (Reflection, shear), Transformation between coordinate systems, Affine Transformations. Two Dimensional Viewing: Viewing pipeline, Clipping Window, Normalization & Viewport coordinate Transformations, Clipping Algorithms: Point clipping, Line clipping and Polygon clipping. Three Dimensional Viewing: 3-dimensional Viewing Concepts, Viewing pipeline, Projection Transformations (Orthogonal, Oblique parallel, Perspective), Clipping Algorithms.

UNIT-III

Three Dimensional Object Representations: Curved Surfaces, Quadratic Surfaces, Spline Representations, Bezier Spline Curves and Surfaces, B-Spline Curves and Surfaces, Octrees, BSP Trees, Fractal Geometry Methods, Gamma correction.

UNIT-IV

Visible Surface Detection Methods: Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer method, A-Buffer Method, Scan line and Depth Sorting, Area subdivision Method, Ray Casting Method.

UNIT-V

Illumination Models: Basic Illumination Models, Displaying light Intensities, Halftone Patterns and Dithering techniques, Polygon-Rendering Methods (Gouroud Shading, Phong Shading), Ray-Tracing Methods (Basic Ray-Tracing Algorithm, Ray-Surface Intersection Calculations). Computer Animation, Hierarchical Modeling (introductory idea only).

Recommended Books:

1. Donald Hearn & M. Pauline Baker, Computer Graphics with OpenGL, Pearson Education.
2. A.V. Dan, F.H. Jones, J.D. Foley, S.K. Feiner, Computer Graphics Principles & Practices in C, 2/e, Pearson.
3. D. F. Rogers, Procedural Elements for Computer Graphics, McGraw Hill.
4. D. F. Rogers, & J. A. Adams, Mathematical Elements for Computer Graphics, 2/e, McGraw Hill.

SEC: II-ANDROID PROGRAMMING
(Credit:02)**UNIT-I**

Introduction: History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture. Overview of object oriented programming using Java: OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine.

UNIT-II

Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating a android project , Hello Word, run on emulator, Deploy it on USB-connected Android device.

UNIT-III

User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes.

UNIT-IV

User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners (Combo boxes), Images, Menu, Dialog.

UNIT-V

Database: Understanding of SQLite database, connecting with the database.

Recommended Books:

1. James C. Sheusi, Android application Development for Java Programmers, Cengage Learning, 2013.
2. M. Burton, & D. Felker, Android Application Development for Dummies, 2/e, Wiley India.

GE:IV-ELECTRONICS
(Credit: 06, Theory:04, Practical:02)**UNIT-I**

Semiconductor Diodes: P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity. PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current. Flow Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Derivation for Barrier Potential, Barrier Width and Current for Step Junction. Current Flow Mechanism in Forward and Reverse Biased Diode.

UNIT-II

Two-terminal Devices and their Applications: (1) Rectifier Diode: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, C-filter (2) Zener Diode and Voltage Regulation. Principle and structure of (1) LEDs, (2) Photodiode

and (3) Solar Cell. Bipolar Junction Transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Current gains α and β Relations between α and β . Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cutoff and Saturation Regions.

UNIT-III

Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers.

UNIT-IV

Coupled Amplifier: Two stage RC-coupled amplifier and its frequency response. Feedback in Amplifiers: Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise. Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency. Hartley & Colpitts oscillators. Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground.

UNIT-V

Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector (8) Wein bridge oscillator. Conversion: Resistive network (Weighted and R-2R Ladder). Accuracy and Resolution. A/D Conversion (successive approximation)

Recommended Books:

1. J. Millman and C.C. Halkias, Integrated Electronics, 1991, Tata Mc-Graw Hill.
2. J.D. Ryder, Electronics: Fundamentals and Applications, 2004, Prentice Hall.
3. B. G. Streetman & S. K. Banerjee, Solid State Electronic Devices, 6/e, 2009, PHI Learning.
4. S. Salivahanan & N. S. Kumar, Electronic Devices & Circuits, 3/e, 2012, Tata Mc-Graw Hill.
5. R. A. Gayakwad, OP-Amps and Linear Integrated Circuit, 4/e, 2000, Prentice Hall.

SEMESTER-V

C: 11-INTERNET TECHNOLOGY

(Credit: 06, Theory:04, Practical:02)

UNIT-I

Java: Use of Objects, Array and ArrayList class

UNIT-II

JavaScript: Data types, operators, functions, control structures, events and event handling.

UNIT-III

JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.

UNIT-IV

JSP: Introduction to Java Server Pages, HTTP and Servlet Basics, The Problem with Servlets, The

Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

UNIT-V

Java Beans: Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB

Recommended Books:

1. Ivan Bayross, Web Enabled Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3/e, 2009.
3. Herbert Schildt , Java 7, The Complete Reference, , 8/e, 2009.
4. Jim Keogh ,The Complete Reference J2EE, TMH, , 2002.

C: 12-SOFTWARE ENGINEERING

(Credit: 06, Theory:04, Practical:02)

UNIT-I

Professional Software Development, Software Engineering Ethics, Software Processes, Software Process Models, Process Activities, Coping with Change, The Rational Unified Process, Agile Software Development, Agile Methods, Plan-Driven and Agile Development, Extreme Programming, Agile Project Management, Scaling Agile Methods.

UNIT-II

Requirements Engineering, Functional and Non-Functional Requirements, The Software Requirements Document, Requirements Specification, Requirements Engineering Processes, Requirements Elicitation and Analysis, Requirements Validation, Requirements Management, System Modelling, Context Models, Interaction Models, Structural Models, Behavioural Models, Model-Driven, Engineering, Architectural Design, Architectural Design Decisions, Architectural Views, Architectural Patterns, Application Architectures.

UNIT-III

Design and Implementation: Object-Oriented Design using the UML, Design Patterns, Implementation Issues, Open Source Development, Software Testing: Development Testing, Test-Driven Development, Release Testing, User Testing, Software Evolution: Evolution Processes, Program Evolution Dynamics, Software Maintenance, Legacy System Management, Dependability and Security.

UNIT-IV

Socio-technical Systems: Complex Systems, Systems Engineering, System Procurement, System Development, System Operation. Dependability and Security: Dependability Properties, Availability and Reliability, Safety, Security. Dependability and Security Specification: Risk-Driven Requirements, Specification, Safety Specification, Reliability Specification, Security, Specification, Formal Specification.

UNIT-V

Dependability Engineering: Redundancy and Diversity, Dependable Processes, Dependable Systems Architectures, Dependable Programming. Security Engineering: Security Risk Management, Design

for Security, System Survivability. Dependability and Security Assurance: Static Analysis, Reliability Testing, Security Testing, Process Assurance, Safety and Dependability Cases.

Recommended Books:

1. I. Sommerville, Software Engineering, 9/e, Addison Wesley.
2. R. Mall, Fundamentals of Software Engineering, 3/e, PHI.
3. R.S. Pressman, Software Engineering, A Practitioners Approach, 7/e, McGraw-Hill, 2009.
4. K.K. Aggarwal and Y. Singh, Software Engineering, 2/e, New Age International Publishers, 2008.

DSE:1-Information Security **(Credit: 06, Theory:04, Practical:02)**

UNIT-I

Introduction: Security, Attacks, Computer Criminals, Security Services, Security Mechanisms. Cryptography: Substitution ciphers, Transpositions Cipher, Confusion, diffusion, Symmetric, Asymmetric Encryption. DES Modes of DES, Uses of Encryption, Hash function, key exchange, Digital Signatures, Digital Certificates.

UNIT-II

Program Security: Secure programs, Non malicious Program errors, Malicious codes virus, Trap doors, Salami attacks, Covert channels, Control against program.

UNIT-III

Threats: Protection in OS: Memory and Address Protection, Access control, File Protection, User Authentication. Database Security: Requirements, Reliability, Integrity, Sensitive data, Inference, Multilevel Security.

UNIT-IV

Security in Networks: Threats in Networks, Security Controls, firewalls, Intrusion detection systems, Secure e-mails.

UNIT-V

Administrating Security: Security Planning, Risk Analysis, Organisational Security Policy, Physical Security. Ethical issues in Security: Protecting Programs and data. Information and law.

Recommended Books:

1. C. P. Pfleeger, S. L. Pfleeger; Security in Computing, PHI, 2006.
2. W. Stallings; Network Security Essentials: Applications and Standards, 4/E, 2010.

DSE: 2-MICROPROCESSOR **(Credit: 06, Theory:04, Practical:02)**

UNIT-I

An Introduction to Processor Design: Processor architecture and organization , Abstraction in hardware design, MU0 - a simple processor, Instruction set design ,Processor design trade-offs ,The Reduced Instruction Set Computer, Design for low power consumption .The ARM Architecture: The Acorn RISC Machine ,Architectural inheritance, The ARM programmer's model, ARM development tools.

UNIT-II ARM Assembly Language Programming: Data processing instructions, Data transfer instructions, Control flow instructions, Writing simple assembly language programs. ARM Organization and Implementation: Pipeline, Types, 3-stage pipeline ARM organization , 5-stage pipeline

ARM organization, ARM instruction execution, ARM implementation, The ARM coprocessor interface.

UNIT-III The ARM Instruction Set: Introduction, Exceptions, Conditional execution , Branch and Branch with Link (B, BL), Branch, Branch with Link and exchange (BX, BLX) , Software Interrupt (SWI) ,Data processing instructions, Multiply instructions, Single word and unsigned byte data transfer instructions , Half-word and signed byte data transfer instructions, Multiple register transfer instructions , Status register to general register transfer instructions ,General register to status register transfer instructions , Coprocessor instructions. Coprocessor data operations, Coprocessor data transfers, Coprocessor register transfers, Breakpoint instruction (BRK - architecture v5T only), Unused instruction space, Memory faults, ARM architecture variants.

UNIT-IV

Architectural Support for High-Level Languages: Abstraction in software design, Data types, Floating-point data types, The ARM floating-point architecture, Expressions, Conditional statements, Loops , Functions and procedures , Use of memory, Run-time environment , Examples and exercises.

UNIT-V

Thumb Instruction Set: The Thumb bit in the CPSR, The Thumb programmer's model ,Thumb branch instructions, Thumb software interrupt instruction , Thumb data processing instructions , Thumb single register data transfer instructions, Thumb multiple register data transfer instructions, Thumb breakpoint instruction, Thumb implementation ,Thumb applications . Architectural Support for System Development: The ARM memory interface, The Advanced Microcontroller Bus Architecture (AMBA),The ARM reference peripheral specification, Hardware system prototyping tools, The ARMulator.

Recommended Books:

Steve Furber :ARM System-On-Chip Architecture.

SEMESTER-VI

C: 13-ARTIFICIAL INTELLIGENCE (Credit: 06, Theory:04, Practical:02)

UNIT-I

Intelligent Agents, Solving problems by searching, Uninformed search strategies(BFS, DFS, DLS, IDS, BD and Uniform cost search), Informed search and exploration (Greedy Best first, A* and its variations) Constraint satisfaction Problems, Adversarial search(Alpha-beta pruning).

UNIT-II

Knowledge and reasoning, logical agent (Wumpus world), Propositional logic, First order logic, Inference in first order logic(Forward chaining, backward chaining, Resolution) , Knowledge representation.

UNIT-III

Planning, Partial-Order planning, Planning Graphs, Planning and acting in the real world, Uncertain knowledge and reasoning.

UNIT-IV

Learning from Observations, Decision trees, Neural network (Multilayer), Reinforcement Learning.

UNIT-V

NLP, Communication, A formal grammar for a fragment of English, Syntactic analysis (chat parsing), semantic Interpretation, Ambiguity of grammar, Machine Translation.

Recommended Books:

1. Stuart Russell and Peter Norvig, ARTIFICIAL INTELLIGENCE A MODERN APPROACH, 2/e, PHI.
2. D.W. Patterson, Introduction to A.I and Expert Systems, PHI, 2007.
3. Rich & Knight, Artificial Intelligence, 2/e, Tata McGraw Hill, 1991.

C:14-DESIGN AND ANALYSIS OF ALGORITHMS

(Credit: 06, Theory:04, Practical:02)

UNIT-I

Analysis and Design of Algorithm (Case study insertion sort and merge sort) Asymptotic Analysis, Divide and Conquer, Recurrence Relations, Strassen's Matrix Multiplication.

UNIT-II

Sorting: Quick sort, heap sort, Counting sort, lower bound for sorting, Randomized quicksort, Order Statistics.

UNIT-III

Amortized Analysis (Aggregate analysis, Accounting analysis, Potential analysis), 2-3-4 tree Advanced Data structure: Fibonacci heap, Redblack tree, hashing, data structure on disjoint set, Splay tree Data Structure.

UNIT-IV

Dynamic Programming : Matrix Chain multiplication, LCS, TSP, Branch and Bound. Greedy Algorithm: MST: Kruskal, Prim's, Dijkstra Algorithm, Huffman Coding, Maxflow matching, Computational geometry: Convex Hull, 0-1-knapsack, fractional knapsack, Back tracking (4-Queen Prob.)

UNIT-V

Complexity Class: P, PSPACE, NP, NP-Hard, NP Complete, Satisfiability, Clique, Vertex Cover, Independent set, Exact cover, Graph Coloring, Hamiltonian, Cycle Matching. Approximation Algorithm: Vertex Cover, TSP, Independent Set, Sum of subset.

Recommended Books:

1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Introduction to Algorithms, PHI, 3/e, 2009.
2. Sarabasse & A.V. Gelder Computer Algorithm, Introduction to Design and Analysis, Pearson 3/e, 1999.
3. E. Horowitz, S. Sahni, & S. Rajasekaran, Fundamentals of Computer Algorithms, 2/e, University Press.
4. A.V. Aho, J.E. Hopcroft, & J.D. Ullman, The Design and Analysis of Computer Algorithm, Pearson.

DSE:3-CLOUD COMPUTING

(Credit: 06, Theory:04, Practical:02)

UNIT-I

Overview of Computing Paradigm: Recent trends in Computing : Grid Computing, Cluster Com-

puting, Distributed Computing, Utility Computing, Cloud Computing. Introduction to Cloud Computing: Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Benefits and limitations of Cloud Computing.

UNIT-II

Cloud Computing Architecture: Comparison with traditional computing architecture (client/server), Services provided at various levels, Service Models- Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), How Cloud Computing Works, Deployment , Models- Public cloud, Private cloud, Hybrid cloud, Community cloud, Case study of NIST architecture.

UNIT-III

Case Studies: Case Study of Service, Model using Google App Engine, Microsoft Azure, Amazon EC2, Eucalyptus.

UNIT-IV

Service Management in Cloud Computing, Service Level Agreements (SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of Scaling.

UNIT-V

Cloud Security: Infrastructure Security- Network level security, Host level security, Application level security, Data security and Storage- Data privacy and security Issues, Jurisdictional issues raised by Data location, Authentication in Cloud Computing.

Recommended Books:

1. Barrie Sosinsky, Cloud Computing Bible, Wiley-India, 2010.
2. Rajkumar Buyya, James Broberg, Andrzej, M. Goscinski, Cloud Computing Principles & Paradigms, Wiley-2011.
3. Nikos Antonopoulos, Lee Gillam, Cloud Computing: Principles, Systems and Applications, Springer, 2012.
4. Ronald L. Krutz, Russell Dean Vines, Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley-India, 2010.
5. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach ,Mc-Graw Hills, 2010.
6. Dimitris N. Chorafas, Cloud Computing Strategies ,CRC Press, 2010.

DSE:4-PROJECT WORK(Credit: 06)

BACHELOR IN COMPUTER APPLICATIONS(BCA)

SEMESTER-I

C-1: PROGRAMMING USING C (Credit:6, Theory:4, Practical: 2)

UNIT-I

Introduction to Programming Language, Introduction to C Programming , Character Set, C Tokens, Keywords & Identifiers, Constants, Variables, Data Types, Variables , Storage Classes, Operators (Arithmetic, Relational, Logical , Assignment, Increment & Decrement, Conditional , Bitwise), Expressions , Input and Output Operations.

UNIT-II

Decision Making and Branching: Simple IF Statement, IF .. ELSE Statement, Nesting IF . ELSE Statement, ELSE IF Ladder, Switch Statement, Operator, GOTO Statement. Decision Making and Looping: The WHILE Statement, The DO Statement, The FOR Statement, Jumps in LOOPS. Arrays, Character Arrays and Strings.

UNIT-III

User-defined Functions: Need, Elements & Definition, Function Calls, Function Definition, Category of Functions, Recursion. Structures and Unions: Defining, Declaring, Accessing, Initialization Structure, Arrays of Structures, Arrays within Structures, Structures and Functions, Unions.

UNIT-IV

Pointers: Accessing the Address of a Variable, Declaring Pointer Variables, Initializations of Pointer Variable, Accessing a Variable through its Pointer, Chain of Pointers, Pointer Expressions, Pointer Increments and Scale Factor, Pointers and Arrays,, Pointers and Character Strings, Array of Pointers, Pointers as Function Arguments, Functions Returning Pointers, Pointers to Functions, Pointers to Structures, Troubles with Pointers.

UNIT-V

File Management in C: Defining and Opening a File, Closing a File, Input/ Output Operations on Files, Error Handling During I/O Operations, Random Access to Files, Command Line Arguments, Dynamic Memory Allocation.

Recommended Books:

1. E. Balaguruswamy, Programming in ANSI C,4/e, (TMH).
2. Paul Deitel, Harvey Deitel, C: How to Program, 8/e, Prentice Hall.
3. J. R. Hanly, Problem Solving & Program Design in C, 7/e, Pearson.
4. B. Kernighan & D.M. Ritchie, The C Programming Language, 2/e PHI.

C: 2-COMPUTER ORGANIZATION (Credit:6, Theory:4, Practical: 2)

UNIT-I

Character Codes, Decimal System, Binary System, Decimal to Binary Conversion, Hexadecimal

Notation, Boolean Algebra, Basic Logic Functions: Electronic Logic Gates, Synthesis of Logic Functions, Minimization of Logic Expressions, Minimization using Karnaugh Maps, Synthesis with NAND and NOR Gates.

UNIT-II

Flip-Flops, Gated Latches, Master-Slave Flip-Flops, Edge-Triggering, T Flip-Flops, JK Flip-Flops. Registers and Shift Registers, Counters, Decoders, Multiplexers, Programmable Logic Devices (PLDs), Programmable Array Logic (PAL), Complex Programmable Logic Devices (CPLDs), Field-Programmable Gate Array (FPGA), Sequential Circuits, Timing Diagrams, The Finite State Machine Model, Synthesis of Finite State Machines.

UNIT-III

Basic Structure of Computers: Computer Types, Functional Units, Input Unit, Memory Unit, Arithmetic and Logic Unit, Output Unit, Control Unit, Basic Operational Concepts, Bus Structures, Software. Machine Instructions and Programs: Numbers, Arithmetic Operations, and Characters: Number Representation, Addition of Positive Numbers, Addition and Subtraction of Signed Numbers, Overflow of Integer Arithmetic, Characters, Memory Locations and Addresses, Byte Addressability, Word Alignment, Accessing Numbers, Characters, and Character Strings, Memory Operations, Instructions and Instruction Sequencing, Register Transfer Notation, Basic Instruction Types, Instruction Execution and Straight-Line Sequencing, Branching, Condition Codes, Generating Memory Addresses, Addressing Modes, Implementation of Variables and Constants, Indirection and Pointers, Indexing and Arrays, Relative Addressing.

UNIT-IV

THE ARM EXAMPLE: Registers, Memory Access, and Data Transfer, Register Structure, Memory Access Instructions and Addressing Modes, Register Move Instructions, Arithmetic and Logic Instructions: Arithmetic Instructions, Logic Instructions, Branch Instructions, Setting Condition Codes, Assembly Language, Pseudo-Instructions, I/O Operations, Subroutines, Vector Dot Product Program, Byte-Sorting Program, Linked-List Insertion and Deletion Subroutines. Basic Input-Output Operations, Stacks and Queues, Subroutines. PowerPC Example: Basic PowerPC Processor Organization, Load and Store Instructions, Arithmetic and Logic Instructions, Flow Control Instructions, Compare Instructions, Logic Instructions, Subroutines.

UNIT-V

Memory System: Semiconductor RAM Memories, Internal Organization of Memory Chips, Static Memories, Asynchronous DRAMS, Synchronous DRAMS, Structure of Large Memories, Memory System Considerations, RAMBUS Memory. Read-Only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size, and Cost of Memory. Secondary Storage: Magnetic Hard Disks, Optical Disks, Magnetic Tape Systems.

Recommended Books:

1. Carl Hamacher, Z. Vranesic, S. Zaky: Computer Organization, 5/e (TMH).
2. William Stallings: Computer Organization and Architecture (Design for Performance), 9/e.
3. S. Brown, & Z. Vranesic, Fundamentals of Digital Logic Design with VHDL, 2/e, McGraw-Hill.
4. J. P. Uyemura, A First Course in Digital System Design, An Integrated Approach, Cengage Learning.

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Logic and Proofs: Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Normal Forms, Proof Methods and Strategy, Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms.

UNIT-II

Basic Structures: Sets, Set Operations, Functions, Recursive Functions, Sequences and Summations. Relations: Relations and their Properties, n-ary Relations and their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Ordering. Boolean.

UNIT-III

Algebra: Boolean Functions, Representing Boolean Functions, Logic Gates, Minimization of Circuits. Algebraic Structures & Coding Theory: The Structure of Algebras, Semi-groups, Monoids and Groups, Homomorphism, Normal Subgroups, and Congruence Relations, Rings, Integral Domains and Fields, Quotient and Product Algebras, Coding Theory. Polynomial Rings and Polynomial Codes.

UNIT-IV

Counting: Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations. Advanced Counting Techniques, Applications of Inclusion-Exclusion, Discrete probability, Conditional probability, Bayes Theorem.

UNIT-V

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Havel-Hakimi Theorem, Representing Graphs and Graph Isomorphism, Connectivity, Cut-Sets, Euler and Hamiltonian Paths, Shortest-Path Problem, Planar Graphs, Graph Coloring, Network Flows.

Recommended Books:

1. Kenneth H Rosen, Discrete Mathematics & Its Applications, McGraw-Hill. 7/e.
2. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009
3. C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition , Tata McGraw Hill, 1985
4. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988

SEMESTER-II

C:3-PROGRAMMING USING C++ (Credit:6, Theory:4, Practical: 2)

UNIT-I

Principles of Object-Oriented Programming: Object-Oriented Programming (OOP) Paradigm, Basic Concepts of OOP, Benefits of OOP, Object Oriented Languages, Applications of OOP. Beginning

with C++: Applications of C++, C++ statements, Example with Class, Structure of C++ Program, Creating the Source File, Compiling and Linking. Tokens, Expressions and Control Structures: Tokens, Keywords, Identifiers & Constants, Basic Data Types, User-Defined Data Types, Derived Data Types, Symbolic Constants, Type Compatibility, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Deferencing Operators, Memory Management Operators, Manipulators, Type Cast Operators, Expressions and their Types, Special Assignment Expressions, Implicit Conversions, Operator Overloading, Operator Precedence, Control Structures.

UNIT- II

Functions in C++: The Main Function, Function Prototyping, Call By Reference, Return by Reference, Inline Functions, Default Arguments, Const. Arguments, Function Overloading, Friend & Virtual Functions, Math. Library Functions. Classes and Objects: Specifying a Class, Defining Member Functions, Making an outside Function Inline, Nested Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects, Cons. Member Functions, Pointer to Members, Local Classes.

UNIT- III

Constructors & Destructors: Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructors, Constructing Two-Dimensional Arrays, Const. Objects, Destructors. Operator Overloading and Type Conversions: Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overloading Binary Operators using Friends, Manipulation of Strings using Operators, Rules for Overloading Operators, Type Conversions.

UNIT- IV

Inheritance : Defining Derived Classes, Single Inheritance, Making a Private Member Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Member Classes, Nesting of Classes. Pointers, Virtual Functions and Polymorphism: Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.

UNIT- V

Managing Console I/O Operations: C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators. Files: Classes for File Stream Operations, Opening and Closing a File, Detecting end-of-file, File Modes, File Pointers and their Manipulations, Sequential Input and Output Operations, Updating a File: Random Access, Error Handling During File Operations, Command-line Arguments.

Recommended Books:

1. E. Balgurusamy, Object Oriented Programming with C++ :, 4/e (TMH).
2. Paul Deitel, Harvey Deitel, "C++: How to Program", 9/e. Prentice Hall.
3. J. Farrell, Object-Oriented Programming, Cengage Learning.
4. Bjarne Stroustrup, "Programming – Principles and Practice using C++", 2/e, Addison-Wesley 2014.

C: 4-DATA STRUCTURES

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Introduction and Overview: Definitions, Concept of Data Structures, Overview of Data Structures, Implementation of Data Structures. Arrays: Terminology, One-Dimensional Array, Multi-Dimensional Arrays, Pointer Arrays.

UNIT-II

Linked Lists: Single Linked List, Circular Linked List, Double Linked List, Circular Double Linked List, Application of Linked Lists, Memory Representation, Boundary Tag System, De-allocation Strategy, Buddy System, Compaction.

UNIT-III

Stacks: Definition, Representation of Stack (Array, Linked List), Operations on Stacks, Applications of Stack (Evaluation of Arithmetic Expressions, Code Generation, Implementation of Recursion, Factorial Calculation, Quick Sort, Tower of Hanoi, Activation Record Management).

UNITIV

Queues: Definition, Representation of Queues (Array, Linked List), Circular Queue, Deque, Priority Queue, Application of Queues (Simulation, CPU Scheduling in Multiprogramming Environment, Round Robin Algorithm).

UNITV

Tree: Binary Trees, Properties of Binary Tree, Linear Representation of Binary a Binary Tree, Linked Representation of a Binary Tree, Physical Implementation of Binary Tree in Memory, Operations on Binary Tree (Insertion, Deletion, Traversal, Merging of two Binary Trees), Types of Binary Trees (Expression Tree, Binary Search Tree, Heap Tree, Threaded Binary Trees, Height Balanced Binary Tree, Weighted Binary Tree, Decision Trees).

Recommended Books:

1. D. Samanta, Classic Data Structures:, 2/e (PHI).
2. D.S Malik, Data Structure using C++, 2/e, Cengage Learning, 2010.
3. Adam Drozdek, "Data Structures and algorithm in C++", 3/e, Cengage Learning, 2012.
4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.

GE:2-NUMERICAL TECHNIQUES

Credits;4

UNIT-I

Introduction: Numbers and their accuracy, Chopping and Rounding off, Errors: Absolute and Relative errors, Floating point representations of numbers, Loss of significance. Solution of Algebraic and Transcendental Equations: Bisection Method, Newton-Raphson Method, Secant Method, Method of false position, Rate of convergence and comparison of iterative methods.

UNIT-II

Interpolation and Numerical Differentiation: Polynomial Interpolation, Interpolating polynomial: Lagrange form, Newton form, Nested form, Divided difference Interpolation, Inverse Interpolation, Errors in polynomial Interpolation. First derivative and second derivative via Taylor Series, Richardson Extrapolation.

UNIT-III

Numerical Integration: Trapezoidal Rule, Composite Trapezoidal rule, Simpsons 1/3 rule, Simpsons 3/8 rule, Gaussian Quadrature formulae (1-point, 2-point, 3-point)

UNIT-IV

Solution of System of Linear Equations: Gaussian Elimination method and Pivoting, LU factorization method, ill Conditioning, Iterative Methods: Jacobi iterative method, Gauss Seidel iterative method. Eigen Values and Eigen Vectors: Eigen value properties, Computation Eigen values by Power method.

UNIT-V

Solution of Ordinary Differential Equations: Taylor Series method, Runge-Kutta method of order 2 and order 4, Predictor-Corrector method: Adams-Bashforth-Moulton method. Smoothing of Data and the Method of Least Squares: Linear and non-linear least square method.

Recommended Books:

1. E. Ward Cheney and David R. Kincaid ,Numerical Methods and Applications CENGAGE Learning India Private Ltd., New Delhi.
2. S.R.K. Iyengar, R.K. Jain, & M.K. Jain, Numerical Methods for Scientific & Engineering Computation, 6/e, New Age Int. Pub.
3. S.S. Sastry, Introductory Methods of Numerical Analysis, 5/e, EEE
4. Steven C. Chapra, Applied Numerical Methods with MATLAB, 2/e, McGraw-Hill.

SEMESTER-III

C:5-JAVA PROGRAMMING **(Credit:6, Theory:4, Practical: 2)**

UNIT-I

Introduction to Java: Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods).

UNIT-II

Arrays, Strings and I/O: Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files. Object-Oriented Programming Overview: Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.

UNIT-III

Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata: Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces

and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.

UNIT-IV

Exception Handling, Threading, Networking and Database Connectivity: Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

UNIT-V

Applets and Event Handling: Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, text fields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. Overview of servlets.

Recommended Books:

1. E. Balagurusamy, Programming with Java, 4/e, TMH
2. Bruce Eckel, "Thinking Java", 8/e, Pearson India, 2010.
3. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2/e, 2004.
4. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 1", 9/e, Printice Hall. 2012.

C: 6-COMPUTER ARCHITECTURE

(Credit:6, Theory:4, Practical: 2)

C: 7-OPERATING SYSTEMS

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Operating System, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special Purpose Systems, Computing Environments, Open-Source Operating Systems. Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating System Structure, Virtual Machines, Operating System Debugging, Operating System Generations. System Boot.

UNIT-II

Process: Process Concept, Process Scheduling, Operations on Processes, Inter-Process Communication, Examples of IPC Systems, Communication in Client-Server Systems. Multithreaded Programming: Multithreading Models, Thread Libraries, Threading Issues, Operating-System Examples.

UNIT-III

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling. Multiple-Process Scheduling. Synchronization: The Critical Section Problem, Petersons Solution, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Monitors, Synchronization Examples, Atomic Transactions.

UNIT-IV

Deadlocks: System Model, Deadlock Characterization, Methods of Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Recovery from Deadlock. Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Example: The Intel Pentium.

UNIT-V

Virtual-Memory Management: Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory. File System: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.

Recommended Books:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8/e, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3/e, Pearson Education 2007.
3. W. Stallings, Operating Systems, Internals & Design Principles, 5/e, Prentice Hall of India. 2008.
4. G. Nutt, Operating Systems: A Modern Perspective, 2/e, Pearson Education 1997.

SEC:1-HTML PROGRAMMING

(Credit:2, Theory:4, Practical: 2)

UNIT-I: Introduction The Basics: The Head, the Body, Colors, Attributes, Lists, ordered and unordered

UNIT-II: Links: Introduction, Relative Links, Absolute Links, Link Attributes, Using the ID Attribute to Link within a Document.

UNIT-III: Images: Putting an Image on a Page, Using Images as Links, Putting an Image in the Background

UNIT-V: Tables Creating a Table ,Table Headers, Captions, Spanning Multiple Columns, Styling Table

UNIT-V: Forms: Basic Input and Attributes, Other Kinds of Inputs, Styling forms with CSS, Where To Go From Here

Recommended Books:

Introduction to HTML and CSS –O'Reilly

GE:3-STATISTICS & PROBABILITY

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Probability and Probability Distribution: Events and the Sample Space, Calculating Probabilities using Simple events, Useful counting rules, Probability rules: Addition rule, Conditional probability and multiplication rule, Bayes rule.

UNIT-II

Probability Distributions: Random Variable, Discrete random variable, Mean and Standard deviation of discrete random variable, Discrete Probability Distributions: Binomial, Poisson and Hypergeometric probability distribution, Continuous Probability distribution: Normal distribution.

UNIT-III

Sampling Distribution: sampling plans and experimental designs, Sampling distribution of a statistic, Central Limit theorem, Sampling distribution of the Sample mean and Proportion. Large Sample Estimation: Point estimation, Interval estimation, Confidence interval of population mean, Population proportion, difference between two population means, difference between two population proportions.

UNIT-IV

Large Sample Tests of Hypothesis: Test of a Population mean, Test of difference of two population means, Test of hypothesis for a binomial proportion, Test of hypothesis for the difference between two binomial proportions. Inference from Small Samples: Students t Distribution, Small Sample inferences concerning a population mean and difference between two population means, Inferences concerning a population variance and difference between two population variances.

UNIT-V

Analysis of Variance: One-way classification, Two-way classification. Linear regression and Correlation: Method of least squares, Analysis of variance for linear regression, Testing the usefulness of the linear regression model, Estimation and Prediction using the fitted line. Carl Pearsons coefficient of Correlation, Test of hypothesis concerning the Correlation coefficient.

Recommended Books:

1. William Mendenhall, Robert J. Beaver, Barbara M. Beaver, Probability and Statistics 14/e, CENGAGE Learning.
2. W. W. Hines, D.C. Montgomery, D.M. Goldsman, & C.M. Borror, Probability & Statistics in Engineering".

SEMESTER-IV

C: 8-DATA COMMUNICATIONS **(Credit:6, Theory:4, Practical: 2)**

UNIT-I

Introduction: Data Communications, Networks, The Internet, Protocols and Standards. Network Models: Layered Tasks, The OSI Model, Layers in the OSI Model, TCP/ IP Protocol Suite, Addressing.

UNIT-II

Data and Signals: Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data Rate Limits, Performance. Digital Transmission: Digital-To-Digital Conversion, Analog-To-Digital Conversion, Transmission Modes. Analog Transmission: Digital-To-Analog Conversion, Analog-To-Analog Conversion.

UNIT-III

Multiplexing and Spreading: Multiplexing, Spread Spectrum. Transmission Media: Guided Media, Unguided Media (Wireless). Switching: Circuit Switched, Datagrams, Virtual Circuit Networks, Structure of a Switch. Telephone Network, Dial-Up MODEMS, Digital Subscriber Line (DSL), Cable TV Networks, Cable TV for Data Transfer.

UNIT-IV

Error Detection and Correction: Introduction, Block Coding, Linear Block Codes, Cyclic Codes,

Checksum. Data Link Control: Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC, Point-To-Point Protocol. Multiple Access: Random Access, Controlled Access, Channelization. Wired LANs: IEEE Standards, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet: Wireless LANs: IEEE 802.11, Bluetooth.

UNIT-V

Connecting LANs: Connecting Devices, Backbone Networks, Virtual LANs. Wireless LANs: Cellular Telephony, Satellite Networks. SONET: Architecture, SONET Layers, SONET Frames, STS Multiplexing, SONET Networks, Virtual Tributaries. Virtual-Circuit Networks. Frame Relay, ATM, ATM LANs.

Recommended Books:

1. B. A. Forouzan, Data Communications and Networking, 4/e, THM ,2007.
2. A. S. Tanenbaum, & David J. Wetherall, Computer Networks, 5/e,Pearson.

C: 9-DATABASE SYSTEMS **(Credit:6, Theory:4, Practical: 2)**

UNIT-I

Databases and Database Users, Database System Concepts and Architecture, Data Modelling using the Entity-Relationship(ER) Model, The Enhanced Entity-Relationship (EER) Model.

UNIT-II

Relational Model: The Relational Data Model and Relational Database Constraints, The Relational Algebra and Relational Calculus.

UNIT-III

Relational Database Design by ER- and EER-to-Relational Mapping, SQL-99: Schema Definition, Constraints, Queries, and Views, Introduction to SQL Programming Techniques.

UNIT-IV

Functional Dependencies and Normalization for Relational Databases, Relational Database Algorithms and Further Dependencies, Practical Database Design Methodology and use of UML Diagrams.

UNIT-V

Disk Storage, Basic File Structures, and Hashing, Indexing Structures for Files, Algorithms for Query Processing and Optimization, Physical Database Design and Tuning.

Recommended Books:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems, 6/e, Pearson Education, 2010.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6/e, McGraw Hill, 2010.
3. R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw-Hill.
4. C. Coronel, S. Morris, & P. Rob, Database Principles (Fundamentals of Design, Implementation, and Management), 9/e, Cengage Learning.

C: 10-MICROPROCESSOR **(Credit:6, Theory:4, Practical: 2)**

UNIT-I

An Introduction to Processor Design: Processor architecture and organization , Abstraction in

hardware design, MU0 - a simple processor, Instruction set design ,Processor design trade-offs ,The Reduced Instruction Set Computer, Design for low power consumption .The ARM Architecture: The Acorn RISC Machine ,Architectural inheritance, The ARM programmer's model, ARM development tools.

UNIT-II

ARM Assembly Language Programming: Data processing instructions, Data transfer instructions, Control flow instructions, Writing simple assembly language programs. ARM Organization and Implementation: Pipeline, Types, 3-stage pipeline ARM organization , 5-stage pipeline ARM organization, ARM instruction execution, ARM implementation, The ARM coprocessor interface.

UNIT-III

The ARM Instruction Set: Introduction, Exceptions, Conditional execution , Branch and Branch with Link (B, BL),Branch, Branch with Link and exchange (BX, BLX) , Software Interrupt (SWI) ,Data processing instructions, Multiply instructions, Single word and unsigned byte data transfer instructions , Half-word and signed byte data transfer instructions, Multiple register transfer instructions , Status register to general register transfer instructions ,General register to status register transfer instructions , Coprocessor instructions. Coprocessor data operations, Coprocessor data transfers, Coprocessor register transfers, Breakpoint instruction (BRK - architecture v5T only), Unused instruction space, Memory faults, ARM architecture variants.

UNIT-IV

Architectural Support for High-Level Languages: Abstraction in software design, Data types, Floating-point data types, The ARM floating-point architecture, Expressions, Conditional statements, Loops , Functions and procedures , Use of memory, Run-time environment , Examples and exercises.

UNIT-V

Thumb Instruction Set: The Thumb bit in the CPSR, The Thumb programmer's model ,Thumb branch instructions, Thumb software interrupt instruction , Thumb data processing instructions , Thumb single register data transfer instructions, Thumb multiple register data transfer instructions, Thumb breakpoint instruction, Thumb implementation ,Thumb applications . Architectural Support for System Development: The ARM memory interface, The Advanced Microcontroller Bus Architecture (AMBA),The ARM reference peripheral specification, Hardware system prototyping tools, The ARMulator.

Recommended Books:

Steve Furber :ARM System-On-Chip Architecture.

SEC:2-PHP PROGRAMMING

(Credit:2)

UNIT-I: Introduction to PHP:PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.), PHP with other, technologies, scope of PHP, Basic Syntax, PHP variables and constants, Types of data in PHP , Expressions, scopes of a variable (local, global), PHP Operators : Arithmetic, Assignment, Relational , Logical operators, Bitwise , ternary and MOD operator. PHP operator Precedence and associativity

UNIT-II: Handling HTML form with PHP: Capturing Form Data, GET and POST form methods Dealing with multi value fields, Redirecting a form after submission. PHP conditional events and

Loops: PHP IF Else conditional statements (Nested IF and Else), Switch case, while ,For and Do While Loop, Goto , Break ,Continue and exit

UNIT-III: PHP Functions: Function, Need of Function , declaration and calling of a function, PHP Function with arguments, Default Arguments in Function, Function argument with call by value, call by reference, Scope of Function Global and Local

UNIT-IV: String Manipulation and Regular Expression: Creating and accessing String , Searching & Replacing String, Formatting, joining and splitting String , String Related Library functions, Use and advantage of regular expression over inbuilt function, Use of pregmatch(), pregreplace(), pregsplit() functions in regular expression.

UNIT-V: Array: Anatomy of an Array ,Creating index based and Associative array ,Accessing array, Looping with Index based array, with associative array using each() and foreach(), Some useful Library function.

GE:4-PROGRAMMING in VISUAL BASIC (Credit:6, Theory:4, Practical: 2)

UNIT-I

GUI Environment: Introduction to graphical user interface (GUI), programming language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs. Controls : Introduction to controls textboxes, frames, check boxes, option buttons, images, setting borders and styles, the shape control, the line control, working with multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls.

UNIT-II

Operations: Data types, constants, named & intrinsic, declaring variables, scope of variables, val function, arithmetic operations, formatting data. Decision Making: If statement, comparing strings, compound conditions (and, or, not), nested if statements, case structure, using if statements with option buttons & check boxes, displaying message in message box, testing whether input is valid or not.

UNIT-III

Modular programming: Menus, sub-procedures and sub-functions defining / creating and modifying a menu, using common dialog box, creating a new sub-procedure, passing variables to procedures, passing argument by value or by reference, writing a function/ procedure. Forms Handling : Multiple forms creating, adding, removing forms in project, hide, show method, load, unload statement, me keyword, referring to objects on a different forms.

UNIT-IV

Iteration Handling: Do/loops, for/next loops, using msgbox function, using string function Arrays and Grouped Data Control: Arrays - 1-dimension arrays, initializing an array using for each, user-defined data types, accessing information with user-defined data types, using list boxes with array, two dimensional arrays. lists, loops and printing list boxes & combo boxes, filling the list using property window/additem method, clear method, list box properties, removing an item from a list, list box/ combo box operations.

UNIT-V

Database Connectivity: Database connectivity of forms with back end tool like mysql, populating

the data in text boxes, list boxes etc. searching of data in database. using forms. Updating/ editing of data based on a criterion.

Recommended Books:

Programming in Visual Basic 6.0 by Julia Case Bradley, Anita C. Millispangh (Tata Mcgraw Hill Edition 2000 (Fourteenth Reprint 2004)).

SEMESTER-V

C:11-SOFTWARE ENGINEERING

(Credit: 06, Theory:04, Practical:02)

UNIT-I

Professional Software Development, Software Engineering Ethics, Software Processes, Software Process Models, Process Activities, Coping with Change, The Rational Unified Process, Agile Software Development, Agile Methods, Plan-Driven and Agile Development, Extreme Programming, Agile Project Management, Scaling Agile Methods.

UNIT-II

Requirements Engineering, Functional and Non-Functional Requirements, The Software Requirements Document, Requirements Specification, Requirements Engineering Processes, Requirements Elicitation and Analysis, Requirements Validation, Requirements Management, System Modelling, Context Models, Interaction Models, Structural Models, Behavioural Models, Model-Driven, Engineering, Architectural Design, Architectural Design Decisions, Architectural Views, Architectural Patterns, Application Architectures.

UNIT-III

Design and Implementation: Object-Oriented Design using the UML, Design Patterns, Implementation Issues, Open Source Development, Software Testing: Development Testing, Test-Driven Development, Release Testing, User Testing, Software Evolution: Evolution Processes, Program Evolution Dynamics, Software Maintenance, Legacy System Management, Dependability and Security.

UNIT-IV

Socio-technical Systems: Complex Systems, Systems Engineering, System Procurement, System Development, System Operation. Dependability and Security: Dependability Properties, Availability and Reliability, Safety, Security. Dependability and Security Specification: Risk-Driven Requirements, Specification, Safety Specification, Reliability Specification, Security, Specification, Formal Specification.

UNIT-V

Dependability Engineering: Redundancy and Diversity, Dependable Processes, Dependable Systems Architectures, Dependable Programming. Security Engineering: Security Risk Management, Design for Security, System Survivability. Dependability and Security Assurance: Static Analysis, Reliability Testing, Security Testing, Process Assurance, Safety and Dependability Cases.

Recommended Books:

1. I. Sommerville, Software Engineering, 9/e, Addison Wesley.
2. R. Mall, Fundamentals of Software Engineering, 3/e, PHI.
3. R.S. Pressman, Software Engineering, A Practitioners Approach, 7/e, McGraw-Hill, 2009.
4. K.K. Aggarwal and Y. Singh, Software Engineering, 2/e, New Age International Publishers, 2008.

C:12-COMPUTER GRAPHICS

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Computer Graphics: A Survey of Computer graphics, Overview of Graphics System: Video Display Devices, Raster-Scan Systems, Input Devices, Hard-Copy Devices, Graphics Software, Introduction to OpenGL. Graphics Output Primitives: Point and Lines, Algorithms for line, circle & ellipse generation, Filled-Area Primitives. Attributes of Graphics Primitives: Point, line, curve attributes, fill area attributes, fill methods for areas with irregular boundaries, Antialiasing.

UNIT-II

Geometric Transformations (both 2-D & 3-D): Basic Geometric Transformations, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Inverse Transformations, Other Transformations (Reflection, shear), Transformation between coordinate systems, Affine Transformations. Two Dimensional Viewing: Viewing pipeline, Clipping Window, Normalization & Viewport coordinate Transformations, Clipping Algorithms: Point clipping, Line clipping and Polygon clipping. Three Dimensional Viewing: 3-dimensional Viewing Concepts, Viewing pipeline, Projection Transformations (Orthogonal, Oblique parallel, Perspective), Clipping Algorithms.

UNIT-III

Three Dimensional Object Representations: Curved Surfaces, Quadratic Surfaces, Spline Representations, Bezier Spline Curves and Surfaces, B-Spline Curves and Surfaces, Octrees, BSP Trees, Fractal Geometry Methods, Gamma correction.

UNIT-IV

Visible Surface Detection Methods: Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer method, A-Buffer Method, Scan line and Depth Sorting, Area subdivision Method, Ray Casting Method.

UNIT-V

Illumination Models: Basic Illumination Models, Displaying light Intensities, Halftone Patterns and Dithering techniques, Polygon-Rendering Methods (Gouroud Shading, Phong Shading), Ray-Tracing Methods (Basic Ray-Tracing Algorithm, Ray-Surface Intersection Calculations). Computer Animation, Hierarchical Modeling (introductory idea only).

Recommended Books:

1. Donald Hearn & M. Pauline Baker, Computer Graphics with OpenGL, Pearson Education.
2. A.V. Dan, F.H. Jones, J.D. Foley, S.K. Feiner, Computer Graphics Principles & Practices in C, 2/e, Pearson.
3. D. F. Rogers, Procedural Elements for Computer Graphics, McGraw Hill
4. D. F. Rogers, & J. A. Adams, Mathematical Elements for Computer Graphics, 2/e, McGraw Hill

DSE:1-ACCOUNTING & FINANCIAL MANAGEMENT

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Accounting: The Language of Business, Accounting: An Information system, users of Accounting Information, Branches of Accounting, Generally Accepted Accounting principles, The Accounting

Equation, Classification of Accounts, The Double Entry System, Journal & Ledger; Process of Recording, Trial Balance & Errors.

UNIT-II

Cash & Bank; Bank Reconciliation, Fixed Assets, Liabilities & shareholders Equity, Expenses & Revenues, Depreciation, Preparation of Final Accounts: Profit and Loss Account, Balance Sheet.

UNIT-III

Analysis and Interpretation of Financial Statements: Ratio Analysis and Trend Analysis, Cost and cost Terminology, Classification of costs, Statement of costs.

UNIT-IV

Marginal Costing & Absorption Costing: Break-even Analysis, Cost-Volume-Profit Analysis, Job costing and Process Costing.

UNIT-V

Budgetary Control System: Flexible Budgets, Master Budgets: Zero-base Budgeting Responsibility Accounting: Responsibility Centers, Management Control Systems

Recommended Books:

1. T. S. Grewal : Introduction to Accounting (S.Chand).
2. Jain & Narang : Introduction to Cost Accounting(Kalyanis).
3. S. N. Maheshwari : Management Accounting.
4. R. Narayanswamy : Financial Accounting : A Managerial Perspective
5. Jawaharlal : Cost Accounting (Tata Mc Graw Hill).
6. Nigam & Jain :Cost Accounting (PHI).
7. P.C. Tulsian : Financial Accounting (Pearson).

DSE:2-PROGRAMMING IN NET(Credit:6, Theory:4, Practical: 2)

SEMESTER-VI

C:13-INTERNET TECHNOLOGY (Credit:6, Theory:4, Practical: 2)

UNIT-I

Java: Use of Objects, Array and ArrayList class.

UNIT-II

JavaScript: Data types, operators, functions, control structures, events and event handling.

UNIT-III

JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.

UNIT-IV

JSP: Introduction to Java Server Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

UNIT-V

Java Beans: Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB.

Recommended Books:

1. Ivan Bayross, Web Enabled Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3/e, 2009.
3. Herbert Schildt , Java 7, The Complete Reference, , 8/e, 2009.
4. Jim Keogh ,The Complete Reference J2EE, TMH, , 2002.

C:13-MULTIMEDIA & APPLICATIONS

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Multimedia: Introduction to multimedia, components, uses of multimedia, multimedia applications, virtual reality. Text: Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia & Hypertext.

UNIT-II

Images: Still Images bitmaps, vector drawing, 3D drawing & rendering, natural light & colors, computerized colors, color palettes, image file formats. Sound: Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats.

UNIT-III

Video: How video works, analog video, digital video, video file formats, video shooting and editing. Animation: Principle of animations, animation techniques, animation file formats.

UNIT-IV

Internet and Multimedia: www and HTML, multimedia on the web web servers, web browsers, web page makers and site builders.

UNIT-V

Making Multimedia: Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia software and Authoring tools.

Recommended Books:

1. Tay Vaughan, Multimedia: Making it work, TMH, Eighth edition.
2. Ralf Steinmetz and KlaraNaharstedt, Multimedia: Computing, Communications Applications, Pearson.
3. Keyes, Multimedia Handbook, TMH.
4. K. Andleigh and K. Thakkar, Multimedia System Design, PHI.

DSE:3-E-COMMERCE

(Credit:6, Theory:4, Practical: 2)

UNIT-I

An introduction to Electronic commerce: What is E-Commerce (Introduction And Definition), Main

activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, Electronic Commerce and Electronic Business(C2C)(C2G,G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C).

UNIT-II

The Internet and WWW: Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov, .net etc.) , Types of Network, Internet Service Provider, World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own Website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Baner, Exchange, Shopping Bots.

UNIT-III

Internet Security: Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime(Laws , Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus(How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorisation and Authentication, Firewall, Digital Signature(How it Works).

UNIT-IV

Electronic Data Exchange: Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model,Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash.

UNIT-V

Planning for Electronic Commerce: Planning Electronic Commerce initiates, Linking objectives to business strategies, Measuring cost objectives, Comparing benefits to Costs, Strategies for developing electronic commerce web sites.

Recommended Books:

1. E-Commerce Concepts, Models, Strategies-G.S.V.Murthy, Himalaya Publishing House.
2. E- Commerce:-Kamlesh K Bajaj and Debjani Nag.
3. Electronic commerce-Gray P. Schneider.
4. E-Commerce, Fundamentals & Applications: Chand (Wiley) Web and E-Commerce.

DSE:4-PROJECT WORK

(Credit:6)

BACHELOR OF SCIENCE(ITM)

SEMESTER-I

C:1-PROGRAMMING USING C (Credit:6, Theory:4, Practical: 2)

UNIT- I

Introduction to Programming Language, Introduction to C Programming , Character Set, C Tokens, Keywords & Identifiers, Constants, Variables, Data Types, Variables , Storage Classes, Operators (Arithmetic, Relational, Logical , Assignment, Increment & Decrement, Conditional , Bitwise), Expressions , Input and Output Operations.

UNIT- II

Decision Making and Branching: Simple IF Statement, IF .. ELSE Statement, Nesting IF . ELSE Statement, ELSE IF Ladder, Switch Statement, Operator, GOTO Statement. Decision Making and Looping: The WHILE Statement, The DO Statement, The FOR Statement, Jumps in LOOPS. Arrays, Character Arrays and Strings.

UNIT- III

User-defined Functions: Need, Elements & Definition, Function Calls, Function Definition, Category of Functions, Recursion. Structures and Unions: Defining, Declaring, Accessing, Initialization Structure, Arrays of Structures, Arrays within Structures, Structures and Functions, Unions.

UNIT- IV

Pointers: Accessing the Address of a Variable, Declaring Pointer Variables, Initializations of Pointer Variable, Accessing a Variable through its Pointer, Chain of Pointers, Pointer Expressions, Pointer Increments and Scale Factor, Pointers and Arrays,, Pointers and Character Strings, Array of Pointers, Pointers as Function Arguments, Functions Returning Pointers, Pointers to Functions, Pointers to Structures, Troubles with Pointers.

UNIT- V

File Management in C: Defining and Opening a File, Closing a File, Input/ Output Operations on Files, Error Handling During I/O Operations, Random Access to Files, Command Line Arguments, Dynamic Memory Allocation.

Recommended Books:

1. E. Balaguruswamy, Programming in ANSI C,4/e, (TMH).
2. Paul Deitel, Harvey Deitel, C: How to Program, 8/e, Prentice Hall.
3. J. R. Hanly, Problem Solving & Program Design in C, 7/e, Pearson.
4. B. Kernighan & D.M. Ritchie, The C Programming Language, 2/e PHI.

C: 2-COMPUTER ORGANIZATION (Credit:6, Theory:4, Practical: 2)

UNIT-I

Character Codes, Decimal System, Binary System, Decimal to Binary Conversion, Hexadecimal

Notation, Boolean Algebra, Basic Logic Functions: Electronic Logic Gates, Synthesis of Logic Functions, Minimization of Logic Expressions, Minimization using Karnaugh Maps, Synthesis with NAND and NOR Gates.

UNIT-II

Flip-Flops, Gated Latches, Master-Slave Flip-Flops, Edge-Triggering, T Flip-Flops, JK Flip-Flops. Registers and Shift Registers, Counters, Decoders, Multiplexers, Programmable Logic Devices (PLDs), Programmable Array Logic (PAL), Complex Programmable Logic Devices (CPLDs), Field-Programmable Gate Array (FPGA), Sequential Circuits, Timing Diagrams, The Finite State Machine Model, Synthesis of Finite State Machines.

UNIT-III

Basic Structure of Computers: Computer Types, Functional Units, Input Unit, Memory Unit, Arithmetic and Logic Unit, Output Unit, Control Unit, Basic Operational Concepts, Bus Structures, Software. Machine Instructions and Programs: Numbers, Arithmetic Operations, and Characters: Number Representation, Addition of Positive Numbers, Addition and Subtraction of Signed Numbers, Overflow of Integer Arithmetic, Characters, Memory Locations and Addresses, Byte Addressability, Word Alignment, Accessing Numbers, Characters, and Character Strings, Memory Operations, Instructions and Instruction Sequencing, Register Transfer Notation, Basic Instruction Types, Instruction Execution and Straight-Line Sequencing, Branching, Condition Codes, Generating Memory Addresses, Addressing Modes, Implementation of Variables and Constants, Indirection and Pointers, Indexing and Arrays, Relative Addressing.

UNIT-IV

THE ARM EXAMPLE: Registers, Memory Access, and Data Transfer, Register Structure, Memory Access Instructions and Addressing Modes, Register Move Instructions, Arithmetic and Logic Instructions: Arithmetic Instructions, Logic Instructions, Branch Instructions, Setting Condition Codes, Assembly Language, Psedo-Instructions, I/O Operations, Subroutines, Vector Dot Product Program, Byte-Sorting Program, Linked-List Insertion and Deletion Subroutines. Basic Input-Output Operations, Stacks and Queues, Subroutines. PowerPC Example: Basic PowerPC Processor Organization, Load and Store Instructions, Arithmetic and Logic Instructions, Flow Control Instructions, Compare Instructions, Logic Instructions, Subroutines.

UNIT-V

Memory System: Semiconductor RAM Memories, Internal Organization of Memory Chips, Static Memories, Asynchronous DRAMS, Synchronous DRAMS, Structure of Large Memories, Memory System Considerations, RAMBUS Memory. Read-Only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size, and Cost of Memory. Secondary Storage: Magnetic Hard Disks, Optical Disks, Magnetic Tape Systems.

Recommended Books:

1. Carl Hamacher, Z. Vranesic, S. Zaky: Computer Organization, 5/e (TMH)
2. William Stallings: Computer Organization and Architecture (Design for Performance), 9/e
3. S. Brown, & Z. Vranesic, Fundamentals of Digital Logic Design with VHDL, 2/e, McGraw-Hill
4. J. P. Ujemura, A First Course in Digital System Design, An Integrated Approach, Cengage Learning.

C: 3-PERSONAL MANAGEMENT & ORGANIZATIONAL BEHAVIOUR

(Credit:6, Theory:4, Practical: 2)

GE:1-DISCRETE STRUCTURES

(Credit:6, Theory:4, Practical: 2)

UNIT-I Logic and Proofs: Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Normal Forms, Proof Methods and Strategy, Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms.

UNIT-II

Basic Structures: Sets, Set Operations, Functions, Recursive Functions, Sequences and Summations. Relations: Relations and their Properties, n-ary Relations and their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Ordering. Boolean.

UNIT-III

Algebra: Boolean Functions, Representing Boolean Functions, Logic Gates, Minimization of Circuits. Algebraic Structures & Coding Theory: The Structure of Algebras, Semi-groups, Monoids and Groups, Homomorphism, Normal Subgroups, and Congruence Relations, Rings, Integral Domains and Fields, Quotient and Product Algebras, Coding Theory. Polynomial Rings and Polynomial Codes.

UNIT-IV

Counting: Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations. Advanced Counting Techniques, Applications of Inclusion-Exclusion, Discrete probability, Conditional probability, Bayes Theorem.

UNIT-V

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Havel-Hakimi Theorem, Representing Graphs and Graph Isomorphism, Connectivity, Cut-Sets, Euler and Hamiltonian Paths, Shortest-Path Problem, Planar Graphs, Graph Coloring, Network Flows.

Recommended Books:

1. Kenneth H Rosen, Discrete Mathematics & Its Applications, McGraw-Hill. 7/e.
2. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009
3. C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition , Tata McGraw Hill, 1985
4. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988.

SEMESTER-II

C: 4-PROGRAMMING USING C++

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Principles of Object-Oriented Programming: Object-Oriented Programming (OOP) Paradigm, Basic

Concepts of OOP, Benefits of OOP, Object Oriented Languages, Applications of OOP. Beginning with C++: Applications of C++, C++ statements, Example with Class, Structure of C++ Program, Creating the Source File, Compiling and Linking. Tokens, Expressions and Control Structures: Tokens, Keywords, Identifiers & Constants, Basic Data Types, User-Defined Data Types, Derived Data Types, Symbolic Constants, Type Compatibility, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Deferencing Operators, Memory Management Operators, Manipulators, Type Cast Operators, Expressions and their Types, Special Assignment Expressions, Implicit Conversions, Operator Overloading, Operator Precedence, Control Structures.

UNIT- II

Functions in C++: The Main Function, Function Prototyping, Call By Reference, Return by Reference, Inline Functions, Default Arguments, Const. Arguments, Function Overloading, Friend & Virtual Functions, Math. Library Functions. Classes and Objects: Specifying a Class, Defining Member Functions, Making an outside Function Inline, Nested Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects, Cons. Member Functions, Pointer to Members, Local Classes.

UNIT- III

Constructors & Destructors: Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructors, Constructing Two-Dimensional Arrays, Const. Objects, Destructors. Operator Overloading and Type Conversions: Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overloading Binary Operators using Friends, Manipulation of Strings using Operators, Rules for Overloading Operators, Type Conversions.

UNIT- IV

Inheritance : Defining Derived Classes, Single Inheritance, Making a Private Member Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Member Classes, Nesting of Classes. Pointers, Virtual Functions and Polymorphism: Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.

UNIT- V

Managing Console I/O Operations: C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators. Files: Classes for File Stream Operations, Opening and Closing a File, Detecting end-of-file, File Modes, File Pointers and their Manipulations, Sequential Input and Output Operations, Updating a File: Random Access, Error Handling During File Operations, Command-line Arguments.

Recommended Books:

1. E. Balgurusamy, Object Oriented Programming with C++ :, 4/e (TMH).
2. Paul Deitel, Harvey Deitel, "C++: How to Program", 9/e. Prentice Hall.
3. J. Farrell, Object-Oriented Programming, Cengage Learning.
4. Bjarne Stroustrup, "Programming – Principles and Practice using C++", 2/e, Addison-Wesley 2014.

C: 5-DATA STRUCTURES

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Introduction and Overview: Definitions, Concept of Data Structures, Overview of Data Structures, Implementation of Data Structures. Arrays: Terminology, One-Dimensional Array, Multi-Dimensional Arrays, Pointer Arrays.

UNIT-II

Linked Lists: Single Linked List, Circular Linked List, Double Linked List, Circular Double Linked List, Application of Linked Lists, Memory Representation, Boundary Tag System, De-allocation Strategy, Buddy System, Compaction.

UNIT-III

Stacks: Definition, Representation of Stack (Array, Linked List), Operations on Stacks, Applications of Stack (Evaluation of Arithmetic Expressions, Code Generation, Implementation of Recursion, Factorial Calculation, Quick Sort, Tower of Hanoi, Activation Record Management).

UNITIV

Queues: Definition, Representation of Queues (Array, Linked List), Circular Queue, Deque, Priority Queue, Application of Queues (Simulation, CPU Scheduling in Multiprogramming Environment, Round Robin Algorithm).

UNITV

Tree: Binary Trees, Properties of Binary Tree, Linear Representation of Binary a Binary Tree, Linked Representation of a Binary Tree, Physical Implementation of Binary Tree in Memory, Operations on Binary Tree (Insertion, Deletion, Traversal, Merging of two Binary Trees), Types of Binary Trees (Expression Tree, Binary Search Tree, Heap Tree, Threaded Binary Trees, Height Balanced Binary Tree, Weighted Binary Tree, Decision Trees).

Recommended Books:

1. D. Samanta, Classic Data Structures:, 2/e (PHI).
2. D.S Malik, Data Structure using C++, 2/e, Cengage Learning, 2010.
3. Adam Drozdek, "Data Structures and algorithm in C++", 3/e, Cengage Learning, 2012.
4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.

GE:2-STATISTICS FOR BUSINESS

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Probability and Probability Distribution: Events and the Sample Space, Calculating Probabilities using Simple events, Useful counting rules, Probability rules: Addition rule, Conditional probability and multiplication rule, Bayes rule.

UNIT-II

Probability Distributions: Random Variable, Discrete random variable, Mean and Standard deviation of discrete random variable, Discrete Probability Distributions: Binomial, Poisson and Hypergeometric probability distribution, Continuous Probability distribution: Normal distribution.

UNIT-III

Sampling Distribution: sampling plans and experimental designs, Sampling distribution of a statistic,

Central Limit theorem, Sampling distribution of the Sample mean and Proportion. Large Sample Estimation: Point estimation, Interval estimation, Confidence interval of population mean, Population proportion, difference between two population means, difference between two population proportions.

UNIT-IV

Large Sample Tests of Hypothesis: Test of a Population mean, Test of difference of two population means, Test of hypothesis for a binomial proportion, Test of hypothesis for the difference between two binomial proportions. Inference from Small Samples: Students t Distribution, Small Sample inferences concerning a population mean and difference between two population means, Inferences concerning a population variance and difference between two population variances.

UNIT-V

Analysis of Variance: One-way classification, Two-way classification. Linear regression and Correlation: Method of least squares, Analysis of variance for linear regression, Testing the usefulness of the linear regression model, Estimation and Prediction using the fitted line. Carl Pearsons coefficient of Correlation, Test of hypothesis concerning the Correlation coefficient.

Recommended Books:

1. William Mendenhall, Robert J. Beaver, Barbara M. Beaver, Probability and Statistics 14/e, CENGAGE Learning.
2. W. W. Hines, D.C. Montgomery, D.M. Goldsman, & C.M. Borror, Probability & Statistics in Engineering"

SEMESTER-III

C: 6-OPERATING SYSTEMS **(Credit:6, Theory:4, Practical: 2)**

UNIT-I

Operating System, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special Purpose Systems, Computing Environments, Open-Source Operating Systems. Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating System Structure, Virtual Machines, Operating System Debugging, Operating System Generations. System Boot.

UNIT-II

Process: Process Concept, Process Scheduling, Operations on Processes, Inter-Process Communication, Examples of IPC Systems, Communication in Client-Server Systems. Multithreaded Programming: Multithreading Models, Thread Libraries, Threading Issues, Operating-System Examples.

UNIT-III

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling. Multiple-Process Scheduling. Synchronization: The Critical Section Problem, Petersons Solution, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Monitors, Synchronization Examples, Atomic Transactions.

UNIT-IV

Deadlocks: System Model, Deadlock Characterization, Methods of Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Recovery from Deadlock. Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Example: The Intel Pentium.

UNIT-V

Virtual-Memory Management: Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory. File System: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.

Recommended Books:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8/e, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3/e, Pearson Education 2007.
3. W. Stallings, Operating Systems, Internals & Design Principles, 5/e, Prentice Hall of India. 2008.
4. G. Nutt, Operating Systems: A Modern Perspective, 2/e, Pearson Education 1997.

C: 7-BUSINESS ACCOUNTING

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Introduction to Financial Accounting. Accounting as an Information System.Importance, Scope, and Limitations.Users of Accounting Information.Generally Accepted Accounting Principles.The Accounting Equation.Nature of Accounts and Rules of Debit and Credit.Recording Transactions in General Journal. Recording Transactions in three column Cash Book. An overview of Subsidiary books Purchase Book, Purchase Returns Book, Sales Book, and Sales Returns Book. Opening and Closing Entries.Preparation of Ledger Accounts.

UNIT-II

Introduction to International Financial Reporting Standards (IFRS). Understanding Accounting Standards issued by the ICAI related to Disclosure of Accounting Policies, Depreciation Accounting, and Revenue Recognition. Methods of charging DepreciationStraight-line Method, and Written-down-value Method.Preparation of Trial Balance.Adjustment Entries.Post-adjusted Trial Balance.Bank Reconciliation Statement.

UNIT-III

Preparation of Financial Statements: Preparing Trading Account, Profit & Loss Account and Balance Sheet for a Sole Proprietor. Understanding contents of Financial Statements of a Joint Stock Company as per Companies Act 2013. Understanding the contents of a Corporate Annual Report. Preparation of Cash Flow Statement as per AS-3 (revised).

UNIT-IV

Analyzing Financial Statements: Objectives of Financial Statement Analysis; Sources of Information; Standards of Comparison; Techniques of Financial Statement Analysis - Horizontal Analysis, Vertical Analysis, and Ratio Analysis. Meaning and Usefulness of Financial Ratios; Analysis of Financial Ratios from the perspective of different Stakeholders like Investors, Lenders, and Short-term

Creditors; Profitability Ratios, Solvency Ratios, Liquidity Ratios, and Turnover Ratios; Limitations of Ratio Analysis.

Recommended Books:

1. S.N. Maheshwari, Suneel K. Maheshwari, and Sharad K. Maheshwari: An Introduction to Accountancy, Vikas Publishing House Pvt. Ltd.
2. R. Narayanaswamy, Financial Accounting: A Managerial Perspective, PHI Learning Pvt. Ltd.
3. Charles T. Horngren, Gort L. Sundem, John A. Elliott, and Donna R. Philbrick, Introduction to Financial Accounting, Pearson.
4. J.R. Monga, Financial Accounting: Concepts and Applications, Mayur Paperbacks.
5. T.P. Ghosh, Financial Accounting for Managers: Taxmann Allied Services Pvt. Ltd.

C: 8-MANAGERIAL ECONOMICS **(Credit:6, Theory:4, Practical: 2)**

UNIT-I

Demand, Supply and Market equilibrium: individual demand, market demand, individual supply, market supply, market equilibrium; Elasticities of demand and supply : Price elasticity of demand, income elasticity of demand, cross price elasticity of demand, elasticity of supply; Theory of consumer behavior : cardinal utility theory, ordinal utility theory(indifference curves, budget line, consumer choice, price effect, substitution effect, income effect for normal, inferior and giffen goods), revealed preference theory.

UNIT-II

Producer and optimal production choice : optimizing behavior in short run(geometry of product curves, law of diminishing margin productivity, three stages of production), optimizing behavior in long run (isoquants, isocost line, optimal combination of resources) Costs and scale : traditional theory of cost (short run and long run, geometry of cot curves, envelope curves), modern theory of cost (short run and long run), economies of scale, economies of scope.

UNIT-III Theory of firm and market organization : perfect competition (basic features, short run equilibrium of firm/industry, long run equilibrium of firm/industry, effect of changes in demand, cost and imposition of taxes) ; monopoly (basic features, short run equilibrium, long run equilibrium, effect of changes in demand, cost and imposition of taxes, comparison with perfect competition, welfare cost of monopoly), price discrimination, multiplant monopoly ; monopolistic competition (basic features, demand and cost, short run equilibrium, long run equilibrium, excess capacity) ; oligopoly (Cournots model, kinked demand curve model, dominant price leadership model, prisoners dilemma)

UNIT-IV

Factor market : demand for a factor by a firm under marginal productivity theory (perfect competition in the product market, monopoly in the product market), market demand for a factor, supply of labour, market supply of labour, factor market equilibrium.

Recommended Books:

1. Dominick Salvatore (2009). Principles of Microeconomics (5th ed.) Oxford University Press.
2. Lipsey and Chrystal. (2008). Economics.(11th ed.) Oxford University Press.
3. Koutosyannis (1979). Modern Micro Economics. Palgrave Macmillan.

4. Pindyck, Rubinfeld and Mehta. (2009). Micro Economics. (7th ed.), Pearson.

SEC:1-BUSINESS COMMUNICATION
(Credits:2)

GE:1-NUMERICAL TECHNIQUES
(Credit:6, Theory:4, Practical: 2)

UNIT-I

Introduction: Numbers and their accuracy, Chopping and Rounding off, Errors: Absolute and Relative errors, Floating point representations of numbers, Loss of significance. Solution of Algebraic and Transcendental Equations: Bisection Method, Newton-Raphson Method, Secant Method, Method of false position, Rate of convergence and comparison of iterative methods.

UNIT-II

Interpolation and Numerical Differentiation: Polynomial Interpolation, Interpolating polynomial: Lagrange form, Newton form, Nested form, Divided difference Interpolation, Inverse Interpolation, Errors in polynomial Interpolation. First derivative and second derivative via Taylor Series, Richardson Extrapolation.

UNIT-III

Numerical Integration: Trapezoidal Rule, Composite Trapezoidal rule, Simpsons 1/3 rule, Simpsons 3/8 rule, Gaussian Quadrature formulae (1-point, 2-point, 3-point)

UNIT-IV

Solution of System of Linear Equations: Gaussian Elimination method and Pivoting, LU factorization method, ill Conditioning, Iterative Methods: Jacobi iterative method, Gauss Seidel iterative method. Eigen Values and Eigen Vectors: Eigen value properties, Computation Eigen values by Power method.

UNIT-V

Solution of Ordinary Differential Equations: Taylor Series method, Runge-Kutta method of order 2 and order 4, Predictor-Corrector method: Adams-Bashforth-Moulton method. Smoothing of Data and the Method of Least Squares: Linear and non-linear least square method.

Recommended Books:

1. E. Ward Cheney and David R. Kincaid, Numerical Methods and Applications CENGAGE Learning India Private Ltd., New Delhi.
2. S.R.K. Iyengar, R.K. Jain, & M.K. Jain, Numerical Methods for Scientific & Engineering Computation, 6/e, New Age Int. Pub.
3. S.S. Sastry, Introductory Methods of Numerical Analysis, 5/e, EEE
4. Steven C. Chapra, Applied Numerical Methods with MATLAB, 2/e, McGraw-Hill.

SEMESTER-IV

C: 9-JAVA PROGRAMMING
(Credit:6, Theory:4, Practical: 2)

UNIT-I

Introduction to Java: Java Architecture and Features, Understanding the semantic and syntax

differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods).

UNIT-II

Arrays, Strings and I/O: Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files. Object-Oriented Programming Overview: Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.

UNIT-III

Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata: Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.

UNIT-IV

Exception Handling, Threading, Networking and Database Connectivity: Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

UNIT-V

Applets and Event Handling: Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, text fields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. Overview of servlets.

Recommended Books:

1. E. Balagurusamy, Programming with Java, 4/e, TMH
2. Bruce Eckel, "Thinking Java", 8/e, Pearson India, 2010.
3. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2/e, 2004.
4. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 1", 9/e, Printice Hall, 2012.

C: 10-DATABASE MANAGEMENT SYSTEM (Credit:6, Theory:4, Practical: 2)

UNIT-I

Databases and Database Users, Database System Concepts and Architecture, Data Modelling using

the Entity-Relationship(ER) Model, The Enhanced Entity-Relationship (EER) Model.

UNIT-II

Relational Model: The Relational Data Model and Relational Database Constraints, The Relational Algebra and Relational Calculus.

UNIT-III

Relational Database Design by ER- and EER-to-Relational Mapping, SQL-99: Schema Definition, Constraints, Queries, and Views, Introduction to SQL Programming Techniques.

UNIT-IV

Functional Dependencies and Normalization for Relational Databases, Relational Database Algorithms and Further Dependencies, Practical Database Design Methodology and use of UML Diagrams.

UNIT-V

Disk Storage, Basic File Structures, and Hashing, Indexing Structures for Files, Algorithms for Query Processing and Optimization, Physical Database Design and Tuning.

Recommended Books:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems, 6/e, Pearson Education, 2010.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6/e, McGraw Hill, 2010.
3. R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw-Hill.
4. C. Coronel, S. Morris, & P. Rob, Database Principles (Fundamentals of Design, Implementation, and Management), 9/e, Cengage Learning.

C: 11-MANAGEMENT ACCOUNTING (Credit:6, Theory:4, Practical: 2)

UNIT-I

Nature, Scope of Management Accounting: Meaning, definition, nature and scope of Management Accounting; Comparison of Management Accounting with Cost Accounting and Financial Accounting. Cost concepts: Meaning, Scope, Objectives, and Importance of Cost Accounting; Cost, Costing, Cost Control, and Cost Reduction; Elements of Cost, Components of total Cost, Cost Sheet. Classification of Costs: Fixed, Variable, Semivariable, and Step Costs; Product, and Period Costs; Direct, and Indirect Costs; Relevant, and Irrelevant Costs; Shut-down, and Sunk Costs; Controllable, and Uncontrollable Costs; Avoidable, and Unavoidable Costs; Imputed / Hypothetical Costs; Out-of-pocket Costs; Opportunity Costs; Expired, and Unexpired Costs; Conversion Cost. Cost Ascertainment: Cost Unit and Cost Center. Introduction to Overhead allocation, Overhead apportionment, and Overhead absorption.

UNIT-II

Cost-Volume-Profit Analysis: Contribution, Profit-Volume Ratio, Margin of safety, Cost Break-even Point, Composite Break-even Point, Cash Break-even Point, Key Factor, Break-even Analysis. Relevant Costs and Decision Making: Pricing, Product Profitability, Make or Buy, Exploring new markets, Export Order, Sell or Process Further, Shut down vs. Continue.

UNIT-III

Budgets and Budgetary Control: Meaning, Types of Budgets, Steps in Budgetary Control, Fixed and Flexible Budgeting, Cash Budget. Responsibility Accounting: Concept, Significance, Different

responsibility centers, Divisional performance Financial measures, Transfer pricing.

UNIT-IV

Standard Costing and Variance Analysis: Meaning of Standard Cost and Standard Costing, Advantages, Limitations and Applications; Material, Labor, Overhead and Sales variances. Introduction to Target Costing, Life Cycle Costing, Quality Costing, and Activity based Costing.

Recommended Books:

1. C.T. Horngren, Gary L. Sundem, Jeff O. Schatzberg, and Dave Burgstahler: Introduction to Management Accounting, Pearson.
2. M.N. Arora: A Textbook of Cost and Management Accounting, Vikas Publishing House Pvt. Ltd.
3. M.Y. Khan, and P.K. Jain, Management Accounting: Text Problems and Cases, McGraw Hill Education (India) Pvt. Ltd.
4. S.N. Maheshwari, and S.N. Mittal, Cost Accounting: Theory and Problems, Shree Mahavir Book Depot (Publishers).

SEC: 2-HTML PROGRAMMING (Credit:2))

UNIT-I

Introduction

The Basics: The Head, the Body, Colors, Attributes, Lists, ordered and unordered.

UNIT-II

Links: Introduction, Relative Links, Absolute Links, Link Attributes, Using the ID Attribute to Link within a Document.

UNIT-III

Images: Putting an Image on a Page, Using Images as Links, Putting an Image in the Background

UNIT-IV

Tables, Creating a Table , Table Headers, Captions, Spanning Multiple Columns, Styling Table

UNIT-V

Forms: Basic Input and Attributes, Other Kinds of Inputs, Styling forms with CSS, Where To Go From Here

Recommended Books:

Introduction to HTML and CSS -O' Reilly.

GE:4-QUANTITATIVE TECHNIQUES (Credit:6, Theory:4, Practical: 2)

UNIT-I

Linear Programming: Formulation of L.P. Problems, Graphical Solutions (Specialcases: Multiple optimal solution, infeasibility, unbounded solution); Simplex Methods(Special cases: Multiple optimal solution, infeasibility, degeneracy, unbounded solution)Big-M method and Two-phase method; Duality and Sensitivity (emphasis on formulation & economic interpretation); Formulation of Integer programming, Zero-oneprogramming, Goal Programming.

UNIT-II

Elementary Transportation: Formulation of Transport Problem, Solution by N.W. Corner Rule, Least Cost method, Vogels Approximation Method (VAM), Modified Distribution Method. (Special cases: Multiple Solutions, Maximization case, Unbalanced case, prohibited routes) Elementary Assignment: Hungarian Method, (Special cases: Multiple Solutions, Maximization case, Unbalanced case, Restrictions on assignment).

UNIT-III

Network Analysis: Construction of the Network diagram, Critical Path- float and slack analysis (Total float, free float, independent float), PERT, Project Time Crashing.

UNIT-IV

Decision Theory: Pay off Table, Opportunity Loss Table, Expected Monetary Value, Expected Opportunity Loss, Expected Value of Perfect Information and Sample Information.

UNIT-V

Markov Chains: Predicting Future Market Shares, Equilibrium Conditions (Questions based on Markov analysis) Limiting probabilities, Chapman Kolmogorov equation. Introduction to Game Theory: Pay off Matrix- Two person Zero-Sum game, Pure strategy, Saddle point; Dominance Rule, Mixed strategy, Reduction of $m \times n$ game and solution of 2×2 , $2 \times s$, and $r \times 2$ cases by Graphical and Algebraic methods; Introduction to Simulation: Monte Carlo Simulation.

Recommended Books:

1. N. D. Vohra: Quantitative Management, Tata McGraw Hill.
2. P. K. Gupta, Man Mohan, Kanti Swarup: Operations Research, Sultan Chand.
3. V. K. Kapoor: Operations Research, Sultan Chand & Sons.
4. J. K. Sharma: Operations Research Theory & Applications, Macmillan India, Limited.

SEMESTER-V

C: 12-DATA COMMUNICATIONS

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Introduction: Data Communications, Networks, The Internet, Protocols and Standards. Network Models: Layered Tasks, The OSI Model, Layers in the OSI Model, TCP/ IP Protocol Suite, Addressing.

UNIT-II

Data and Signals: Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data Rate Limits, Performance. Digital Transmission: Digital-To-Digital Conversion, Analog-To-Digital Conversion, Transmission Modes. Analog Transmission: Digital-To-Analog Conversion, Analog-To-Analog Conversion.

UNIT-III

Multiplexing and Spreading: Multiplexing, Spread Spectrum. Transmission Media: Guided Media, Unguided Media (Wireless). Switching: Circuit Switched, Datagram, Virtual Circuit Networks, Structure of a Switch. Telephone Network, Dial-Up MODEMS, Digital Subscriber Line (DSL), Cable TV Networks, Cable TV for Data Transfer.

UNIT-IV

Error Detection and Correction: Introduction, Block Coding, Linear Block Codes, Cyclic Codes, Checksum. Data Link Control: Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC, Point-To-Point Protocol. Multiple Access: Random Access, Controlled Access, Channelization. Wired LANs: IEEE Standards, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet: Wireless LANs: IEEE 802.11, Bluetooth.

UNIT-V— Connecting LANs: Connecting Devices, Backbone Networks, Virtual LANs. Wireless LANs: Cellular Telephony, Satellite Networks. SONET: Architecture, SONET Layers, SONET Frames, STS Multiplexing, SONET Networks, Virtual Tributaries. Virtual-Circuit Networks. Frame Relay, ATM, ATM LANs.

Recommended Books:

1. B. A. Forouzan, Data Communications and Networking, 4/e, THM ,2007.
2. A. S. Tanenbaum, & David J. Wetherall, Computer Networks, 5/e,Pearson

C: 13-SOFTWARE ENGINEERING

(Credit:6, Theory:4, Practical: 2)

UNIT-I

Professional Software Development, Software Engineering Ethics, Software Processes, Software Process Models, Process Activities, Coping with Change, The Rational Unified Process, Agile Software Development, Agile Methods, Plan-Driven and Agile Development, Extreme Programming, Agile Project Management, Scaling Agile Methods.

UNIT-II

Requirements Engineering, Functional and Non-Functional Requirements, The Software Requirements Document, Requirements Specification, Requirements Engineering Processes, Requirements Elicitation and Analysis, Requirements Validation, Requirements Management, System Modelling, Context Models, Interaction Models, Structural Models, Behavioural Models, Model-Driven, Engineering, Architectural Design, Architectural Design Decisions, Architectural Views, Architectural Patterns, Application Architectures.

UNIT-III

Design and Implementation: Object-Oriented Design using the UML, Design Patterns, Implementation Issues, Open Source Development, Software Testing: Development Testing, Test-Driven Development, Release Testing, User Testing, Software Evolution: Evolution Processes, Program Evolution Dynamics, Software Maintenance, Legacy System Management, Dependability and Security.

UNIT-IV

Socio-technical Systems: Complex Systems, Systems Engineering, System Procurement, System Development, System Operation. Dependability and Security: Dependability Properties, Availability and Reliability, Safety, Security. Dependability and Security Specification: Risk-Driven Requirements, Specification, Safety Specification, Reliability Specification, Security, Specification, Formal Specification.

UNIT-V

Dependability Engineering: Redundancy and Diversity, Dependable Processes, Dependable Systems Architectures, Dependable Programming. Security Engineering: Security Risk Management, Design for Security, System Survivability. Dependability and Security Assurance: Static Analysis, Reliability Testing, Security Testing, Process Assurance, Safety and Dependability Cases.

Recommended Books:

1. I. Sommerville, Software Engineering, 9/e, Addison Wesley.
2. R. Mall, Fundamentals of Software Engineering, 3/e, PHI.
3. R.S. Pressman, Software Engineering, A Practitioners Approach, 7/e, McGraw-Hill, 2009.
4. K.K. Aggarwal and Y. Singh, Software Engineering, 2/e, New Age International Publishers, 2008.

DSE: 1-PROGRAMMING IN VISUAL BASIC

(Credit:6, Theory:4, Practical: 2)

UNIT-I

GUI Environment: Introduction to graphical user interface (GUI), programming language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs. Controls : Introduction to controls textboxes, frames, check boxes, option buttons, images, setting borders and styles, the shape control, the line control, working with multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls.

UNIT-II

Operations: Data types, constants, named & intrinsic, declaring variables, scope of variables, val function, arithmetic operations, formatting data. Decision Making: If statement, comparing strings, compound conditions (and, or, not), nested if statements, case structure, using if statements with

option buttons & check boxes, displaying message in message box, testing whether input is valid or not.

UNIT-III

Modular programming: Menus, sub-procedures and sub-functions defining / creating and modifying a menu, using common dialog box, creating a new sub-procedure, passing variables to procedures, passing argument by value or by reference, writing a function/ procedure. Forms Handling : Multiple forms creating, adding, removing forms in project, hide, show method, load, unload statement, me keyword, referring to objects on a different forms.

UNIT-IV

Iteration Handling: Do/loops, for/next loops, using msgbox function, using string function Arrays and Grouped Data Control: Arrays - 1-dimension arrays, initializing an array using for each, user-defined data types, accessing information with user-defined data types, using list boxes with array, two dimensional arrays. lists, loops and printing list boxes & combo boxes, filling the list using property window/additem method, clear method, list box properties, removing an item from a list, list box/ combo box operations.

UNIT-V

Database Connectivity: Database connectivity of forms with back end tool like mysql, populating the data in text boxes, list boxes etc. searching of data in database. using forms. Updating/ editing of data based on a criterion.

Recommended Books:

Programming in Visual Basic 6.0 by Julia Case Bradley, Anita C. Millispangh (Tata Mcgraw Hill Edition 2000 (Fourteenth Reprint 2004)).

DSE: 2-FINANCIAL MANAGEMENT **(Credit:6, Theory:4, Practical: 2)**

UNIT-I

Nature of Financial Management: Finance and related disciplines; Scope of Financial Management; Profit Maximization, Wealth Maximization - Traditional and Modern Approach; Functions of finance Finance Decision, Investment Decision, Dividend Decision; Objectives of Financial Management; Organisation of finance function; Concept of Time Value of Money, present value, future value, and annuity; Risk & Return: Historical return, expected return, absolute return, holding period return, annualized return, arithmetic & geometric return; Risk - Systematic & unsystematic risk their sources and measures.

UNIT-II

Long -term investment decisions: Capital Budgeting - Principles and Techniques; Nature and meaning of capital budgeting; Estimation of relevant cash flows and terminal value; Evaluation techniques - Accounting Rate of Return, Net Present Value, Internal Rate of Return & MIRR, Net Terminal Value, Profitably Index Method. Concept and Measurement of Cost of Capital: Explicit and Implicit costs; Measurement of cost of capital; Cost of debt; Cost of perpetual debt; Cost of Equity Share; Cost of Preference Share; Cost of Retained Earning; Computation of over-all cost of capital based on Historical and Market weights.

UNIT-III

Capital Structures: Approaches to Capital Structure Theories - Net Income approach, Net Operating Income approach, Modigliani-Miller (MM) approach, Traditional approach, Capital Structure and Financial Distress, Trade-Off Theory.

Dividend Policy Decision - Dividend and Capital; The irrelevance of dividends: General, MM hypothesis; Relevance of dividends: Walter's model, Gordon's model; Leverage Analysis: Operating and Financial Leverage; EBIT -EPS analysis; Combined leverage.

UNIT-IV

Working Capital Management: Management of Cash - Preparation of Cash Budgets (Receipts and Payment Method only); Cash management technique, Receivables Management Objectives; Credit Policy, Cash Discount, Debtors.

Outstanding and Ageing Analysis; Costs - Collection Cost, Capital Cost, Default Cost, Delinquency Cost, Inventory Management (Very Briefly) - ABC Analysis; Minimum Level; Maximum Level; Reorder Level; Safety Stock; EOQ, Determination of Working Capital.

Recommended Books:

1. M.Y. Khan & P.K. Jain: Financial Management Text Problem and Cases, Tata McGraw Hill Publishing Co. Ltd.
2. R. P. Rustogi: Financial Management: Theory Concepts and Practices, Taxmann Publication.
3. I.M. Pandey: Financial Management: Theory and Practices, Vikas Publishing House.
4. R.A. Brealey, S.C. Myers, F. Allen & P. Mohanty: Principles of Corporate Finance, McGraw Hill Higher Education.
5. J.V. Horne & J.M. Wachowicz: Fundamentals of Financial Management Prentice Hall.

SEMESTER-VI

C: 14-INTERNET TECHNOLOGY (Credit:6, Theory:4, Practical: 2)

UNIT-I

UNIT-I

Java: Use of Objects, Array and ArrayList class.

UNIT-II

JavaScript: Data types, operators, functions, control structures, events and event handling.

UNIT-III

JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.

UNIT-IV

JSP: Introduction to Java Server Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

UNIT-V

Java Beans: Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB.

Recommended Books:

1. Ivan Bayross, Web Enabled Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3/e, 2009.
3. Herbert Schildt , Java 7, The Complete Reference, , 8/e, 2009.
4. Jim Keogh ,The Complete Reference J2EE, TMH, , 2002.

C: 15-PROGRAMMING IN NET
(Credit:6, Theory:4, Practical: 2)**DSE: 3-E-COMMERCE**
(Credit:6, Theory:4, Practical: 2)**UNIT-I**

An introduction to Electronic commerce: What is E-Commerce (Introduction And Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, Electronic Commerce and Electronic Business(C2C)(C2G,G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C).

UNIT-II

The Internet and WWW: Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov, .net etc.) , Types of Network, Internet Service Provider, World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own Website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Baner, Exchange, Shopping Bots.

UNIT-III

Internet Security: Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime(Laws , Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus(How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorisation and Authentication, Firewall, Digital Signature(How it Works).

UNIT-IV

Electronic Data Exchange: Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model,Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash.

UNIT-V

Planning for Electronic Commerce: Planning Electronic Commerce initiates, Linking objectives to business strategies, Measuring cost objectives, Comparing benefits to Costs, Strategies for developing electronic commerce web sites.

Recommended Books:

1. E-Commerce Concepts, Models, Strategies-G.S.V.Murthy, Himalaya Publishing House.
2. E- Commerce:-Kamlesh K Bajaj and Debjani Nag.
3. Electronic commerce-Gray P. Schneider.
4. E-Commerce, Fundamentals & Applications: Chand (Wiley) Web and E-Commerce.

DSE: 4-PROJECT WORK
(Credit:6)

GEOGRAPHY(HONOURS)

SEMESTER-I

C:1-GEOMORPHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I

- (a) Nature, objective and relevance of Geomorphology.
- (b) Geological time scale.
- (c) Internal structure of the earth evidences & zoning.

UNIT-II

- (a) Constituents of earth surface- rock forming minerals & rocks.
- (b) Origin of continents and ocean basin.
- (c) Tetrahedral Hypothesis

UNIT-III

- (a) Forces affecting earth crust
- (b) Orogenic & Epeorogenic earth movements fold, fault.
- (c) Earthquake & its world distribution.

UNIT-IV

- (a) Volcanoes and volcanic land forms.
- (b) Geomorphic processes weathering and mass wasting
- (c) Soil forming processes & major soil groups of the world.

UNIT-V: Evolution of land form Erosional & Depositional

- (a) Fluvial.
- (b) Karst & Aeolian.
- (c) Glacial & coastal.

PRACTICAL

Study of symbols and techniques of representation of relief features and Geomorphic Interpretation of topographic Maps.

1. Representation of Relief features: Hill, Plateau, Valley, Col, Knoll, Ridge, Escarpment.
2. Drawing of Serial, superimposed, composite and projected profiles.
3. Drawing long profile and cross profile of a river.
4. Study of drainage pattern; dendritic, trellised, radial using stream order and bifurcation ratio.
5. Measurement of drainage density and texture of topography.
6. Use of Rotameter and planimeter and graphic methods in measurement of area and length from maps.

C:2-ECONOMIC GEOGRAPHY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I

- (a) Meaning & concept of economic Geography.
- (b) Concept of Resource, Resource classification and resource conservation policy.
- (c) Types of human activities primary secondary & tertiary.

UNIT-II

- (a) Types & Problems of Agriculture.
- (b) Von Thunens theory of Agriculture.
- (c) Tea plantation in Srilanka.

UNIT-III: World Distribution & mode of occurrence

- (a) Mineral resource iron ore and bauxite.
- (b) Energy Resource coal, petroleum & nuclear.
- (c) Conventional energy resource Hydel Power & solar energy.

UNIT-IV

- (a) Factor affecting location of industry.
- (b) Industrial location theory by Weber.

- (c) World distribution of Iron & steel Industry.

UNIT-V

- (a) Major industrial regions of the world.
- (b) Ship building Industry in Japan.
- (c) Utility of transport in trade & services, break point theory of trade.

PRACTICAL

Representation of economic data through following diagrams

- (a) Simple and compound bars.
 - (b) Simple and divided Pie/ Wheel diagrams.
 - (c) Uniform and proportional circles.
 - (d) Block and Sphere Diagrams.
 - (e) Depiction of data through Choropleth and Isopleth diagrams.
1. Preparation of Maps to show distribution and production of Minerals, goods and resources
 2. Preparation of Maps to show distribution of Crops in Odisha : Rice, Sugarcane
 3. Line graphs, Time series Graphs

SEMESTER-II

C:3-CLIMATOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I

- (a) Atmospheric structure & composition.
- (b) Factors affecting weather & climate.
- (c) Insolation, global energy budget, vertical & horizontal distribution of temperature.

UNIT-II

- (a) Atmospheric pressure belts of the earth.
- (b) Planetary wind system.
- (c) Periodical & local wind system.

UNIT-III: Atmospheric moisture

- (a) Humidity, evaporation, condensation.
- (b) Types of clouds and fog.
- (c) Types of precipitation & world pattern of rain fall.

UNIT-IV

- (a) Air mass, concept classification & properties.
- (b) Atmospheric disturbance tropical cyclones & extra tropical cyclones.
- (c) Origin & mechanism of Indian monsoon.

UNIT-V

- (a) Koppens climatic classification.
- (b) Thornthwaits climatic classification.
- (c) Atmospheric pollution & Global warming.

PRACTICAL

1. Use and interpretation of weather Maps.
2. Use of symbols of various weather parameters in Indian weather maps.
3. Interpretation of Weather map for understanding weather conditions.
4. Distribution of temperature/ pressure/ humidity on maps by isopleth techniques.
5. Distribution of rainfall on maps by choropleth/ Isopleth techniques
6. Distribution of monthly variation of temperature/ rainfall on maps by bars and graphs.
7. Graphical methods of presentation of Temperature, rainfall, Humidity.
8. Construction of wind Rose for displaying wind direction and wind velocity of a place.
9. Construction of Climographs.
10. Construction of Hythergraphs & Ergographs.
11. Practical record and viva.

C:4- HYDROLOGY & OCEANOGRAPHY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I

- (a) Hydrological cycle & global water balance.
- (b) Characteristics of river basin, drainage pattern, river discharge.
- (c) Hydrological input output precipitation, evaporation, evapotranspiration, infiltration, ground water, surface run off & over flow.

UNIT-II

- (a) Surface configuration of ocean floor continental shelf, continental slope, abyssal plain, mid oceanic ridges, oceanic trench.
- (b) Relief of Atlantic, Indian & Pacific ocean.

UNIT-III

- (a) Ocean water salinity and temperature distribution & determinants.
- (b) Oceanic movements wave, currents & tides.
- (c) Circulation of Atlantic, Indian & Pacific ocean.

UNIT-IV

- (a) Coral reef & atolls .
- (b) Theories of origin of coral reef & atolls.
- (c) Marine deposits and its Classification.

UNIT-V

- (a) Coastal environment.
- (b) Sea is store house of resources.
- (c) Coastal emergence & submergence.

PRACTICAL

Statistical Techniques.

1. Exercises on mean deviation and standard deviation for both un-group data and group data.
2. Exercise on co-efficient of variability.

3. Correlation product movement correlation and sphere mans rank correlation.
 4. Regression analysis.
Drawing of scatter grams & regression line (i.e., y on x and x on y.)
 5. Practical record & viva.
-

SEMESTER-III

C:5-ENVIRONMENT & ECO SYSTEM

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I

- (a) Meaning and concept of environment.
- (b) Environment changes- short term, medium term, long term.
- (c) Environmental tolerance-light, temperature, water & wind.

UNIT-II: Major environmental zones

- (a) Forestedequatorial, boreal, coniferous.
- (b) Intermediatesavanna & steppes & tundra.
- (c) Barren-arid, tundra & polar.

UNIT-III: Structure & function

- (a) Concept of ecology & ecosystem.
- (b) Energy conversion & photosynthesis, food chain, food web, energy flow.
- (c) Mans place in ecosystem.

UNIT-IV: Environmental cycle & environment protection act

- (a) Nutrient cycle-phosphorous cycle.
- (b) Gaseous cycle-Nitrogen & carbon cycle.
- (c) Environmental protection acts

UNIT-V: Waste & pollution

- (a) Solid waste & its management.
- (b) Water pollution & air pollution.

- (c) Global ecological imbalance.
- (d) Global warming & green house effects.

PRACTICAL

Environmental Geography

1. Calculation of PE, TE & Evaporation Rates based on Thornthwaite method.
2. Water Surplus and deficit diagrams.
3. Graphical and Spatial presentation of different environmental / pollution parameters.
4. Biomass estimation of an area / forest patch.
5. Use of various weather instruments- Thermometer, Torricelli and Aneroid Barometer, Wind Vane, Hygrometer, Anemometer, Dry Bulb- Wet bulb thermometer.
6. Practical record & viva.

C:6- APPLIED GEOMORPHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I

- (a) Continental drift theory of Wegener.
- (b) Concept of Isostasy Airy & Pratt.
- (c) Drift & orogenesis.

UNIT-II

- (a) Plate tectonic.
- (b) Paleomagnetism.
- (c) Sea floor spreading.

UNIT-III: Mountain building theory by

- (a) Kober.
- (b) Holmes.
- (c) Joly.

UNIT-IV: Cycle of erosion

- (a) Concept of W. M. Davis.
- (b) Concept of Penk.
- (c) Interpretation of cycle erosion.

UNIT-V

- (a) Applied Geomorphology.
- (b) Geomorphic Hazards.
- (c) Assessment and management of Geomorphic Hazards.

PRACTICAL

1. Identification and characterization of common rocks and rock forming minerals, Ores.
 - (a) Sandstone, slate, shale, limestone, Breccia, granite, Basalt, Khondalite, Gneiss, Schist, Marble.
 - (b) Quartzite, Calcite, Bauxite, Haematite, Chromite.
2. Understanding of Dip, Strike, bedding plain, unconformity, disconformity, outcrop, geological structure (Fold & Fault), dyke, sills, geological history and stratigraphic succession.
3. Geomorphological interpretation of an area from toposheet.
4. Determination of Slope and Relative Relief (Wentworth & Smith).
5. Interpretation of Geological Maps.
6. Practical record & viva.

C:7-REGIONAL GEOGRAPHY OF INDIA

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Physical Aspects

- (a) Physiographic division of India.
- (b) Drainage, Climate, Soil & Vegetation.

UNIT-II: Economic Aspects

- (a) Types of Characteristic of Indian Agriculture, production and distribution of Major crops- Rice, Wheat & Sugar Cane.
- (b) Production and distribution of Mineral Resource Iron ore, Bauxite & Coal.

- (c) Production and distribution Iron & Steel Industry, fertilizer Industry, information & technology.

UNIT-III: Population & Settlement

- (a) Distribution, Density & Growth of Population in India, rural & urban Population & Population Problems.
- (b) Caste, Religion, Language, Tribes and their correlates.
- (c) Settlement- Rural & Urban.

UNIT-IV: Selected Natural regions of India

- (a) Ganga Plain.
- (b) Chhotnagpur Plateau.
- (c) Odisha Coastal Plain.

UNIT-V: Transport & Trade of India

- (a) Road transport.
- (b) Rail transport.
- (c) Water Transport.

PRACTICAL

Concept of Spheroid and Geoid: Coordinate and grid reference system

1. Location of place on grid reference system using 8 digit, 12 digit and 16 digit system.
2. Drawing of:
 - (a) Simple Cylindrical Projection.
 - (b) Cylindrical Equal Area.
 - (c) Simple conical projection with one and Two standard parallel.
 - (d) Bonnes Projection.
 - (e) Polyconic projection.
 - (f) Stereographic Projection.
 - (g) Mercators Projection.
 - (h) Practical record & viva.

SEMESTER-IV

C:8-REGIONAL PLANNING OF DEVELOPMENT

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I

- (a) Definition of region, Evolution & types of regional planning.
- (b) Types of Region- formal & functional, Uniform & nodal, Single purpose & composite purpose.
- (c) Hierarchy & region.

UNIT-II

- (a) Delineation of Planning region.
- (b) Utility of regions & regional planning.
- (c) Multi level planning & planning problem.

UNIT-III: Choice of region for regional planning

- (a) Physical region.
- (b) River valley region.
- (c) Metropolitan or city region.

UNIT-IV: Economic Base & regional multiplier

- (a) Concept of Growth included models & growth pole theory.
- (b) Measurement of level of development.
- (c) Regional disparities In India.

UNIT-V

- (a) World policy for urbanization.
- (b) Metropolitan planning and vision planning in India.
- (c) Integrated rural development planning.

PRACTICAL

1. Mapping Regional / spatial variation of developmental parameters(Choropleath Method).

2. Calculation of levels of Regional development by scores/ ranks/ weightages
3. Mapping Levels of Development by choropleth /chorochromatic maps.
4. Practical record & viva.

C:9-SETTLEMENT AND POPULATION GEOGRAPHY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Settlement Geography

- (a) Meaning nature & Scope of Settlement Geography.
- (b) Factors controlling growth and development of settlement.
- (c) Types of Settlement Internal morphology of Rural Settlement, Functional Classification of Settlement.

UNIT-II

- (a) Evaluation of Settlement Central place theory of Christaller.
- (b) Trends of urbanisation in India.
- (c) Settlement and Environment Relationship.
- (d) Concept of urban settlement Urban hierarchy, Run-Urban-Tension, Hinterland, Umland, Conurbation and Satellite town.

UNIT-III

- (a) Scope, objective and nature of Population Geography.
- (b) Source of population data.
- (c) Problems of population mapping.

UNIT-IV

- (a) Population distribution and growth Determinants and patterns in the world.
- (b) Population composition Over population, Under population, density, age and sex, Castes and Tribes.
- (c) Population dynamics Measurement of fertility, mortality and migration.

UNIT-V

- (a) Population and resource relationship.

- (b) Human development Index and its Components.
- (c) Population theory Malthusian and Neo Malthusian.

PRACTICAL

1. Study of different settlement patterns from toposheets Random, Cluster, systematic.
2. Nearest Neighbour Analysis of settlement pattern.
3. Population Distribution Maps by Uniform dots, multiple dots, proportionate circles and spheres.
4. Population Pyramid for Odisha/ India/ other geographical units.
5. Population Projection/estimation by different methods- Arithmetic, harmonic, geometric, R.G. India method (calculation and graphical display).
6. Practical record & viva.

C:10-REGIONAL GEOGRAPHY OF ODISHA

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I

- (a) Geographical evolution and structural division of Odisha.
- (b) Physiography of Odisha.
- (c) Drainage and Climate.
- (d) Soil and natural vegetation of Odisha.

UNIT-II

- (a) Types and Characteristics Agriculture of Odisha.
- (b) Rice, Pulses and Commercial Crops of Odisha.
- (c) Irrigation Projects of Odisha.

UNIT-III: Economic Base

- (a) Mineral resource Iron Ore, Bauxite.
Power resource Coal and Hydel Power.
- (b) Industries:
Iron and steel Industries.
Aluminium Industries.

Cotton textile Industries.

Cement Industries.

UNIT-IV

- (a) Population distribution and density.
- (b) Trends of Population growth in Odisha.
- (c) Road and Rail transport.

UNIT-V: Ecological Regions

- (a) Northern Plateau.
- (b) The Easternghat Zone.
- (c) Central table Land.

PRACTICAL

1. Exercises on mean deviation and standard deviation for both un-group data and group data.
2. Exercise on co-efficient of variability.
3. Correlationproduct movement correlation and sphere mans rank correlation.
4. Regression analysis.
5. Drawing of scatter grams & regression line i.e. y on x and x on y.
6. Practical record & viva.

SEMESTER-V

C:11-ADVANCED CARTOGRAPHY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I

- (a) Nature, Scope and Status of Cartography.
- (b) Development of Cartographic techniques in recent period with changing technology.
- (c) Geodesy Mapping Science.

UNIT-II

- (a) Maps Their needs and characteristic, and types.

- (b) Geographical Co-ordinates Latitude-authalic, geodetic and Longitude.
- (c) Co-ordinates Cartesian Co-ordinates - X and Y axis.
- (d) Rectangular Co-ordinate- Easting and Northing.

UNIT-III: Map Projection

- (a) Scale factors, transformation of angles, area and direction.
- (b) Types of Map projection Cylindrical, Conical, Zenithal, conformal, Equal Area.
- (c) Principles of Surveying Horizontal Survey Traversing, Triangulation, Trilateration. Vertical Survey- Height and Level.
- (d) Techniques of analysis of Socio economic data.

UNIT-IV: Remote Sensing

- (a) Concept of Remote Sensing.
- (b) Source of energy in remote sensing Radiant energy, electromagnetic radiation.
- (c) Aerial Photography and satellite remote sensing.

UNIT-V

- (a) Utility of GIS to Cartography.
- (b) Geo-Referencing and image rectification, Raster, and vector data structure.
- (c) Application of GIS in Land use mapping.

PRACTICAL

1. Scale- Graphical construction of plain scale, diagonal scale, comparative scale.
2. Earth shape, size, area.
3. Latitude definition & determination of latitude from pole star & sun.
Longitude-Definition & determination of longitude with the help of Sun.
4. Map design & layout.
5. Geographical data representation through colour, shading, layer and tint method.
6. Network system of road and river.
7. Drawing of thematic, complex thematic and chorochromatic maps.
8. Thematic map interpretation.

9. Practical record & viva.

C:12-HUMAN GEOGRAPHY
(Credits:6, Theory-4, Practical-2)
Lectures: 60 (Theory:40, Practical:20)
Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Cultural Geography

- (a) Cultural evolution of man.
- (b) Emergence of man & Races of mankind.
- (c) Major cultural realms of the world.
- (d) Cultural elements and their changes in recent times.

UNIT-II: Political Geography

- (a) Concepts, nature & scope of political geography.
- (b) Concept of nation, state, frontiers, boundaries.
- (c) Heart land theory, Rim land theory & Buffer zones.

UNIT-III

- (a) Geopolitics of Middle East.
- (b) Geopolitics of South Asia.
- (c) Geopolitics of Indian Ocean.

UNIT-IV: Electoral Geography & resource conflict

- (a) Geography of voting.
- (b) Geographic influence on voting pattern.
- (c) Water sharing disputes, conflicts related to forest & minerals.

UNIT-V: Environmental emerging issues

- (a) Population explosion & food problem.
- (b) Deforestation & environmental hazards.
- (c) Global warming.
- (d) Biodiversities.

PRACTICAL

1. Continuity & smoothness of data.
 2. Probability & normal curve.
 3. Histogram, frequency curve & frequency polygon.
 4. Measures of central tendency mean, median, mode for group & un group data.
Determination of median & quartiles from cumulative frequency curve & ogive.
 5. Proportionate symbols dots, circle and sphere.
 6. Segmented bar and wheel diagram.
 7. Traffic flow cartograms.
 8. Climograph , Hythergraph & Ergograph.
 9. Practical record & viva.
-

SEMESTER-VI

C:13- EVOLUTION OF GEOGRAPHICAL THOUGHTS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Debates on geographical thought

- (a) Environmental determination.
- (b) Possibilism.
- (c) Neo- determinism.
- (d) Systematic and regional.

UNIT-II

- (a) Pre historical ideas in geography.
- (b) Ancient Indian Geographical concept.
- (c) Impact of Exploration & discoveries and scientific invention on geography.

UNIT-III: Modern themes in Geographical thought

- (a) Behaviouralism.
- (b) Humanism.
- (c) Radicalism.

UNIT-IV

(a) Contribution of Modern Geographers-

Alexander von Humboldt

Carl Ritter

(b) School of Geographical thought-

Friedrich Ratzel

Vidal de la Blache

Taylor

UNIT-V: Models in Geography

(a) Meaning & need of models in Geography.

(b) Classification of models in Geography.

(c) Dichotomy in Geography.

PRACTICAL

1. Plane table survey radiation, intersection, resection method.
2. Prismatic compass survey close traverse & open traverse.
3. Dumpy level survey contouring & levelling.
4. Theodolite survey non transit triangulation, Transit height determination through accessible, inaccessible method.
5. Practical record & viva.

C:14-DISASTERS MANAGEMENT

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I

(a) Definition & concept of disasters.

(b) Hazards, disasters, risk & vulnerability.

(c) Classification of disasters.

UNIT-II: Disaster in India

- (a) Flood Causes, impact, distribution & mapping.
- (b) Cyclone - Causes, impact, distribution & mapping.
- (c) Draught - Causes, impact, distribution & mapping.

UNIT-III: Geomorphic hazards in India causes, impact, mapping

- (a) Earth quake.
- (b) Tsunami.
- (c) Land slide_

UNIT-IV: Man made disaster causes, impact, distribution & mapping

- (a) Fire Hazards.
- (b) Chemical Hazards.
- (c) Industrial accident.

UNIT-V: Response & mitigation to disaster

- (a) Mitigation and preparedness.
- (b) Function of NDMA, NIDM & NDRF.
- (c) Indigenous community based disaster management.

PRACTICAL

Field Work And Research Methodology

- (a) Preparation of:
 - (i) Observation Schedule (Participant / Non Participant),
 - (ii) Questionnaires (Open/ Closed / Structured / Non-Structured);
 - (iii) Guide line for Focused Group Discussions;
- (b) Preparation of Questionnaires for Socio-Economic survey

Note:

- (i) Each student will prepare an individual report based on primary and secondary data collected during field work.
- (ii) The students / teachers can opt to take students in or outside the NCR, depending upon, problem to be studied.
- (iii) The duration of the field work should not exceed 10 days.
- (iv) The word count of the report should be about 8000 to 12,000 excluding figures, tables, photographs, maps, references and appendices.
- (v) One copy of the report on A-4 size paper should be submitted in soft binding.

GENERIC ELECTIVE(GE)

GE:1- GEOGRAPHY OF INDIA

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Physical aspects

- (a) Location, Physiographic divisions.
- (b) Drainage, system The Indus system, The Ganga system, The Brahmaputra system.
- (c) Evolution of drainage systems.

UNIT-II: Climate, soil and natural vegetation

- (a) The mechanism of Indian Monsoon, The seasons of India.
- (b) Soils of India-Classification, Characteristics.
- (c) Natural vegetation of India Classification, Characteristics.

UNIT-III: Agriculture, Mineral and power Resources.

- (a) Agriculture types, distribution of major crops. (Rice, Wheat, Cotton).
- (b) Mineral resources Iron ores, Manganese, Bauxite.
- (c) Power resources Coal, Petroleum, Natural gas.

UNIT-IV: Population and Settlement

- (a) Distribution, Density and Growth of population in India.
- (b) Caste, Religion, Language, Tribes.
- (c) Settlement Rural and Urban.

UNIT-V: Industries & Transport

- (a) Types and distribution (Iron and steel, Textiles).
- (b) Road transports, Rail transport and water transport.

PRACTICAL

Field Work and Research Methodology Concept of Spheroid and Geoid: Coordinate and grid reference system.

- (1) Location of place on grid reference system using 8 digit, 12 digit and 16 digit system
- (2) Drawing of:
 - (i) Simple Cylindrical Projection:
 - (ii) Cylindrical Equal Area
 - (iii) Simple conical projection with one and Two standard parallel
 - (iv) Bonnes Projection
 - (v) Polyconic projection
 - (vi) Gnomonic projection
 - (vii) Practical record & viva.

GE:2-DISASTERS MANAGEMENT

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I

- (a) Definition & concept of disasters.
- (b) Hazards, disasters, risk & vulnerability.
- (c) Classification of disasters.

UNIT-II: Disaster in India

- (a) Flood Causes, impact, distribution & mapping.
- (b) Cyclone - Causes, impact, distribution & mapping.
- (c) Draught - Causes, impact, distribution & mapping.

UNIT-III: Geomorphic hazards in India causes, impact, mapping

- (a) Earth quake.
- (b) Tsunami.
- (c) Land slide.

UNIT-IV: Man made disaster causes, impact, distribution & mapping

- (a) Fire Hazards.
- (b) Chemical Hazards.
- (c) Industrial accident.

UNIT-V: Response & mitigation to disaster

- (a) Mitigation and preparedness.
- (b) Function of NDMA, NIDM & NDRF.
- (c) Indigenous community based disaster management.

PRACTICAL

Field Work and Research Methodology

1. Preparation of:
 - (i) Observation Schedule (Participant / Non Participant),
 - (ii) Questionnaires (Open/ Closed / Structured / Non-Structured);
 - (iii) Guide line for Focused Group Discussions;
2. Preparation of Questionnaires for Socio-Economic survey.

Note:

- (i) Each student will prepare an individual report based on primary and secondary data collected during field work.
- (ii) The students / teachers can opt to take students in or outside the NCR, depending upon, problem to be studied.
- (iii) The duration of the field work should not exceed 10 days.
- (iv) The word count of the report should be about 8000 to 12,000 excluding figures, tables, photographs, maps, references and appendices.
- (v) One copy of the report on A-4 size paper should be submitted in soft binding.

GE:3- ENVIRONMENTAL GEOGRAPHY(OPTIONAL)

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I

- (a) Meaning and types of environment.
- (b) Environmental changes Long term, Medium and short term.
- (c) Environmental tolerance light, temperature, water and wind.

UNIT-II: Major environmental zones

- (a) Forested Equatorial, Boreal, Coniferous.

(b) Intermediate Savanna and steppes and tundra.

(c) Barren arid, Tundra and polar.

UNIT-III: Structure and function

(a) Concept of ecology and ecosystem.

(b) Energy conversion and photosynthesis, food web, energy flow.

(c) Man's impact on ecosystem.

UNIT-IV: Environmental cycle and environmental protection act

(a) Nutrient cycle Phosphorous cycle.

(b) Gaseous cycle Nitrogen and carbon cycle.

(c) Environmental protection acts.

UNIT-V: Waste and pollution

(a) Solid waste and its management.

(b) Water pollution and air pollution.

(c) Global ecological imbalance.

(d) Global warming and green house effects.

PRACTICAL

1. Calculation of PE, TE & Evaporation Rates based on Thornthwaite method.
2. Water Surplus and deficit diagrams
3. Graphical and Spatial presentation of different environmental / pollution parameters
4. Biomass estimation of an area / forest patch
5. Use of various weather instruments- Thermometer, Torricelli and Aneroid Barometer, Wind Vane, Hygrometer, Anemometer, Dry Bulb- Wet bulb thermometer.
6. Practical record & viva.

GE:4-NATURAL RESOURCE MANAGEMENT STUDIES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I

- (a) Concepts & types of Resources.
- (b) Problems of resource utilization.
- (c) Population pressure, development and resource use.

UNIT-II

- (a) Use and misuse of resource.
- (b) Distribution of resource and global problems.
- (c) Types of human occupation, primary, secondary, Tertiary.

UNIT-III

- (a) Agriculture types and problems.
- (b) Mineral resources distribution of Iron ore and bauxite.
- (c) Power resources Distribution of coal and petroleum.

UNIT-IV

- (a) Natural hazards and risk management.
- (b) Global resource crisis.
- (c) Historical and future prospects of various resources like (i) soil (ii) water.

UNIT-V

- (a) Resource conservation and conservation policy.
- (b) Resource management concepts methods and dimension.
- (c) Integrated resource development and its application.

PRACTICAL

1. Depiction of data through Choropleth and Isopleth diagrams.
2. Preparation of Maps to show distribution and production of Minerals, goods and resources.
3. Preparation of Maps to show distribution of Crops in Odisha : Rice, Sugarcane.
4. Line graphs, Time series Graphs.
5. Practical record and Viva.

DISCIPLINE SPECIFIC ELECTIVE (DSE)

DSE:1-POPULATION GEOGRAPHY
(Credits:6, Theory-4, Practical-2)
Lectures: 60 (Theory:40, Practical:20)
Max. Marks:100 (Theory:70, Practical:30)

UNIT-I

- (a) Scope, objective and nature of population Geography.
- (b) Source of population data.
- (c) Problems of mapping of population.

UNIT-II

- (a) Factors controlling distribution of world population.
- (b) Growth of population and their determinants.
- (c) Population density and distribution.

UNIT-III

- (a) Population composition- Age and sex, Religion and caste.
- (b) Population dynamics Measurement of fertility, mortality and migration.
- (c) Human development Index and its components.

UNIT-IV

- (a) Population and resource relationship.
- (b) Population Resource regions.
- (c) Population and Environment.

UNIT-V: Population theories.

- (a) Malthasian theory.
- (b) Neo- Malthusian theory.
- (c) Demographic transition theory.

PRACTICAL

1. Construction of population pyramids.

2. Population projection.
3. Drawing of triangular diagram and lorenge curve.
4. Practical record and Viva.

DSE:2-URBAN GEOGRAPHY
 (Credits:6, Theory-4, Practical-2)
 Lectures: 60 (Theory:40, Practical:20)
 Max. Marks:100 (Theory:70, Practical:30)

UNIT-I

Nature and scope, origin and growth of urban settlement.

UNIT-II

- (a) Factors affecting growth and distribution of Urban settlement.
- (b) Trend of Urbanization.

UNIT-III

- (a) Classification of Town.
- (b) Concept of the following urban elements.
 - (i) Ruralurban fringe.
 - (ii) UrbanHierarchy
 - (iii) Conurbation.

UNIT-IV

Urban issues Problems of housing, slums, civic amenities (water and transport).

UNIT-V

Case studies of Delhi, Mumbai and Kolkatta with reference to urban issues.

PRACTICAL

Field Work And Research Methodology

1. Exercises on point symbol Uniform and multiple dot.
2. Segmented, wheel and bar diagram.
3. Trafic flow diagram.
4. Practical record and Viva.

DSE:3-REGIONAL DEVELOPMENT
 (Credits:6, Theory-4, Practical-2)
 Lectures: 60 (Theory:40, Practical:20)
 Max. Marks:100(Theory:70, Practical:30)

UNIT-I: Historical development of Regional Planning.

- (a) Meaning, scope and content of Regional planning.
- (b) Regional planning in developed and developing countries.
- (c) Regional planning in India.

UNIT-II

- (a) Definition of Region.
- (b) Types of region formal, functional and planning regions.
- (c) Regional development.
- (d) Methods and techniques of regional planning.

UNIT-III

- (a) Concepts of planning region.
- (b) Methods of delineation of planning region.
- (c) Problems of regional planning.

UNIT-IV

- (a) Regional imbalances in India.
- (b) Regional disparity in India.
- (c) Indicators and methods of study of disparities.

UNIT-V

- (a) Planning for backward regions in India.
- (b) Multi-level planning in India.
- (c) Integrated rural development planning (IRDP).

PRACTICAL

1. Transport net work analysis.
2. Nearest neighbor analysis.
3. Determination of service center.
4. Practical Record and Viva.

DSE:4-PROJECT REPORT

(Credits:6, Max. Marks:100-Project: 70+Viva-Voce:30)

Project work / Dissertation is considered as a special course involving application of knowledge in solving / analyzing / exploring a real life situation / difficult problems. A project / Dissertation work may be given in lieu of a discipline specific elective paper.

SKILL ENHANCEMENT COURSE (SEC)

SEC:1-REMOTE SENSING (Practical)

(Credits-2: Max. Marks: 50)

UNIT-I

Remote sensing-Definition and development, platforms and types.

UNIT-II

Satellite remote sensing-Principles, EMR interactions with atmosphere and earth surface.

UNIT-III

Image processing-Digital and manual.

UNIT-IV

Satellite image interpretation.

UNIT-V

Application of remote sensing land use and land cover.

Practical record-A project file consisting of 5 exercises by using any method on above mentioned themes.

SEC:2-GEOGRAPHICAL INFORMATION SYSTEM(GIS)-(Practical)

(Credits-2: Max. Marks: 50)

UNIT-I

GISDefinition and components.

UNIT-II

Global positioning system(GPS)-Principles and uses, DGPS.

UNIT-III

GIS Data structures-Types (spatial & non-spatial) Raster and vector data structure.

UNIT-IV

GIS Data analysis-Input, Geo-Referencing, Editing, Output and Query, Overlays.

UNIT-V

Application of GIS-Land use mapping, urban sprawl analysis, Forests monitoring.

Practical Record-A project file consisting of 5 exercises on using any GIS software on above mentioned themes.

GEOGRAPHY(PASS)

SEMESTER-I

DSC-1A: PHYSICAL GEOGRAPHY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Geomorphology

- (a) Nature, objectives, relevance of studies of Geomorphology.
- (b) Origin of the universe Nebular Hypothesis of Kant and Laplace. Tidal Hypothesis of Jean, Jeffery Big-Bang theory.
- (c) Geological time scale.
- (d) Continental drift theory of Wegener, internal structure of the earth.
- (e) Organic and Epirogenic Earth movements folds, faults, Earthquakes and volcanoes.
- (f) Rocks origin, composition and types.

UNIT-II

- (a) Mass wasting weathering (Physical and chemical), Geomorphic agents and process of erosion, transportation and deposition.
- (b) The concept of Normal cycle of erosion sy Davis.
- (c) Land forms produced by the running water, underground water, Glacier, wind and sea-waves.

UNIT-III: Climatology

- (a) Composition and structure of the atmosphere.
- (b) Atmospheric temperature vertical, horizontal and seasonal distribution.
- (c) Atmospheric pressure and winds vertical, horizontal distribution of pressure planetary, periodic and local winds.
- (d) Atmospheric moisture Humidity, Hydrological types of rainfall.
- (e) Elements and factors of weather and climate.

UNIT-IV

- (a) Surface configuration of the ocean floor, continental shelf, continental slope, abyssal plain, and oceanic trenches. Reformation of Atlantic, Pacific and Indian oceans floor.

- (b) Distribution of temperature and salinity of ocean water.
- (c) Circulation of oceanic water Tides and currents, currents of the atlantic, pacific and Indian oceans.
- (d) Marine deposits Types and distribution.

UNIT-V: Soil and Bio-Geography

- (a) Soils Constituents , characteristics and profiles, soil forming processes.
- (b) Major soil groups of the world.
- (c) Concept and structure of Ecosystem.
- (d) Energy flow in ecosystem, food chain, food web.

PRACTICAL

1. Types of Data.

- (a) Methods of collection of data.
- (b) Classes of phenomena Positional, linear and Areal data.
- (c) Measurement of phenomena Nominal, ordinal, Interval, Ratio.
- (d) Frequency distribution Histogram and frequency polygon, cumulative frequency curve.

2. Measures of central tendency and Dispersion.

- (a) Computation of mean, median and mode.
- (b) Computation of mean deviation and standard deviation.

3. Practical Record and Viva.

SEMESTER-II

DSC1B: ECONOMIC GEOGRAPHY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Concept of Resources

- (a) Meaning and concepts of resources, types.
- (b) Distribution of forest, mineral and power resources.
- (c) Resource conservation and conservation policy.

UNIT-II: Agriculture

- (a) Types and problems of Agriculture.
- (b) World distribution of the following crops- Rice, wheat, cotton.
- (c) Agricultural regions of the world.

UNIT-III: Industries

- (a) Factors affecting the location of industries.
- (b) Major industrial regions of the world.
- (c) World distribution of major industries, iron and steel, Textile.

UNIT-IV: Transport and Trade

- (a) Types of transport Roads, railways, Airways and waterways.
- (b) Problems and utilizes of transport.
- (c) Role of transport in trade (National and International).

UNIT-V: Some related economic activities of Asia

- (a) Rice cultivation in China.
- (b) Tea plantation in Srilanka.
- (c) Oil resources in Middle- East.
- (d) Ship building industry of Japan.

PRACTICAL

Representation of economic data through following diagrams

- (a) Simple and compound bars.
- (b) Simple and divided Pie/ Wheel diagrams.
- (c) Uniform and proportional circles.
- (d) Block and Sphere Diagrams.
- (e) Depiction of data through Choropleth and Isopleths diagrams.
- (f) Preparation of Maps to show distribution and production of Minerals, goods and resources .
- (g) Preparation of Maps to show distribution of Crops in Odisha : Rice, Sugarcane.
- (h) Line graphs, Time series Graphs.

SEMESTER-III

DSC-1C:REGIONAL GEOGRAPHY OF INDIA

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Physical

- (a) Physiographic division of India.
- (b) Drainage, climate, soil and vegetation.

UNIT-II: Economic

- (a) Types of characteristics of India Agriculture, production and distribution of major crops- rice, wheat and sugar cane.
- (b) Production and distribution of mineral resource- Iron ore, Bauxite and coal.
- (c) Production and distribution Iron and steel industry, fertilizer industry, information and technology.

UNIT-III: Population and settlement

- (a) Distribution, density and growth of population in India, rural and urban population and population problems.
- (b) Caste, religion, language, tribes and their correlates.
- (c) Settlement Rural and Urban.

UNIT-IV: Selected Natural regions of India

- (a) Ganga plain.
- (b) Chhota Nagpur plateau.
- (c) Odisha coastal plain.

UNIT-V: Transport and Trade

- (a) Road transport.
- (b) Rail transport.
- (c) Water transport.

PRACTICAL

1. Types of maps and map works.
 - (a) Choropleth Maps- colour and shading.

- (b) Isopleths maps Isotherm and Isohyet.
- (c) Enlargement and reduction by square methods.

2. Map interpretation.

- (a) Interpretation of Indian- Toposheets.
- (b) Interpretation of Indian weather map.

3. Practical Record and Viva.

SEMESTER-IV

DSC-1D: REGIONAL GEOGRAPHY OF ODISHA

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Geomorphology

- (a) Geographical evolution and structural division of Odisha.
- (b) Physiographic of Odisha.
- (c) Drainage and Climate.
- (d) Soil and natural vegetation of Odisha.

UNIT-II

- (a) Types of Characteristics of Odisha Agriculture.
- (b) Rice, Pulses and Commercial Crops of Odisha.
- (c) Irrigation Projects of Odisha.

UNIT-III: Economic Base

- (a) Mineral resource Iron Ore, Bauxite.
Power resource Coal and Hydel Power.
- (b) Industries.
Iron and steel Industries.
Aluminium Industries.
Cotton textile Industries.
Cement Industries.

UNIT-IV

- (a) Population distribution and density.
- (b) Trends of Population growth in Odisha.
- (c) Road and Rail transport.

UNIT-V: Ecological Regions

- (a) Northern Plateau.
- (b) The Easternghat Zone.
- (c) Central table Land.

PRACTICAL

1. Exercises on mean deviation and standard deviation for both un-group data and group data.
2. Exercise on co-efficient of variability.
3. Correlationproduct movement correlation and sphere mans rank correlation.
4. Regression analysis.
5. Drawing of scatter grams & regression line i.e. y on x and x on y.

SKILL ENHANCEMENT COURSES

SEC-1: REMOTE SENSING(PRACTICAL) (Credits:2, Max. Marks: 50)

UNIT-I Remote sensing Definition and development, platforms and types. **UNIT-II** Satellite remote sensing Principles, EMR interactions with atmosphere and earth surface. **UNIT-III** Image processing Digital and manual. **UNIT-IV** Satellite image interpretation. **UNIT-V** Application of remote sensing land use and land cover.

Practical record A project file consisting of 5 exercises on using any method on above mentioned themes.

SEC-2: GEOGRAPHICAL INFORMATION SYSTEM(GIS)-(PRACTICAL) (Credits: 2, Max.Marks:50)

UNIT-I: Geomorphology GIS Definition and components. **UNIT-II** Global positioning system (GPS) Principles and uses, DGPS. **UNIT-III: Climatology** GIS Data structures Types (spatial & non spatial) Raster and vector data structure. **UNIT-IV** GIS Data analysis Input, Geo-Referencing, Editing, Output and Query, Overlays. **UNIT-V: Soil and Bio-Geography** Application of GIS- Land use mapping, urban sprawl analysis, Forests monitoring.

Practical Record A project file consisting of 5 exercises on using any GIS software on above mentioned themes.

SEC-3: STATISTICAL METHODS IN GEOGRAPHY-(PRACTICAL) (Credits:2, Max. Marks: 50)

1. Use of Data in Geography: Geographical Data Matrix, Significance of Statistical Methods in Geography; Sources of Data, Scales of Measurement (Nominal, Ordinal, Interval, Ratio).
2. Tabulation and Descriptive Statistics: Frequencies (Deciles, Quartiles), Cross Tabulation, Central Tendency (Mean, Median and Mode, Centographic Techniques, Dispersion (Standard Deviation, Variance and Coefficient of Variation).
3. Sampling: Purposive, Random, Systematic and Stratified.
4. Theoretical Distribution: Probability and Normal Distribution.
5. Association and Correlation: Rank Correlation, Product Moment Correlation, and Simple Regression, Residuals from regression

Class Record:

Each student will submit a record containing five exercises:

1. Construct a data matrix of about (10×10) with each row representing an areal unit (districts or villages or towns) and about 10 columns of relevant attributes of the areal units.
2. Based on the above table, a frequency table, measures of central tendency and dispersion would be computed and interpreted for any two attributes.
3. Histograms and frequency curve would be prepared on the entire data set and attempt to fit a normal curve and interpreted for one or two variables.
4. From the data matrix a sample set (20 Percent) would be drawn using, random - systematic and stratified methods of sampling and locate the samples on a map with a short note on methods used.
5. Based on of the sample set and using two relevant attributes, a scatter and regression line would be plotted and residual from regression would be mapped with a short interpretation.

SEC-4: PROJECT WORK(PRACTICAL)

(Credits:2, Max. Marks:50)

Disaster Management based Project Work.

The Project report based on any two field based case studies among following disasters and one disaster.

Preparedness plan of respective college or locality:

1. Flood.
2. Drought.
3. Cyclone and Hailstorms.
4. Earthquake.
5. Landslides.
6. Human Induced Disasters: Fire Hazards, Chemical, Industrial accidents.

DISCIPLINE SPECIFIC ELECTIVES

DSE-1A: POPULATION GEOGRAPHY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I: Geomorphology

- (a) Scope, objective and nature of population Geography.
- (b) Source of population data.
- (c) Problems of mapping of population.

UNIT-II

- (a) Factors controlling distribution of world population.
- (b) Growth of population and their determinants.
- (c) Population density and distribution.

UNIT-III: Climatology

- (a) Population composition- Age and sex, Religion and caste.
- (b) Population dynamics Measurement of fertility, mortality and migration.
- (c) Human development Index and its components.

UNIT-IV

- (a) Population and resource relationship.
- (b) Population Resource regions.
- (c) Population and Environment.

UNIT-V: Population theories

- (a) Malthasian theory.
- (b) Neo- Malthusian theory.
- (c) Demographic transition theory.

PRACTICAL

1. Construction of population pyramids.

2. Population projection.
3. Drawing of triangular diagram and lorenge curve.
4. Practical record and Viva.

DSE-1B: URBAN GEOGRAPHY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I

Nature and scope, origin and growth of urban settlement. **UNIT-II**

- (a) Factors affecting growth and distribution of Urban settlement.
- (b) Trend of Urbanization.

UNIT-III: Climatology

- (a) Classification of Town.
- (b) Concept of the following urban elements.
 - (i) Rural urban fringe.
 - (ii) Urban Hierarchy.
 - (iii) Conurbation.

UNIT-IV

Urban issues Problems of housing, slums, civic amenities (water and transport). **UNIT-V**
Case studies of Delhi, Mumbai and Kolkatta with reference to urban issues.

PRACTICAL

1. Exercises on point symbol Uniform and multiple dot.
2. Segmented, wheel and bar diagram.
3. Trafic flow diagram.
4. Practical record and Viva.

GENERIC ELECTIVES(GE)

GE1: INDIAN GEOGRAPHY (OPTIONAL)

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I: Physical

- (a) Location, Physiographic divisions.
- (b) Drainage, system The Indus system, The Ganga system, The Brahmaputra system.
- (c) Evolution of drainage systems.

UNIT-II: Climate, soil and natural vegetation

- (a) The mechanism of Indian Monsoon, The seasons of India..
- (b) Soils of India-Classification, Characteristics.
- (c) Natural vegetation of India Classification, Characteristics.

UNIT-III: Agriculture, Mineral and power Resources

- (a) Agriculture types, distribution of major crops. (Rice, Wheat, Cotton).
- (b) Mineral resources Iron ores, Manganese, Bauxite.
- (c) Power resources Coal, Petroleum, Natural gas.

UNIT-IV: Population and Settlement

- (a) Distribution, Density and Growth of population in India.
- (b) Caste, Religion, Language, Tribes.
- (c) Settlement Rural and Urban.

UNIT-V: Industries & Transport

- (a) Types and distribution (Iron and steel, Textiles).
- (b) Road transports, Rail transport and water transport.

PRACTICAL

Concept of Spheroid and Geoid: Coordinate and grid reference system

1. 1 Location of place on grid reference system using 8 digit, 12 digit and 16 digit system.
2. 2 Drawing of:
 - (i) Simple Cylindrical Projection
 - (ii) Cylindrical Equal Area
 - (iii) Simple conical projection with one and Two standard parallel
 - (iv) Bonnes Projection

GE-2: DISASTERS MANAGEMENT

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I

- (a) Definition and concept of disasters.
- (b) Hazards, disasters, risk and vulnerability.
- (c) Classification of disasters.

UNIT-II: Disaster in India

- (a) Flood causes, impact, distribution and mapping.
- (b) Cyclone causes, impact, distribution and mapping.
- (c) Draught causes, impact, distribution and mapping.

UNIT-III: Geomorphic hazards in India causes, impact, mapping

- (a) Earth quake.
- (b) Tsunami.
- (c) Land slide.

UNIT-IV: Man made disaster causes, impact, distribution and mapping

- (a) Fire Hazards.
- (b) Chemical Hazards.
- (c) Industrial Hazards.

UNIT-V: Response and mitigation to disaster

- (a) Mitigation and preparedness.
- (b) Function of NDMA, NIDM & NDRF.
- (c) Indigenous community based disaster management.

PRACTICAL

Field Work And Research Methodology

1. Preparation of:

- (i) Observation Schedule (Participant / Non Participant).

(ii) Questionnaires (Open/ Closed / Structured / Non-Structured).

(iii) Guide line for Focused Group Discussions.

2. Preparation of Questionnaires for Socio-Economic survey.

Note:

- (i) Each student will prepare an individual report based on primary and secondary data collected during field work.
- (ii) The students / teachers can opt to take students in or outside the NCR, depending upon, problem to be studied.
- (iii) The duration of the field work should not exceed 10 days.
- (iv) The word count of the report should be about 8000 to 12,000 words excluding figures, tables, photographs, maps, references and appendices.
- (v) One copy of the report on A 4 size paper should be submitted in soft binding.

GEOLOGY(HONOURS)

SEMESTER-I

C:1-GEOLOGY-I

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1hr duration)

(The emphasis of course is on applications in solving problems of interest to physicists. The students are to be examined entirely on the basis of problems, seen and unseen.)

UNIT- I: General geology-A

Geology - its perspective, scope and subdivisions; Earth in the Solar system; Origin of the Earth, Seismology and internal structure of the earth; Radioactivity and age of the earth.

UNIT-II: General geology-B

Volcanoes: Types, products and distribution. Earthquakes - intensity, causes and distribution.

UNIT: Geomorphology-A

Weathering and Erosion, Mass wasting; Geological works of rivers, glaciers, and landforms produced by them.

UNIT-IV: Geomorphology-B

Geological works of wind, underground water and oceans and landforms produced by them.

UNIT-V: Quaternary Geology

Scope, climate change, eustatic movement and other geological phenomena during Quaternary; Landforms and deposits with special reference to India; Neotectonics; Glaciation and its causes; Sea-level change during Quaternary.

PRACTICAL

Study of geomorphic forms. Study of contour patterns and drawing of profiles. Laboratory records and viva voce.

C:2-GEOLOGY-II

(Credit:6, Theory:4, Practical:2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1 hr. duration)

(The emphasis of course is on applications in solving problems of interest to physicists. The students are to be examined entirely on the basis of problems, seen and unseen.)

UNIT-I: Geotectonics-A

Tectonic movements Epeiorogeny and orogeny; Isostasy concept and theories; Geosynclines; Mountain building theories.

UNIT-II: Geotectonics-B

Plate tectonics concept and types of plate margins; Continental drift evidences and causes; Sea-floor spreading; Mid-oceanic ridge; Island arc.

UNIT-III: Photogeology

Principles of aerial photography; Scale, photo-elements and interpretation. Application of aerial photography in mineral exploration, ground water exploration and geomorphology.

UNIT-IV: Remote Sensing

Principles of remote sensing, Electromagnetic radiation, Scale, Sensors; Platforms, Photo mosaic and FCC. Application of remote sensing in mineral exploration, ground water exploration and geomorphology.

UNIT-V: Marine Geology

Relief of ocean floor; Marine sediments and their classification; Marine resources; Submarine canyons, Sea mounts and guyots; Coral reef.

PRACTICAL

Study of aerial photographs and uses of stereoscopes. Laboratory records and viva voce.

SEMESTER-II

C:3-GEOLOGY-III

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1 hr. duration)

UNIT-I: Crystallography-A

Crystalline and non-crystalline substances, Crystals - definition, characteristics, intercepts, parameters, indices and forms. Symmetry elements and classification of crystals in to seven systems. International Symbol; Holohedrim, hemihedrim hemimorphism and enantiomorphism. Study of axial relationship, symmetry elements and forms present in 4/m 2/m, 3m, 2/m , 4/m2/m2/m and 2/m classes.

UNIT-II: Crystallography-B

Study of axial relationship, symmetry elements and forms present in 6/m2/m2/m, 622, 2/m, 3m, 32, 2/m2/m2/m, 2/m and classes. Twinning, Fundamentals of stereographic projection of crystals. Zone and zonal laws.

UNIT-III: Mineralogy-A

Scope of mineralogy; chemical bonding and compound formation. Definition and classification of minerals. Physical properties of minerals, Silicate structure and its classification.

UNIT-IV: Mineralogy-B

Study of atomic structure, chemistry, physical, optical properties and uses of minerals of Olivine, Feldspar, Pyroxene, Amphibole, Garnet, Feldspathoids and Mica groups.

UNIT-V: Mineralogy-C

Isomorphism, polymorphism and pseudomorphism; Chemical composition, physical and optical properties of important rock forming minerals.

PRACTICAL

Study and identification of crystal models as mentioned in theory. Megascopic identification of rock forming minerals, Laboratory records and viva voce.

C:4-GEOLOGY-IV

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1 hr. duration)

UNIT-I: Mineral Optics-A

Nature of light rays and their propagation, internal reflection, double refraction, interference and polarization. Nicol Prism and polaroids. Petrological microscope - parts and their functions.

UNIT-II: Mineral Optics-B

Preparation of thin section of minerals and rocks. Behaviour of light in thin section and production of interference colours. Order of interference colour and Twinkling. Optic axis, Uniaxial and biaxial minerals.

UNIT-III: Mineral Optics-C

Isotropism and anisotropism,. Extinction and extinction angle. Pleochroism, pleochroic scheme, Birefringence; Outline of study of optical characters of minerals in thin sections.

UNIT-IV: Geochemistry-A

Cosmic abundance of elements; composition of planets and meteorites. Structure and composition of earth.

UNIT-V: Geochemistry-B

Geochemical classification of elements, Primary geochemical differentiation; Atomic substitution and solid solution.

PRACTICAL

Microscopic identification of rock forming minerals; Measurement of extinction angle; sign of elongation and order of interference colour. Laboratory records and viva voce.

SEMESTER-II

C:5-GEOLOGY-V

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1 hr. duration)

UNIT-I: Igneous Petrology-A

Magma and its characteristics; Crystallization behaviour of unicomponent magma; bicomponent magma showing solid solution and eutectic relationships, Introduction to Di-Ab-An ternary system.

UNIT-II: Igneous Petrology-B

Introduction, Forms, Texture, Mega- and micro-structures of igneous rocks.

UNIT-III: Igneous Petrology-C

Bowens reaction series and its implications. Differentiation of magma and diversity of igneous rocks.

UNIT-IV: Igneous Petrology-D

Classification of igneous rocks. Preliminary idea on assimilation processes.

UNIT-V: Igneous Petrology-E

Petrographic notes on Basalt, Dolerite, Gabbro, Granite, Pegmatite, Syenite, Dunite, Diorite, Peridotite, Carbonatite, Anorthosite and Kimberlite and their occurrences in India.

PRACTICAL

Megascopic and microscopic identification of igneous rocks. Laboratory records and viva voce.

C:6-GEOLOGY-VI

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1 hr. duration)

UNIT-I: Sedimentary Petrology-A

Introduction, formation of sediments and sedimentary rocks. Elementary idea on sedimentary environments.

UNIT-II: Sedimentary Petrology-B

Texture, structure and diagenesis of sedimentary rocks. Elementary idea on sedimentary facies.

UNIT-III: Sedimentary Petrology-C

Classification of sedimentary rocks. Sedimentary basins of India.

UNIT-IV: Sedimentary Petrology-D

Palaeocurrent; Heavy minerals and Provenance.

UNIT-V: Sedimentary Petrology-E

Petrographic notes on sandstones, conglomerate, shale, limestone and breccia and their occurrences in India.

PRACTICAL

Megascopic and microscopic identification of sedimentary rocks. Laboratory records and viva voce.

C:7-GEOLOGY-VII

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1hr duration)

UNIT-I: Metamorphic Petrology-A

Introduction, agents and types of metamorphism; ACF and AKF diagrams.

UNIT-II: Metamorphic Petrology-B

Texture and structure of metamorphic rocks.

UNIT-III: Metamorphic Petrology-C

Classification of metamorphic rocks; Metamorphic differentiation.

UNIT-IV: Metamorphic Petrology-D

Zone and grade and facies of metamorphism. Metasomatism.

UNIT-V: Metamorphic Petrology-E

Petrographic notes on important rock types like schists, gneisses, marble, quartzite, slate, phyllites, khondalite and charnockite and their occurrences in India.

PRACTICAL

Megascopic and microscopic identification of metamorphic rocks. Laboratory records and viva voce.

SEMESTER-III

C:8-GEOLOGY-VIII

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1hr duration)

UNIT-I: Palaeontology-A

Fossil-definition and conditions of fossilization; Mode of preservation and geological significance of fossils.

UNIT-II: Palaeontology-B

Morphology, evolution and geological history of Trilobite, Brachiopoda, Pelecypoda, Cephalopoda and Gastropoda.

UNIT-III: Palaeontology-C

Morphology, evolution and geological history of Echinoidea, Coral and graptolite. Index and Zonal guide fossils. Brief ideas on evolution of horse and man.

UNIT-V: Palaeobotany

Scope of paleobotany, taxonomy of plants, Gondwana flora and their significance.

UNIT-V: Palynology

Introduction; Separation of spores and pollens and mounting for study. Utility of palynological studies in different fields.

PRACTICAL

Identification of important invertebrate and plant fossils; Drawing and labeling of fossils; Arrangement of fossils in chronological order; Laboratory records and viva voce.

C:9-GEOLOGY-IX

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1hr duration)

UNIT-I: Stratigraphy-A

Principle of Stratigraphy, Stratigraphic units; Stratigraphic correlation, Standard stratigraphic time scale and Indian equivalences; Geomorphic and tectonic divisions of India.

UNIT-II: Stratigraphy-B

Precambrian stratigraphy of Karnataka, Odisha, Jharkhand, Rajasthan, Madhya Pradesh and Maharashtra. Stratigraphy of Cuddapah and Vindyan basins.

UNIT-III: Stratigraphy-C

Gondwana rocks with special emphasis on fossils, climate and economic importance. Deccan traps and Tertiary of Assam.

UNIT-IV: Stratigraphy-D

Triassic of Spiti, Jurassic of Kutch and Cretaceous of Trichinopoly. Siwalik rocks.

UNIT-5: Paleogeography

Elements of paleogeography; Paleogeography of Indian subcontinent during Permo-Carboniferous, Triassic, Jurassic and Cretaceous periods.

PRACTICAL

Drawing of stratigraphic units in outline map of India and Odisha; Identification and interpretation of stratigraphic assemblages; Drawing of paleogeographic maps as mentioned in theory; Laboratory records and viva voce.

C:10-GEOLOGY-X

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1hr duration)

UNIT-I: Structural geology-A

Introduction, Attitude of beds; Vs rule; Deformation, concept of stress and strain; Outlier, Inlier, Nappe, Klippe and Window.

UNIT-II: Structural geology-B

Fold - geometry, classification, recognition in field and map, causes of folding. Top and bottom criteria of deformed strata.

UNIT-III: Structural geology-C

Fault- classification, mechanism, significance, recognition in the field and map, general effects of faulting. Joints - geometry, classification and significance.

UNIT-IV: Structural geology-D

Unconformity - types, significance, recognition in the field and map, difference between fault and unconformity.

UNIT-V: Structural geology-E Foliation - types and relation with major structures, Lineation - types and relation with major structures; Salt domes and diapirs.

PRACTICAL

Interpretation of structure, stratigraphy and geologic history from maps; Drawing of sections; Completion of outcrops; Three point problems; Thickness and depth problems; Laboratory records and viva voce.

SEMESTER-V

C:11-GEOLOGY-XI

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1hr duration)

UNIT-I: Ore Genesis-A

Process of formation of ore bodies: Magmatic concentration, Hydrothermal processes, Wall rock alteration and Paragenesis, Zoning.

UNIT-II: Ore Genesis-B

Process of formation of ore bodies: Residual and mechanical concentration, Oxidation and Supergene enrichment.

UNIT-III: Ore Genesis-C

Process of formation of ore bodies: Sedimentation, Evaporation, Metamorphism.

UNIT-IV: Energy Resources

Origin, occurrence, distribution and uses of coal and petroleum; Atomic minerals.

UNIT-V: Mineral Economics

Strategic, essential and critical minerals. Sustainable developments of minerals; Conservation of mineral resources.

PRACTICAL

Megascopic study of strategic, critical and essential minerals. Laboratory records and viva voce.

C:12-GEOLOGY-XII

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1hr duration)

UNIT-I: Mineral Resources-A

Mineralogy, mode of occurrence, origin, Indian distribution and uses of ores of Fe and Mn. Important ore deposits of India.

UNIT-II: Mineral Resources-B

Mineralogy, mode of occurrence, origin, Indian distribution and uses of ores of Cr and Al. Important ore deposits of India.

UNIT-III: Mineral Resources-C

Mineralogy, mode of occurrence, origin, Indian distribution and uses of ores of Cu, Pb and Zn. Important ore deposits of India.

UNIT-IV: Mineral Resources-D

Mineralogy, mode of occurrence, origin, Indian distribution and uses of Mica, Asbestos, Kyanite, Sillimanite, Graphite and Magnesite.

UNIT-V: Mineral Resources-E

Controls of ore localization, Classification of mineral deposits; Metallogenic epochs and provinces; Ore districts.

PRACTICAL

Megascopic identification and uses of important metallic and non-metallic minerals; Laboratory records and viva voce.

SEMESTER-VI

C:13-GEOLOGY-XIII

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1hr duration)

UNIT-I: Groundwater-A

Hydrological cycle, vertical zonation of ground water, Properties of water bearing formations - porosity, permeability, specific yield, specific retention, storativity. Aquifer types- Confined and unconfined aquifers, aquitard, aquiclude, aquifuse. Darcys law.

UNIT-II: Groundwater-B

Ground Water exploration - types of wells, groundwater provinces of India and Odisha. Sea-water intrusion, Quality of ground water and its use in domestic, agriculture and industries; Ground water pollution.

UNIT-III: Engineering Geology-A

Introduction, Engineering properties of rocks and soils, Geological considerations of Dam and reservoir site selection.

UNIT-IV: Engineering Geology-B

Geological considerations of tunnel alignment, bridge site selection. Earthquake resistant structures, Soil - classification, erosion and conservation.

UNIT-V: Exploration Geology

Geological, Geophysical and Geochemical exploration methods.

PRACTICAL

Problems related to groundwater and engineering properties of rocks. Laboratory records and viva voce.

C:14-GEOLOGY-XIV

(Credit:6, Theory:4, Practical: 2)

Theory: 70 Marks, Practical: 30 Marks

Theory: 40 Classes (1hr duration)

UNIT-I: Mining

Terminology in mining, Open-cast and Underground mining methods, Drilling, Surveying.

UNIT-II: Disaster Management

Natural disasters and their management Earthquake, Landslide, Flood, Tsunami and Cyclone.

UNIT-III: Environmental Geology-A

Renewable and non-renewable resources; Conservation of mineral resources; Impact of mining on environment; Fundamentals of environmental impact assessment.

UNIT-IV: Environmental Geology-B

Management of solid wastes including mining wastes; Fly ash, Radioactive wastes; Environmental protection- Legislative measures in India; Fluorosis problems and arsenic poisoning in India Causes and remedial measures.

UNIT-V: Resource Evaluation

Sampling; Assaying; Ore-reserve estimation

PRACTICAL

Borehole problems, ore reserve estimation. Laboratory records and viva voce.

DISCIPLINE SPECIFIC ELECTIVE(DSE)

DSE: 1-GEOLOGY OF ODISHA
(Credit:6, Theory-05, Tutorial-01)
Theory: 50 Classes (1hr. duration)
Max. Marks: 100

UNIT-I: Geomorphology.

UNIT-II: Stratigraphy of Odisha.

UNIT-III: Structure and tectonics.

UNIT-IV: Mineral resources of Odisha.

UNIT-V: Mineral-based industries of Odisha.

DSE: 2-EXTRA-TERRESTRIAL GEOLOGY
(Credit:6, Theory-05, Tutorial-01)
Theory: 50 Classes (1hr. duration)
Max. Marks: 100

UNIT-I: Solar system.

UNIT-II: Meteorites, asteroids and comets.

UNIT-III: Relationship of Earth with Moon, Mars and other planets.

UNIT-IV: Lunar topography.

UNIT-V: Lunar petrology.

DSE: 3-CLIMATE CHANGE
(Credit:6, Theory-05, Tutorial-01)
Theory: 50 Classes (1hr. duration)
Max. Marks: 100

UNIT-I: Weather and Climate; Concept and causes of climate change.

UNIT-II: Global warming and Green house effect,

UNIT-III: Impact of climate change on environment.

UNIT-IV: Rise in sea level; Impact of climate change on ocean; El Nino.

UNIT-V: Desertification Causes and effects

DSE: 4-PROJECT WORK
(Credit:6, COMPULSORY)
Max. Marks: 100

SKILL ENHANCEMENT COURSE(SEC)

SEC: 1-COMMUNICATIVE ENGLISH & ENGLISH WRITING SKILL(Compulsory)

(Credits: 02)

Theory: 20 Classes (1hr duration)

SEC: 2-RENEWABLE ENERGY AND ENERGY HARVESTING (Credits: 02)

Theory: 20 Classes (1hr duration)

UNIT:I

Fossil fuels and Alternate Sources of energy: Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity.

Solar energy: Solar energy, its importance, storage of solar energy, solar pond, non plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems. (10 Lectures)

UNIT-II

Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices. Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass. Geothermal Energy: Geothermal Resources, Geothermal Technologies. Hydro Energy: Hydropower resources, hydropower technologies, environmental impact of hydro power sources. (10 Lectures)

3.GROUNDWATER MANAGEMENT

(Credits: 02)

Theory: 20 Classes (1hr duration)

UNIT-I: Concept of Groundwater

Hydrological cycle, vertical zonation of ground water, Properties of water bearing formations - porosity, permeability, specific yield, specific retention, storativity.

UNIT-II: Aquifer characteristics

Aquifer types- Confined and unconfined aquifers, aquitard, aquiclude, aquifuse. Darcys law.

UNIT-III: Quality of Groundwater

Physical and Chemical Quality of ground water and its use in domestic, agriculture and industries; Ground water pollution.

UNIT-IV: Groundwater Harvesting

Groundwater basin, Water table fluctuation, , Artificial recharge of groundwater, Rainwater Harvesting.

UNIT-V: Groundwater exploration & pollution

Ground Water exploration - types of wells, Sea-water intrusion, Groundwater hazard due to Arsenic and Fluoride and their mitigation.

4. DIASASTER MANAGEMENT

(Credits: 02)

Theory: 20 Classes (1hr duration)

UNIT-I: Understanding disaster

Concept and definitions of different terms of disaster, classification of disasters-natural, manmade; difference between disaster and hazard- atmospheric and geo-hazards, Disaster risk, Vulnerability.

UNIT-II: General characteristics and problem areas of different atmospheric hazards

Flood, cyclone, drought, heat wave, lightning.

UNIT-III: Characteristics of Geo-hazards

Earthquake, Tsunami, volcanoes, Landslide.

UNIT-IV: Concepts of disaster management

Pre disaster, post disaster management, real time management, Warning system, Public communication system, Relief operation, rescue operation.

UNIT-V: Disaster risk mitigation

Hazard mapping and forecasting. Preparedness for damage mitigation and coping with disasters. Evacuation strategy, Capacity building for disaster/damage mitigation.

GENERIC ELECTIVE PAPERS(GE)
(Minor-Geology) for other Departments/Disciplines
(Credits: 06 each)

SEMESTER-I

GE:1

(Credits: 06, Theory: 04, Practical: 02)

Max. Marks: 100 (Theory: 70, Practical:30)

UNIT-I: General geology

Scope and subdivisions of Geology; Origin, age and interior of the Earth; Earthquake and volcanoes.

UNIT-II: Geomorphology

Weathering and erosion; Geological work of river, wind, glacier and underground water.

UNIT-III: Crystallography

Crystalline and non-crystalline substances; Symmetry elements, parameters and indices; Classification of crystals into six systems. Symmetry elements and forms of normal classes of isometric, tetragonal and orthorhombic systems.

UNIT-IV: Mineralogy

Minerals: definition and classification; Study of physical and chemical characters of rock forming minerals like quartz, feldspar, hypersthene, diopside, augite, hornblende, muscovite, biotite, garnet, olivine, sillimanite, kyanite, tourmaline, topaz, epidote, calcite, apatite, fluorite, talc, gypsum and corundum.

UNIT-V: Optical Mineralogy

Nature of light rays; Polarization, Double refraction, Isotropism, Anisotropism, Nicol prism, Petrological microscope; Behaviour of light in thin section; Birefringence; pleochroism, extinction angle and interference colours.

PRACTICAL

Identification of crystal models with respect to axis, symmetry and forms; Megascopic and microscopic identification of minerals mentioned in theory. Laboratory record and viva voce.

SEMESTER-II

GE:2

(Credits: 06, Theory: 04, Practical: 02)

Max. Marks: 100 (Theory: 70, Practical: 30)

UNIT-I: Igneous Petrology

Forms and texture of igneous rocks; Bowens reaction series; Classification of igneous rocks; Magmatic differentiation; Petrography of granite, syenite, peridotite, anorthosite, gabbro, dolerite and basalt.

UNIT-II: Sedimentary Petrology

Formation of sedimentary rocks; Texture, structure and classification of sedimentary rocks. Petrography of conglomerate, breccia, sandstone, shale and limestone.

UNIT-III: Metamorphic Petrology

Metamorphism: definition, agents, types. Texture, structure and classification of sedimentary rocks. Petrography of schists, gneisses, marble, charnockite and khondalite.

UNIT-IV: Palaeontology

Fossilisation and uses of fossils; Morphology and geologic history of trilobite, brachiopod, pelecypod, gastropod, cephalopod. Gondwana flora.

UNIT-V: Stratigraphy

Definition and scope of stratigraphy. Stratigraphic units and correlation. Physiographic division of Indian subcontinent. Stratigraphy of type areas of Archaeans, Cuddapah, Vindhyan, Triassic, Jurassic, Cretaceous and Gondwanas.

PRACTICAL

Megascopic and microscopic identification of igneous, sedimentary and metamorphic rocks as mentioned in theory. Morphological study of invertebrate and plant fossils mentioned in theory; drawing and labeling of fossils. Laboratory record and viva voce.

SEMESTER-III**GE:3**

(Credits: 06, Theory: 04, Practical: 02)

Max. Marks: 100(Theory: 70, Practical: 30)

UNIT-I: Structural Geology

Strike and dip; Fold: geometry, classification, recognition and causes of folding; Fault: geometry, classification and recognition. Vs rule. Unconformity: definition, types, significance and classification. Elementary idea about foliation and lineation.

UNIT-II: Geotectonics

Orogeny and epeiorogeny; Plate tectonics, continental drift; Isostasy; mid oceanic ridge, geosynclines.

UNIT-III: Ground Water

Hydrologic cycle; vertical distribution of groundwater; porosity and permeability; types of aquifers; Darcy's law. Quality of groundwater and its use; groundwater provinces of India.

UNIT-IV: Engineering Geology

Engineering properties of rocks; Geological and geotechnical studies of dam, reservoir and tunnel. Earthquake resistant structures.

UNIT-V: Environmental Geology

Renewable and non-renewable resources; Conservation of mineral resources; Impact of mining on environment; Management of solid wastes including mining wastes.

PRACTICAL

Interpretation of structure, stratigraphy and geologic history from maps; Drawing of sections; Completion of outcrops; Identification of building stones and their uses. Laboratory records and viva voce

SEMESTER-IV**GE:4**

(Credits: 06, Theory: 04, Practical: 02)

Max. Marks: 100 (Theory: 70, Practical:30)

UNIT-I: Ore Genesis

Ore mineral, gangue, tenor and grade; Processes of formation of mineral deposits: Magmatic, Hydrothermal, Mechanical and residual concentration, oxidation and supergene sulphide enrichment.

UNIT-II: Prospecting

Geological, geophysical and geochemical prospecting methods; Controls of ore localization; Metallogenic epoch and provinces; Ore reserve estimation.

UNIT-III: Mining and Resource Evaluation

Opencast and underground mining methods; sampling methods.

UNIT-IV: Mineral Resources-A

Mineralogy, mode of occurrence, distribution and uses of ores of Fe, Mn, Cr, Cu and Al ores.

UNIT-V: Mineral Resources-B

Mineralogy, mode of occurrence, origin, Indian distribution and uses of Mica and Asbestos. Origin, occurrence, distribution and uses of coal and petroleum.

PRACTICAL

Megascopic identification and uses of important metallic and non-metallic minerals mentioned in theory; Laboratory records and viva voce.

Recommended Books:

1. Bureaus Higher Secondary Geology (Part I) (2009) The Odisha State Bureau of Textbook Preparation and Production, Pustak Bhawan, Bhubaneswar.
2. Bureaus Higher Secondary Geology (Part II) (2011) The Odisha State Bureau of Textbook Preparation and Production, Pustak Bhawan, Bhubaneswar.
3. A. Dasgupta (2005) An introduction to Palaeontology, World Press, Kolkata.
4. A. Dasgupta (2006) An introduction to Earth Science, World Press, Kolkata.
5. A. Holmes - Principles of Physical Geology.
6. A. K. Jain (2014) An introduction to structural geology, Geological Society of India, Bangalore.
7. A. K. Roy (2009) Introduction to Geological maps and structures, World Press, Kolkata.
8. A. K. Sen and P. K. Guha (2006) A Hand Book of Economic Geology, Modern Book Agency, Kolkata.
9. A. M. Bateman & Jansen - Economic Mineral Deposit.
10. A. M. Evans (1993) Ore geology and industrial minerals.
11. A.K. Sen - Laboratory Mannual of Geology.
12. B. Mason and C. B. Moore (1982) Principles of Geochemistry, Wiley Eastern, New Delhi.
13. B. S. Sathya Narayan Swami (1985) Engineering Geology Laboratory Manual, Urasia Publ. House, New Delhi.
14. Berry and Mason - Mineralogy.
15. Bhaskar Rao - Metamorphic Petrology.
16. Brain Mason - Geochemistry.
17. C. S. Hurlbut and C. Klein (1977) Manual of Mineralogy, John Wiley & Sons, New York.
18. C. W. Fetter (2007) Applied Hydrogeology, CBS Pub. & Dist., New Delhi.
19. D. Chandra and R. M. Singh (2003) Petroleum Indian Context, Tara Book Agency, Varanasi.
20. D. Chandra, R. M. Singh and M. P. Singh (2000) Text Book of Coal Indian Context, Tara Book Agency, Varanasi.
21. D. G. A. Whitten and J. R. V. Brooks (1972) Penguin Books Ltd., London.

22. D. K. Banerjee (1992) Mineral resources of India, World Press, Kolkata.
23. D. K. Todd (1980) Groundwater hydrology; John Willey & Sons, New York.
24. D. M. Raup and S. M. Stanley (2004) Principles of palaeontology, CBS Pub. & Dist., New Delhi
25. D. Perkins (2002) Mineralogy, Prentice-Hall of India, New Delhi.
26. D. R. Prothero and F. Schwab (1999) Sedimentary Geology, W. H. Freeman & Co., New York.
27. Dobrin - Geophysical Prospecting.
28. E. Flint (1964) Essentials of Crystallography, Mir Publ., Moscow.
29. E. N. K. Clarkson (1998) Invertebrate palaeontology and evolution, Wiley India.
30. E. S. Dana and W. E. Ford (1977) A text book of mineralogy, Asia Publ. House, Kolkata.
31. E.A. Keller - Environmental Geology
32. F. H. Lahee (1987) Field Geology, CBS Pub. & Dist., New Delhi.
33. F. J. Pettijohn (1984) Sedimentary rocks, CBS Pub. & Dist., New Delhi.
34. F. J. Turner and J. Verhoogen (1987) Igneous and Metamorphic petrology, CBS Pub. & Dist., New Delhi.
35. G. Nichols (2001) Sedimentology and Stratigraphy, Blackwell Science, London.
36. G. W. Tyrrel (1980) Principles of Petrology, B. I. Publication, New Delhi.
37. G.B. Mohapatra (2010) Text book of Geology; CBS Pub. & Dist., New Delhi.
38. G.B. Mohapatra (2010) Text book of Physical Geology; CBS Pub. & Dist., New Delhi.
39. Geology and Mineral Resources of Odisha (2006), SGAT, Bhubaneswar.
40. H. H. Read (1984) Rutley's Element of Mineralogy, CBS Pub. & Dist., New Delhi.
41. H. M. Raghunath (1987) Ground Water, New Age International, New Delhi.
42. H. Williams, F. C. Turner and C. M. Gilbert (1985) Petrography An introduction to the study of rocks in thin section, CBS Pub. & Dist., New Delhi.
43. H. Woods (1985) Invertebrate Palaeontology, CBS Pub. & Dist., New Delhi.
44. J. A. Steers (1979) The Unstable Earth, Kalyani Publisher, New Delhi.
45. J. D. Collinson and D. B. Thompson (1994) Sedimentary structures, CBS Pub. & Dist., New Delhi.
46. K. M. Bangar (2013) Principles of Engineering Geology, Standard Publ. & Dist., Delhi.

47. K. S. Valdiya (1987) Environmental Geology, Tata McGraw Hill, New Delhi.
48. K. V. G. K. Gokhale and T. C. Rao (1973) Ore deposits of India, Thomson Press, Delhi.
49. Krynire & Judd - Principles of Engineering Geology.
50. L. R. A. Narayan (1999) Remote sensing and its application, University Publ., Hyderabad.
51. Levorsen - Petroleum Geology.
52. M. C. Dash and P. C. Mishra (2001) Man and Environment, Mac Millan, Kolkata.
53. M. G. Best (1986) Igneous and metamorphic petrology, CBS Pub. & Dist., New Delhi
54. M. K. Bose (2010) Igneous petrology, World Press, Kolkata.
55. M. P. Billings () Structural Geology.
56. M. P. Billings (1972) Structural Geology, Prantice-Hall of India, New Delhi
57. M. Ramakrishnan and R. Vaidyanadhan (2008) Geology of India (Vol. I & II), Geological Society of India, Bangalore.
58. M.S. Krishnan (1982) Geology of India and Berma, CBS Pub. & Dist., New Delhi.
59. N. K. N. Aiyengar and K. N. Prasad (1996) An introduction to Invertebrate paleontology, Vikas Publ. House, New Delhi.
60. N. W. Gokhale (1994), Manual of Geological Maps, CBS Pub. & Dist., New Delhi.
61. N. W. Gokhale (1996) Exercises on Geological maps and dip-strike problems, CBS Pub. & Dist., New Delhi
62. N. W. Gokhale (2000) A manual of problems in structural geology, CBS Pub. & Dist., New Delhi
63. N. W. Gokhale (2001) A guide to field geology, CBS Pub. & Dist., New Delhi.
64. P. C. Jain and M. S. Anantharaman (2005) Palaeontology; Vishal Pub. Co., Jalandhar.
65. P. F. Kerr (1964) Optical mineralogy, Tata McGraw Hill, New Delhi.
66. P. J. R. Reddy (2013) A text book of Hydrology, University Science Press, New Delhi.
67. P.K. Mukherjee (1997) A Text Book of Geology, World Press, Kolkata.
68. R. C. Moore, C. G. Iallicker and A. G. Fischer (2004) Invertebrate fossils, CBS Pub. & Dist., New Delhi.
69. R. K. Sinha and N. L. Sharma (1980) Mineral Economics, Oxford & IBH, New Delhi.
70. R. Lindholm (1987) A Practical Approach to Sedimentology, Allen and Unwin, London.

71. R. N. Hota (2011) Practical approach to crystallography and mineralogy; CBS Pub. & Dist., New Delhi
72. R. N. Hota (2011) Practical approach to petrology; CBS Pub. & Dist., New Delhi.
73. R. N. P. Arogyaswami (1980) Courses in mining geology, Oxford and IBH, New Delhi.
74. R. R. Shrock and W. H. Twenhofel (1953) CBS Pub. & Dist., New Delhi.
75. R. S. Sharma and A. Sharma (2014) Crystallography and Mineralogy, Geological Society of India, Bangalore.
76. Ravindra Kumar (1986) Fundamentals of Historical Geology & Stratigraphy of India, Wiley Eastern, New Delhi.
77. S. Deb (1980) Industrial minerals and rocks of India, Allied Publ., Mumbai.
78. S. K. Donovan (1992) The process of Fossilization, CBS Pub. & Dist., New Delhi.
79. S. K. Shah (2013) Elements of Palaeontology, Geological Society of India, Bangalore.
80. S. K. Tiwari (2004) Stratigraphy, Micropalaeontology and Palaeobotany, Kalyani Publ., New Delhi.
81. S. Krishnaswami (1972) Indias Mineral resources, Oxford and IBH, New Delhi.
82. S. M. Mathur (2001) Guide to field geology, Prantice-Hall of India, New Delhi.
83. S. M. Naqvi (2005) Geology and evolution of the Indian plate, Capital Publ. Co. New Delhi.
84. S. N. Pandey (1987) Principles and applications of photogeology, Wiley Eastern, New Delhi.
85. S. Ray - Text Book of Geology.
86. S. Singh (1997) Physical Geography, Prayag Pustak Bhawan, Allahbad.
87. Sam- Boggs (1987) Principles of Sedimentology and Stratigraphy, Prentice-Hall Int., London.
88. Sharma and Ram - Introduction to India's Economic Minerals.
89. Shephard - Submarine Geology.
90. U. Prasad (2000) Economic Geology, CBS Pub. & Dist., New Delhi.
91. V. Radhakrishnan (1987) General Geology, V.V.P. Publishers, Tuticorin.
92. V. S. Kale and A. Gupta (2015) Introduction to Geomorphology, University Press, Hyderabad.
93. W. A. Deer, R. A. Howie and J. Zisman (1979) An introduction to the rock forming minerals, ELBS and Longman.
94. W. D. Thornbury (1984) Principles of Geomorphology, Wiley Eastern, New Delhi.

95. W. G. Morrison (2004) A dictionary of Geology, CBS Pub. & Dist., New Delhi.
96. W. R. Phillips and D. T. Griffen (2004) Optical Mineralogy The non-opaque minerals, CBS Pub. & Dist., New Delhi.
97. Winchell-Optical Mineralogy.

MATHEMATICS(HONOURS)

SEMESTER-I

C:1-CALCULUS-I

(Total Marks: 100)

Part-I(Marks: 70)

4 Lectures, 1 Tutorial (per week)

Unit-I

Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of the type $e^{ax+b} \sin x$, $e^{ax+b} \cos x$, $(ax + b)^n \sin x$, $(ax + b)^n \cos x$, concavity and inflection points, asymptotes, curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves, LHospitals rule, applications in business, economics and life sciences.

Unit-II

Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n x dx$, $\int \cos^n x dx$, $\int \tan^n x dx$, $\int \sec^n x dx$, $\int (\log x)^n dx$, $\int \sin^n x \cos^n x dx$, volumes by slicing, disks and washers methods, volumes by cylindrical shells, parametric equations, parameterizing a curve, arc length, arc length of parametric curves, area of surface of revolution.

Unit-III

Techniques of sketching conics, reflection properties of conics, rotation of axes and second degree equations, classification into conics using the discriminant, polar equations of conics. Sphere, Cone, Cylinder, Conicoids.

Unit-IV

Vector triple product, Introduction to vector functions, operations with vector-valued functions, limits and continuity of vector functions, differentiation and integration of vector functions, tangent and normal components of acceleration.

Part-II(PRACTICAL)

(Marks: 30)

**List of Practical (Using any software/MATLAB)
Practical/Lab work to be performed on a Computer.**

1. Plotting the graphs of the functions e^{ax+b} , $\log(ax + b)$, $1/(ax + b)$, $\sin(ax + b)$, $\cos(ax + b)$, $|ax + b|$ and to illustrate the effect of a and b on the graph.
2. Plotting the graphs of the polynomial of degree 4 and 5, the derivative graph, the second derivative graph and comparing them.

3. Sketching parametric curves (eg. Trochoid, Cycloid, Epicycloids, Hypocycloid).
4. Obtaining the surface of revolution of curves.
5. Tracing of conics in cartesian/polar coordinates.
6. Sketching Ellipsoid, Hyperboloid of one and two sheets, Elliptic cone, Elliptic, Paraboloid, Hyperbolic paraboloid using cartesian coordinates.
7. Matrix operation (addition, multiplication, inverse, transpose).

Books Recommended:

1. H. Anton, I. Bivens and S. Davis: Calculus, 10-th Ed., John Wiley and Sons (Asia) P. Ltd., Singapore, 2002. Chapters: 3 (3.1, 3.2), 5 (5.2-5.5), 6(6.5, 6.8), 10 (10.1-10.5), 11(11.1, 11.4), 12(12.1, 12.2, 12.3, 12.6).
2. B.P. Acharya and D.C. Sahu: Analytical Geometry of Quadratic Surfaces, B.P. Acharya and D.C. Sahu, Kalyani Publishers, New Delhi, Ludhiana, Chapters: 2 and 3.
3. Shantinayakan: Text Book of Calculus(Part-II), S. Chand & Co. Pvt. Ltd., New Delhi, Chapters: 6,7, 10 (Art. 33-36).
4. Shantinayakan: Text Book of Calculus(Part-III), S. Chand & Co., Pvt. Ltd., New Delhi, Chapters: 1(Art.1,2), 3 (Art.7,8), 6 (15 restricted).

Books for Reference:

1. G.B. Thomas and R.L. Finney: Calculus, 9-th Ed., Pearson Education, Delhi, 2005.
2. R. Courant and F. John: Introduction to Calculus and Analysis (Volumes I & II), Springer-Verlag, New York, Inc., 1989.
3. Shanti Narayan and P.K. Mittal: Analytical Solid Geometry, S. Chand & Co. Pvt. Ltd., New Delhi.
4. M.J. Strauss, G.L. Bradley and K. J. Smith: Calculus, 3-rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.

C:2-ALGEBRA-I

**Total Marks: 100-(Theory: 80 Marks+Mid-Sem: 20 Marks)
5 Lectures, 1 Tutorial (per week)**

Unit-I

Polar representation of complex numbers, n -th roots of unity, De Moivres theorem for rational indices and its applications.

Unit-II

Equivalence relations, Basic Terminology, Functions, Inverse and composition of functions, One-to-One correspondence and cardinality of a set, Division algorithm, Divisibility and Euclidean algorithm, Prime numbers, Congruence relation between integers, Principles of Mathematical Induction, Statement of Fundamental Theorem of Arithmetic.

Unit-III

Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation $Ax = b$, solution sets of linear systems, applications of linear systems, linear independence.

Unit-IV

Introduction to linear transformations, Matrix of a linear transformation, Inverse of a matrix, Characterizations of invertible matrices. Subspaces of \mathbb{R}^n , Dimension of subspaces of \mathbb{R}^n and Rank of a matrix, Eigen values, Eigen Vectors and Characteristic equation of a matrix.

Books Recommended:

1. Titu Andreescu and Dorin Andrica: Complex Numbers from A to Z , Birkhauser, 2006. Chapter: 2.
2. Edgar G. Goodaire and Michael M. Parmenter: Discrete Mathematics with Graph Theory, 3-rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005. Chapters: 2(2.4), 3, 4(4.1 – 4.1.6, 4.2 – 4.2.12, 4.3 – 4.3.9, 4.4 – 4.4.8), 5(5.1 – 5.1.4).
3. David C. Lay: Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007. Chapters: 1(1.1 – 1.9), 2(2.1 – 2.3, 2.8, 2.9), 5(5.1, 5.2).

SEMESTER-II

C:3-REAL ANALYSIS (ANALYSIS-I)

Total Marks: 100-(Theory: 80 Marks+Mid-Sem: 20 Marks)
5 Lectures, 1 Tutorial (per week)

Unit-I

Review of Algebraic and Order Properties of \mathbb{R} , Upper bound & Lower bound, Least upper bound (LUB), Greatest lower bound (GLB), LUB & GLB property of an ordered field, Completeness of an ordered field, Incompleteness of \mathbb{Q} , Supremum and Infimum, Roots, Archimedean property, Rational & Irrational density theorems, Decimal representations of real numbers.

Unit-II

Idea of countable, uncountable sets and theorems relating to these sets, Sequences, Convergence & divergence of sequences, Limit of a sequence & Limit Theorems, Monotonic sequences, Weierstrass completeness principle, Nested Intervals, Cantor's completeness principle, Idea about higher order cardinals (restricted).

Unit-III

Subsequences, Bolzano Weierstrass theorem for sequences, Cluster points, Cauchy(Fundamental)

sequence, Cauchy's Convergence Criterion, Limit superior and Limit inferior, Convergence and divergence of infinite series, Series of positive terms, Tests of convergence.

Unit-IV

Absolute convergence, Rearrangement of terms of a series, Conditional convergence of a series, Open sets, Closed sets, Limit points, Closure, Interior and Boundary of sets. Bolzano Weierstrass theorem for sets.

Book Recommended:

1. G. Das and S. Pattanayak: Fundamentals of Mathematics Analysis, TMH Publishing Co., Chapters: 2(2.1-2.7), 3(3.1-3.4), 4(4.1-4.8, 4.11-4.13), 5(5.1-5.5).

Books for Reference:

1. R.G. Bartle and D. R. Sherbert: Introduction to Real Analysis, 3-rd Ed., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002.
2. Gerald G. Bilodeau, Paul R. Thie, G.E. Keough: An Introduction to Analysis, 2-nd Ed., Jones & Bartlett, 2010.
3. Brian S. Thomson, Andrew. M. Bruckner and Judith B. Bruckner: Elementary Real Analysis, Prentice Hall, 2001.
4. S.K. Berberian: A First Course in Real Analysis, Springer Verlag, New York, 1994.
5. S.C. Mallik and S. Arora: Mathematical Analysis, New Age International Publications.
6. D. Somasundaram and B. Choudhury: A First Course in Mathematical Analysis, Narosa Publishing House.
7. S.L. Gupta and Nisha Rani: Real Analysis, Vikas Publishing House Pvt. Ltd., New Delhi.

C-:4-DIFFERENTIAL EQUATIONS

(Total Marks:100)

Part-I(Marks: 70)

4 Lectures, 1 Tutorial (per week)

Unit-I

Basic concepts of Differential equations and mathematical models. First order and first degree Ordinary differential equations(variables separable, homogeneous, exact, and linear). Applications of first order differential equations(Growth, Decay and Chemical Reactions, Heat flow, Oxygen debt, Economics). Equations of first order but of higher degree.

Unit-II

Second order linear equations(both homogeneous and non-homogeneous) with constant coefficients, second order equations with variable coefficients, variation of parameters, method of undetermined coefficients, Euler's equation, Second order differential equations with variable coefficients, Equations reducible to linear equations with constant coefficients.

Unit-III

Power series solutions of second order differential equations.

Unit-IV

Laplace transforms and its applications to solutions of differential equations.

Part-II(PRACTICAL)

(Marks: 30)

List of Practical (Using any Software/MATLAB) Practical/Lab work to be performed on a Computer.

1. Plotting of second order solution of family of differential equations.
2. Plotting of third order solution of family of differential equations.
3. Growth model (exponential case only).
4. Decay model (exponential case only).
5. Oxygen debt model.
6. Economic model.
7. Vibration problems.

Book Recommended:

1. J. Sinha Roy and S. Padhy: A Course of Ordinary and Partial Differential Equations, Kalyani Publishers, New Delhi. Chapters: 1, 2, 3, 4(4.1-4.8), 5, 7, 9(9.1-9.5, 9.10, 9.11, 9.13).

Books for Reference:

1. Martin Braun: Differential Equations and their Applications, Springer International.
2. M.D. Raisinghania: Advanced Differential Equations, S. Chand & Company Ltd., New Delhi.
3. G. Dennis Zill: A First Course in Differential Equations with Modelling Applications, Cengage Learning India Pvt. Ltd.
4. S.L. Ross: Differential Equations, John Wiley & Sons, India, 2004.

SEMESTER-III

C-5: THEORY OF REAL FUNCTIONS (ANALYSIS-II)

**Total Marks: 100-(Theory: 80 Marks+Mid-Sem: 20 Marks)
5 Lectures, 1 Tutorial (per week)**

Unit-I

Limits of functions ($\epsilon - \delta$ approach), Sequential criterion for limits, Divergence criteria. Limit theorems, one-sided limits. Infinite limits and limit at infinity. Continuous functions, Sequential criterion for continuity, Algebra of continuous functions and theorems related to continuity of functions.

Unit-II

Discontinuity and kinds of discontinuity, Further properties of continuity, Uniform continuity, Differentiable functions, Left hand & Right hand derivatives, Algebra of differentiable functions, Caratheodory's theorem.

Unit-III

Mean value conditions, Global and local maximum & minimum, Rolle's theorem, Generalized mean value theorem, Cauchy mean value theorem, Lagrange's mean value theorem and their applications, Darboux's theorem, Indeterminant forms, Higher order derivatives (Leibnitz theorem), Taylor's theorem and its applications to approximating functions by means of polynomials.

Unit-IV

Maxima and Minima, Taylor's theorem with different forms of remainder, Maclaurin's theorem, Deduction of Taylor's theorem from mean value theorem, Taylor's and Maclaurin's infinite series, Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions, $\ln(1+x)$, $1/(ax+b)$ and $(1+x)^n$.

Books Recommended:

1. G. Das and S. Pattanayak: Fundamentals of Mathematics Analysis, TMH Publishing Co., Chapters: 6(6.1-6.7), 7(7.1-7.7), 9(9.7 only).
2. S.C. Mallik and S. Arora: Mathematical Analysis, New Age International Publications, Chapter: 6(8.1-8.6).

Books for Reference:

1. R. Bartle and D.R. Sherbert, Introduction to Real Analysis, John Wiley and Sons, 2003.
2. K.A. Ross, Elementary Analysis: The Theory of Calculus, Springer, 2004.
3. A. Mattuck, Introduction to Analysis, Prentice Hall, 1999.
4. S.R. Ghorpade and B.V. Limaye, A Course in Calculus and Real Analysis, Springer, 2006.

C-6: GROUP THEORY (ALGEBRA-II)

Total Marks: 100-(Theory: 80 Marks+Mid-Sem: 20 Marks)
5 Lectures, 1 Tutorial (per week)

Unit-I

Symmetries of a square, Dihedral groups, Definition and examples of groups including permutation groups and quaternion groups (illustration through matrices), Elementary properties of groups.

Subgroups and examples of subgroups, Centralizer, Normalizer, Center of a group, Product of two subgroups.

Unit-II

Properties of cyclic groups, Classification of subgroups of cyclic groups. Cycle notation for permutations, Properties of permutations, Even and Odd permutations, Alternating group, Properties of cosets, Lagranges theorem and consequences including Fermats Little theorem.

Unit-III

External direct product of a finite number of groups, Normal subgroups, Factor groups, Cauchys theorem for finite abelian groups.

Unit-IV

Group homomorphisms, properties of homomorphisms, Cayleys theorem, Properties of isomorphisms, First isomorphism theorem, Second and Third isomorphism theorems (Statements only).

Book Recommended:

1. Joseph A. Gallian: Contemporary Abstract Algebra(4-th Edn.), Narosa Publishing House, New Delhi, Chapters: I, II, III, IV, V, VI(up to Theorem 6.2 only), VII, VIII, IX, X, XI.

Books for Reference:

1. D.S. Malik, J.M. Mordeson, and M.K. Sen: Fundamentals of Abstract Algebra, McGraw-Hill, 1997.
2. John B. Fraleigh: A First Course in Abstract Algebra, 7-th Ed., Pearson, 2002.
3. M. Artin: Abstract Algebra, 2-nd Ed., Pearson, 2011.
4. Joseph J. Rotman: An Introduction to the Theory of Groups, 4-th Ed., Springer Verlag, 1995.
5. I.N. Herstein: Topics in Algebra, Wiley Eastern Limited, India, 1975.

C-7: PARTIAL DIFFERENTIAL EQUATIONS & SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS

(Total Marks: 100)

Part-I(Marks: 70)
04 Lectures(per week)

Unit-I

Systems of Linear Differential Equations: Basic theory of linear systems, Trial solution method for linear system with constant coefficients, Simultaneous linear first order equations in three variables, Methods of solution, Pfaffian differential equations, methods of solutions of Pfaffian differential equations in three variables.

Unit-II

Formation of first order partial differential equations, Linear and non-linear partial differential equations of first order, Special types of first-order equations, Solutions of partial differential equations of first order satisfying given conditions.

Unit-III

Linear partial differential equations with constant coefficients, Equations reducible to linear partial differential equations with constant coefficients, Partial differential equations with variable coefficients, Some standard forms of variable coefficients.

Unit-IV

Laplace equation, Solution of Laplace equations by separation of variables, One-dimensional Wave equation, Solution of the Wave equation(method of separation of variables), Diffusion equation, Solution of one-dimensional diffusion equation, Method of separation of variables.

Part-II(PRACTICAL)

(Marks: 30)

List of Practical (Using any Software/MATLAB) Practical/Lab work to be performed on a Computer.

1. To find the general solution of the non-homogeneous system of the form:

$$\frac{dx}{dt} = a_1x + b_1y + f_1(t), \frac{dy}{dt} = a_2x + b_2y + f_2(t)$$

with given conditions.

2. Plotting the integral surfaces of a given first order PDE with initial data.

3. Solution of wave equation $\frac{\partial^2 u}{\partial t^2} - c^2 \frac{\partial^2 u}{\partial x^2} = 0$ for the following associated conditions:

(a) $u(x, 0) = \phi(x), u_t(x, 0) = \psi(x), x \in \mathbb{R}, t > 0$. (b) $u(x, 0) = \phi(x), u_t(x, 0) = \psi(x), u_x(0, t) = 0, x \in (0, \infty), t > 0$. (c) $u(x, 0) = \phi(x), u_t(x, 0) = \psi(x), u(0, t) = 0, x \in (0, \infty), t > 0$. (d) $u(x, 0) = \phi(x), u_t(x, 0) = \psi(x), u(0, t) = 0, u(1, t) = 0, 0 < x < 1, t > 0$.

4. Solution of Diffusion equation $\frac{\partial u}{\partial t} - k^2 \frac{\partial^2 u}{\partial x^2} = 0$ for the following associated conditions:

(a) $u(x, 0) = \phi(x), u(0, t) = a, u(l, t) = b, 0 < x < l, t > 0$.

(b) $u(x, 0) = \phi(x), x \in \mathbb{R}, 0 < t < T$.

(c) $u(x, 0) = \phi(x), u(0, t) = a, x \in (0, \infty), t \geq 0$.

Book Recommended:

1. J.Sinha Roy and S. Padhy: A Course on Ordinary and Partial Differential Equations, Kalyani Publishers, New Delhi, Ludhiana, 2012.
Chapters: 8 (8.1-8.3), 11, 12, 13(13.1-13.5), 15(15.1 & 15.5 only), 16(16.1 & 16.1.1 only), 17(17.1-17.3).

Books for References:

1. Tyn Myint-U and Lokenath Debnath: Linear Partial Differential Equations for Scientists and Engineers, 4-th edition, Springer, Indian reprint, 2006.

2. S.L. Ross: Differential equations, 3-rd Ed., John Wiley and Sons, India, 2004.

SEMESTER-IV

C-8: NUMERICAL METHODS

(Total Marks: 100)

Part-I(Marks: 70)

04 Lectures(per week)

Unit-I

Rate of convergence, Algorithms, Errors: Relative, Absolute, Round off, Truncation. Numerical solution of non-linear equations : Bisection method, Regular-Falsi method, Secant method, Newton-Raphson method, Fixed-point Iteration method, Newton-Raphson method for multiple roots, Aitken's Δ^2 process, Muller's method. Rate of convergence of these methods.

Unit-II

System of linear equations: Gaussian Elimination method, Gauss-Jordan method, Gauss Jacobi method, Gauss-Seidel method and their convergence analysis, .

Unit-III

Polynomial interpolation: Existence uniqueness of interpolating polynomials, Lagrange and Newtons divided difference interpolation, Error in interpolation, Central difference & averaging operators, Gauss-forward and backward difference interpolation, Simple numerical methods for derivatives, Interpolatory formulas.

Unit-IV

Numerical Integration: Some simple quadrature rules, Newton-Cotes rules, Trapezoidal rule, Simpsons rule, Simpsons $\frac{3}{8}$ -th rule, Compound quadrature rules, Compound mid-point rule, Compound Trapezoidal rule, Compound Simpsons rule, Gauss-Legendre 2-point & 3-point rules. Numerical solutions of Differential Equations: Eulers method. Runge-Kutta methods of orders two, three and four.

Part-II(PRACTICAL)

(Marks: 30)

**List of Practical (Using any Software/MATLAB)
Practical/Lab work to be performed on a Computer.**

1. Calculate the sum $1/1 + 1/2 + 1/3 + 1/4 + \dots + 1/N$.
2. To find the absolute value of an integer.
3. Enter 100 integers into an array and sort them in an ascending order.

4. Bisection Method.
5. Newton-Raphson Method.
6. Secant Method.
7. Regular-Falsi Method.
8. LU decomposition Method.
9. Gauss-Jacobi Method.
10. SOR Method or Gauss-Siedel Method.
11. Lagrange Interpolation or Newton Interpolation.
12. Simpsons rule.

Note: For any of the CAS (Computer aided software) Data types-simple data types, floating data types, character data types, arithmetic operators and operator precedence, variables and constant declarations, expressions, input/output, relational operators, logical operators and logical expressions, control statements and loop statements, arrays should be introduced to the students.

Book Recommended:

1. B.P. Acharya and R.N. Das: A Course on Numerical Analysis, Kalyani Publishers, New Delhi, Ludhiana. Chapters: 0(0.2, 0.8), 1(1.8, 1.9), 2(2.1-2.4, 2.6-2.9), 3(3.1-3.4, 3.6-3.11), 5(5.1-5.3), 6(6.1-6.3, 6.5, 6.10, 6.11), 7(7.1-7.5 & 7.7).
2. Brian Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.

Books for Reference:

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain: Numerical Methods for Scientific and Engineering Computation, 6th Ed., New age International Publisher, India, 2007.
2. C.F. Gerald and P.O. Wheatley: Applied Numerical Analysis, Pearson Education, India, 2008.
3. Uri M. Ascher and Chen Greif: A First Course in Numerical Methods, 7th Ed., PHI Learning Private Limited, 2013.
4. John H. Mathews and Kurtis D. Fink: Numerical Methods using Matlab, 4th Ed., PHI Learning Private Limited, 2012.
5. P. Khandasamy, K. Thilagavathy and K. Gunavathi: Numerical Methods, S. Chand & Company Ltd., 2012.
6. E. Balagurusamy: Numerical Methods, Tata McGraw-Hill Pub. Co. Ltd., 1999.

C-9: RIEMANN INTEGRATION & SERIES OF FUNCTIONS (ANALYSIS-III)

**Total Marks: 100-(Theory: 80 Marks+Mid-Sem: 20 Marks)
5 Lectures, 1 Tutorial (per week)**

Unit-I

Riemann integration, Inequalities of upper and lower sums, Riemann conditions of integrability. Riemann sum and definition of Riemann integral through Riemann sums, Equivalence of two definitions, Riemann integrability of monotone and continuous functions, Properties of the Riemann integral, Definition and integrability of piecewise continuous and monotone functions, Fundamental theorems of Calculus.

Unit-II

Improper integrals; Series and Integrals, Absolute convergence of integrals, Convergence of Beta and Gamma functions.

Unit-III

Point-wise and Uniform convergence of sequence of functions, Cauchy's criterion & Weierstrass M-test for uniform convergence, Dedekind test, Uniform convergence and Continuity, Term by term integration of series, Term by term differentiation of series.

Unit-IV

Power series (Cauchy Hadamard Theorem), Radius of convergence, Differentiation and integration of power series, Abels Limit Theorem, Stirling's formula, More about Taylor's series, Weierstrass Approximation Theorem.

Books Recommended:

1. G. Das and S. Pattanayak: Fundamentals of Mathematics Analysis, TMH Publishing Co., Chapters: 4(4.14 only), 8 (8.1-8.6), 9 (9.1-9.6, 9.8).
2. S.C. Mallik and S. Arora: Mathematical Analysis, New Age International Ltd., New Delhi, Chapters: 11(3.3, 4.3 only), 12(Restricted).

Books for Reference:

1. K.A. Ross, Elementary Analysis: The Theory of Calculus, Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004.
2. R.G. Bartle D.R. Sherbert: Introduction to Real Analysis, 3rd Ed., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002.
3. Charles G. Denlinger: Elements of Real Analysis, Jones & Bartlett (Student Edition), 2011.
4. Shanti Narayan and M.D. Raisinghania: Elements of Real Analysis, S. Chand & Co. Pvt. Ltd.

C-10: RING THEORY & LINEAR ALGEBRA (ALGEBRA-III)

**Total Marks: 100-(Theory: 80 Marks+Mid-Sem: 20 Marks)
5 Lectures, 1 Tutorial (per week)**

Unit-I

Definition and examples of rings, Properties of rings, Subrings, Integral domains and Fields, Characteristic of a ring, Ideal, Ideal generated by a subset of a ring, Factor rings, Operations on Ideals, Prime and Maximal ideals.

Unit-II

Ring homomorphisms, Properties of ring homomorphisms, Isomorphism Theorems I, II and III, Field of quotients.

Unit-III

Vector spaces, Subspaces, Algebra of subspaces, Quotient spaces, Linear combination of vectors, Linear span, Linear independence, Basis and Dimension, Dimension of subspaces.

Unit-IV

Linear transformations, Null space, Range, Rank and Nullity of a linear transformation, Matrix representation of a linear transformation, Algebra of linear transformations. Isomorphisms, Isomorphism theorems, Invertibility and Isomorphisms, Change of co-ordinate matrix.

Book Recommended:

1. Joseph A. Gallian: Contemporary Abstract Algebra(8th Edn.), Narosa Publishing House, New Delhi. Chapters: 12, 13, 14, 15.
2. Stephen H. Friedberg, Arnold J. Insel, and Lawrence E. Spence: Linear Algebra, 4th Ed., Prentice- Hall of India Pvt. Ltd., New Delhi, 2004. Chapters: 1 (1.2-1.6), 2(2.1-2.5).

Books for Reference:

1. John B. Fraleigh: A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2. M. Artin: Abstract Algebra, 2nd Ed., Pearson, 2011.
3. S. Lang: Introduction to Linear Algebra, 2nd Ed., Springer, 2005.
4. Gilbert Strang: Linear Algebra and its Applications, Cengage Learning India Pvt. Ltd.
5. S. Kumaresan: Linear Algebra- A Geometric Approach, Prentice Hall of India,1999.
6. Kenneth Hoffman, and Ray Alden Kunze: Linear Algebra, 2nd Ed., Prentice-Hall of India Pvt. Ltd., 1971.
7. I.N. Herstein: Topics in Algebra, Wiley Eastern Pvt. Ltd.

SEMESTER-V

C-11: MULTIVARIATE CALCULUS (CALCULUS-II)

**Total Marks: 100-(Theory:80 Marks+Mid-Sem: 20 Marks)
5 Lectures, 1 Tutorial (per week)**

Unit-I

Functions of several variables, limit and continuity of functions of two variables, Partial differentiation, Tangent planes, Approximation and Differentiability, Chain rule for one and two independent parameters.

Unit-II

Directional derivatives and gradient, Maximal property of the gradient, Normal property of the gradient, Tangent planes and the normal lines, Extrema of functions of two variables, Method of Lagrange multipliers, Lagrange Multipliers, Constrained optimization problems, A geometrical interpretation.

Unit-III

Double integration over rectangular region and over non-rectangular region, Double integrals in polar co-ordinates, Triple integrals, Triple integral over a parallelepiped and solid regions, Volume by triple integrals. cylindrical and spherical co-ordinates. Change of variables in double integrals and triple integrals.

Unit-IV

Definition of vector field, Divergence and Curl, Line integrals, Applications of line integrals: Mass and Work, Fundamental theorem and path independence for line integrals.

Unit-V

Green's theorem, Area as a line integral, Alternative forms of Green's theorem, Normal derivatives, Surface integrals, Integrals over parametrically defined surfaces. Stokes theorem, The Divergence theorem.

Book Recommended:

1. M.J. Strauss, G.L. Bradley and K. J. Smith: Calculus, 3rd Ed., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007. Chapters: 11(11.1(Pages: 541-543), 11.2-11.6, 11.7(Pages:598-605), 11.8(Pages:610-614)), 12 (12.1, -12.3, 12.4(Pages:652-660), 12.5, 12.6), 13 (13.1-13.3, 13.4(Pages:712-716, 718-720), 13.5(Pages:723-726; 729-730), 13.6 (Pages:733-737), 13.7(Pages:742-745)).

Books for Reference:

1. G.B. Thomas and R.L. Finney: Calculus, 9th Ed., Pearson Education, Delhi, 2005.
2. E. Marsden, A.J. Tromba and A. Weinstein: Basic Multivariable Calculus, Springer (SIE), Indian reprint, 2005.
3. Santosh K. Sengar and S.P. Singh: Advanced Calculus, Cengage Learning India Pvt. Ltd.

C-12: PROBABILITY & STATISTICS

Total Marks:100-(Theory: 80 Marks+Mid-Sem: 20 Marks)
5 Lectures, 1 Tutorial (per week)

Unit-I

Sample space, Probability axioms, Independent events, Conditional probability & Bayes' theorem, Real random variables (discrete and continuous), Cumulative distribution function, Expectation of random variables, Some special expectations.

Unit-II

Multivariate distributions, Joint cumulative distribution functions, Joint probability distributions, Marginal & conditional distributions, Some probability distributions(Discrete case), Uniform distribution, Binomial distribution, Negative Binomial & Geometric distributions, Poisson distribution.

Unit-III

Some probability distributions(Continuous case), Uniform, Gamma, Exponential, Beta distributions, Normal distributions, Normal approximation to the Binomial distribution, Bivariate normal distribution.

Unit-IV

Distribution of two random variables, Expectation of function of two random variables, Moment generating functions, Conditional distributions & expectations, Correlation coefficient, Co-variance, Independent random variables, Linear regression for two variables.

Unit-V

Limit theorems, Markov's inequality, Chebyshevs inequality, Statement and interpretation of Weak and Strong law of large numbers, Central Limit theorem for independent and identically distributed random variables with finite variance, Markov Chains: Introduction, Chapman-Kolmogorov equations.

Books Recommended:

1. Irwin Miller and Marylees Miller, John E. Freund: Mathematical Statistics with Applications, 7th Ed., Pearson Education, Asia, 2006. Chapters: 2 (excluding Art.9), 3 (excluding Art.8), 4, 5(5.1, 5.2, 5.4, 5.5,5.7), 6(6.1-6.7), 14(14.1, 14.2)
2. Sheldon Ross: Introduction to Probability Models, 9th Ed., Academic Press, Indian Reprint, 2007. Chapters:8(8.1-8.4(up to pages 428)), 9(9.1, 9.2).

Books for Reference:

1. Alexander M. Mood, Franklin A. Graybill and Duane C. Boes: Introduction to the Theory of Statistics, 3rd Ed., Tata McGraw- Hill, Reprint 2007.
2. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, S. Chand and Company Pvt. Ltd., New Delhi.
3. Sheldon Ross: A First Course in Probability, Pearson Education.
4. Robert V. Hogg, Joseph W. McKean and Allen T. Craig: Introduction to Mathematical Statistics, Pearson Education, Asia, 2102.

5. Kai Lai Chung: Elementary Probability Theory with Stochastic Processes, 3-rd Edn., Springer International Student Edition.
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SEMESTER-VI

C-13: METRIC SPACES & COMPLEX ANALYSIS (ANALYSIS-IV)

Total Marks: 100-(Theory: 80 Marks+Mid-Sem: 20 Marks)
5 Lectures, 1 Tutorial (per week)

Unit-I

Metric spaces: Definition and examples, Open & Closed spheres, Neighborhoods, Interior points, Open set, Closed set, Boundary points, Limit points & isolated points, Closure of a set, Dense sets, Separable metric spaces, Sequences in metric spaces, Convergent sequences, Cauchy sequences, Complete metric spaces, Distance between sets & diameter of a set, Subspaces, Cantor's theorem.

Unit-II

Continuous functions: Definition & characterizations, Sequential criterion and other characterizations of continuity, Uniform continuity, Homeomorphism, Connectedness, Connected subsets of \mathbb{R} , Separated sets, Disconnected sets, Contraction mappings, Banach Fixed point theorem.

Unit-III

Properties of complex numbers, Regions in the complex plane, Functions of complex variable, Mappings, Limits & Continuity of complex functions, Derivatives, Differentiation formulas, Cauchy-Riemann equations, Sufficient conditions for differentiability, Polar Co-ordinates, Analytic functions, Examples of analytic functions.

Unit-IV

Exponential function, Logarithmic function, Trigonometric function, Derivatives of these functions, Definite integrals of functions, Contours, Contour integrals and its examples, Upper bounds for moduli of contour integrals, Theorems on antiderivatives, Cauchy- Goursat theorem (statement only), Cauchy integral formula, Its extension and consequences.

Unit-V

Liouville's theorem and the Fundamental theorem of Algebra, Convergence of sequences and series, Taylor series with examples, Laurent series (without proof) with examples, Absolute and uniform convergence of power series.

Books Recommended:

1. P.K. Jain and K. Ahmad: Metric Spaces, Narosa Publishing House, New Delhi. Chapters: 2(1-9, 12), 3(1-4), 4(1-4), 6(1-2, 4), 7(1 only).
2. James Ward Brown and Ruel V. Churchill: Complex Variables and Applications, 8th Ed., McGraw Hill International Edition, 2009. Chapters: 1(11 only), 2(12, 13, 15-25), 3(29, 30, 34), 4(37-41, 43-46, 50-53), 5(55-60, 62, 63, 66).

Books for Reference:

1. Satish Shirali and Harikishan L. Vasudeva: Metric Spaces, Springer Verlag, London, 2006.
2. S. Kumaresan: Topology of Metric Spaces, 2nd Ed., Narosa Publishing House, 2011.
3. S. Arumgum, A.T. Issac and A. Somasundaram: Complex Analysis, Scitech Publ. Pvt. Ltd.
4. S. Ponnusamy: Foundations of Complex Analysis, Alpha Science International Ltd.
5. J.B. Conway: Functions of one complex variable, Springer International Student Edn..
6. N. Das: Complex Function Theory, Allied Publishers Pvt. Ltd., Mumbai.

C-14: LINEAR PROGRAMMING

**Total Marks: 100-(Theory: 80 Marks+Mid-Sem: 20 Marks)
5 Lectures, 1 Tutorial (per week)**

Unit-I

Introduction to linear programming problems(LPP), Mathematical formulation of the LPP with illustrations, Graphical method, General Linear programming problems, Canonical & standard form of LPP.

Unit-II

Theory of Simplex method, Optimality and unboundedness, the Simplex algorithm, Simplex method in tableau format, Introduction to artificial variables, Two-phase method, Big-M method and their comparisons.

Unit-III

Duality in LPP: Introduction, General Primal-Dual pair, Formulation of the Dual problem, Primal-Dual relationships, Duality theorems, Complementary slackness theorem, Duality & Simplex method, Economic interpretation of the Duality.

Unit-IV

Transportation Problem(TP): LP formulation of TP, Existence of solution and Duality in TP, Solution of Transportation problems, North-West corner method, Least-Cost method and Vogel approximation method for determination of starting basic solution, Algorithm for solving transportation problem, Assignment problem and its mathematical formulation, Solution methods of Assignment problem, Special cases in Assignment problems.

Unit-V

Games and Strategies: Introduction, Formulation of two person zero sum games, solving two person zero sum games, Maximin-Minimax principle, Games without saddle points, Games with mixed strategies, Graphical solution procedure to $(2 \times n)$ and $(m \times 2)$ games.

Book Recommended:

1. Kanti Swarup, P.K. Gupta and Man Mohan: Operations Research, S. Chand and Co. Pvt. Ltd., Chapters: 2, 3, 4, 5(5.1-5.8), 10(10.1-10.10), 11(11.1-11.4), 17(17.1-17.6).

Books for Reference:

1. G. Hadley: Linear Programming, Narosa Publishing House, New Delhi, 2002.
2. N.V.R. Naidu, G. Rajendra and T. Krishna Rao: Operations Research, I.K. International Publishing House Pvt. Ltd., New Delhi, Bangalore.
3. R. Veerachamy and V. Ravi Kumar: Operations Research- I.K. International Publishing House Pvt. Ltd., New Delhi, Bangalore.
4. P.K. Gupta and D.S. Hira: Operations Research, S. Chand and Company Pvt. Ltd., New Delhi.
5. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali: Linear Programming and Network Flows, 2-nd Ed., John Wiley and Sons, India, 2004.
6. F.S. Hillier and G.J. Lieberman: Introduction to Operations Research, 9-th Ed., Tata McGraw Hill, Singapore, 2009.
7. Hamdy A. Taha: Operations Research, An Introduction, 8-th Ed., PrenticeHall India, 2006.

DISCIPLINE SPECIFIC ELECTIVES(DES)

DSE-1 Programming in C++ (Compulsory) (Total Marks; 100) Part-I(Marks: 70)

Introduction to structured programming: data types- simple data types, floating data types, character data types, string data types, arithmetic operators and operators precedence, variables and constant declarations, expressions, input using the extraction operator `<<` and `cin`, output using the insertion operator `>>` and `cout`, preprocessor directives, increment(`++`) and decrement(`--`) operations, creating a C++ program, input/ output, relational operators, logical operators and logical expressions, if and if-else statement, switch and break statements. for, while and do-while loops and continue statement, nested control statement, value returning functions, value versus reference parameters, local and global variables, one dimensional array, two dimensional array, pointer data and pointer variables.

Book Recommended:

1. D. S. Malik: C++ Programming Language, Edition-2009, Course Technology, Cengage Learning, India Edition. Chapters: 2(Pages:37-95), 3(Pages:96-129), 4(Pages:134-178), 5(Pages:181-236), 6, 7(Pages:287-304), 9 (pages: 357-390), 14(Pages:594-600).

Books for Reference:

1. E. Balaguruswami: Object oriented programming with C++, fifth edition, Tata McGraw Hill Education Pvt. Ltd.
2. R. Johnsonbaugh and M. Kalin-Applications Programming in ANSI C, Pearson Education.
3. S. B. Lippman and J. Lajoie, C++ Primer, 3rd Ed., Addison Wesley, 2000.
4. Bjarne Stroustrup , The C++ Programming Language, 3rd Ed., Addison Welsley.

Part-II(PRACTICAL, Marks:30)

List of Practicals (Using any software) Practical/Lab work to be performed on a Computer.

1. Calculate the Sum of the series $\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{N}$ for any positive integer N .
2. Write a user defined function to find the absolute value of an integer and use it to evaluate the function $(-1)^n/|n|$, for $n = -2, -1, 0, 1, 2$.
3. Calculate the factorial of any natural number.
4. Read floating numbers and compute two averages: the average of negative numbers and the average of positive numbers.
5. Write a program that prompts the user to input a positive integer. It should then output a message indicating whether the number is a prime number.
6. Write a program that prompts the user to input the value of a, b and c involved in the equation $ax^2 + bx + c = 0$ and outputs the type of the roots of the equation. Also the program should outputs all the roots of the equation.
7. write a program that generates random integer between 0 and 99. Given that first two Fibonacci numbers are 0 and 1, generate all Fibonacci numbers less than or equal to generated number.
8. Write a program that does the following:
 - a. Prompts the user to input five decimal numbers.
 - b. Prints the five decimal numbers.
 - c. Converts each decimal number to the nearest integer.
 - d. Adds these five integers.
 - e. Prints the sum and average of them.
9. Write a program that uses whileloops to perform the following steps:
 - a. Prompt the user to input two integers :first Num and second Num (first Num should be less than second Num).
 - b. Output all odd and even numbers between first Num and second Num.
 - c. Output the sum of all even numbers between first Num and second Num.
 - d. Output the sum of the square of the odd numbers firs tNum and second Num.
 - e. Output all uppercase letters corresponding to the numbers between first Num and second Num, if any.

10. Write a program that prompts the user to input five decimal numbers. The program should then add the five decimal numbers, convert the sum to the nearest integer, and print the result.
11. Write a program that prompts the user to enter the lengths of three sides of a triangle and then outputs a message indicating whether the triangle is a right triangle or a scalene triangle.
12. Write a value returning function smaller to determine the smallest number from a set of numbers. Use this function to determine the smallest number from a set of 10 numbers.
13. Write a function that takes as a parameter an integer (as a long value) and returns the number of odd, even, and zero digits. Also write a program to test your function.
14. Enter 100 integers into an array and sort them in an ascending/ descending order and print the largest/ smallest integers.
15. Enter 10 integers into an array and then search for a particular integer in the array.
16. Multiplication/ Addition of two matrices using two dimensional arrays.
17. Using arrays, read the vectors of the following type: $A = (12345678)$, $B = (02340156)$ and compute the product and addition of these vectors.
18. Read from a text file and write to a text file.
19. Write a function, reverse Digit, that takes an integer as a parameter and returns the number with its digits reversed. For example, the value of function reverse Digit12345 is 54321 and the value of reverse Digit -532 is -235.

DSE-2

Total Marks:100-(Theory: 80 Marks+Mid-Sem: 20 Marks)

5 Lectures, 1 Tutorial(per week)

(Any one of the following)

1-DISCRETE MATHEMATICS

Unit-I

Propositional Logic, Proportional equivalences, Predicates and Quantifiers, Nested quantifiers, Rules of Inference, Methods of proof, Relations and their properties, n-ary relations and their applications, The basic counting, the Pigeon-hole principle, Generalized Permutations and Combinations.

Unit-II

Recurrence relations, Modelling with recurrence relations, Solving linear homogeneous recurrence relations with constant coefficients, Generating functions, Solving recurrence relations using generating functions, Principle of Inclusion-Exclusion & applications.

Unit-III

Partially ordered sets, Hasse diagram of partially ordered sets, maps between ordered sets, Boolean

expressions and Boolean functions, Duality principle, Lattices as ordered sets, Lattices as algebraic structures, sublattices, Boolean algebra and its properties.

Unit-IV

Graphs: Basic concepts and graph terminology, representing graphs and graph isomorphism, Cut-vertices and Cut-edges, Distance in a graph (restricted), Connectivity, Euler and Hamiltonian path, Shortest-Path problems, Planar graphs, Graph coloring.

Book Recommended:

1. Kenneth H. Rosen: Discrete Mathematics and Applications, Tata McGraw Hill Publications, Chapters: 1(1.1-1.6), 4(4.1, 4.2, 4.5), 5(5.1, 5.2, 5.5), 6(6.1, 6.2, 6.4-6.6), 7(7.1, 7.2), 8, 10(10.1, 10.2).

Books for References:

1. B A. Davey and H. A. Priestley: Introduction to Lattices and Order, Cambridge University Press, Cambridge, 1990.
2. Edgar G. Goodaire and Michael M. Parmenter: Discrete Mathematics with Graph Theory (2nd Edition), Pearson Education (Singapore) Pte. Ltd., Indian Reprint 2003.
3. Rudolf Lidl and Gnter Pilz: Applied Abstract Algebra (2nd Edition), Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004.
4. D.S. Malik: Discrete Mathematics: Theory & Applications, Cengage Learning India Pvt. Ltd.
5. Kevin Ferland: Discrete Mathematical Structures, Cengage Learning India Pvt. Ltd.

2-MATHEMATICAL MODELLING

Unit-I

Simple situations requiring Mathematical modelling. The technique of Mathematical modelling, Mathematical modelling through differential equations, linear growth and decay models, non-linear growth and decay models, compartment models, Mathematical modelling of geometrical problems through ordinary differential equations of first order.

Unit-II

Mathematical modelling in population dynamics, Mathematical modelling of epidemics through systems of ordinary differential equations of first order, compartment models through systems of ordinary differential equations, Mathematical modelling in economics through systems of ordinary differential equations of first order.

Unit-III

Mathematical models in medicine, arms race, battles and international trade in terms of systems of ordinary differential equations, Mathematical modelling of planetary motions, Mathematical modelling of circular motion and motion of satellites, mathematical modelling through linear differential equations of second order.

Unit-IV

Situation giving rise to partial differential equations models, mass balance equations: First method of getting PDE models, momentum balance equations. The second method of obtaining partial differential models, variational principles, third function, fourth method of obtaining partial differential equation models, models for traffic flow of a highway. Situation that can be modelled through graphs, mathematical models in terms of directed graphs, optimization principles and techniques, Mathematical modelling through calculus of variations.

Book Recommended:

1. J.N. Kapur: Mathematical Modelling, Chapters: 1(1.1 and 1.2), 2(2.1 to 2.4, 2.6), 3(3.1 to 3.5), 4(4.1 to 4.3), 6(6.1 to 6.6), 7(7.1 to 7.2), 9(9.1 and 9.2).

3-NUMBER THEORY

Unit-I

Divisibility theorem in integers, Primes and their distributions, Fundamental theorem of arithmetic, Greatest common divisor, Euclidean algorithms, Modular arithmetic, Linear Diophantine equation, prime counting function, statement of prime number theorem, Goldbach conjecture.

Unit-II

Introduction to congruences, Linear Congruences, Chinese Remainder theorem, Polynomial congruences, System of linear congruences, complete set of residues, Chinese remainder theorem, Fermats little theorem, Wilsons theorem.

Unit-III

Number theoretic functions, sum and number of divisors, totally multiplicative functions, definition and properties of the Dirichlet product, the Mbius inversion formula, the greatest integer function, Eulers phifunction, Eulers theorem, reduced set of residues, some properties of Eulers phi-function.

Unit-IV

Order of an integer modulo n , primitive roots for primes, composite numbers having primitive roots, Eulers criterion, the Legendre symbol and its properties, quadratic reciprocity, quadratic congruences with composite moduli.

Book Recommended:

1. D.M. Burton: Elementary Number Theory, McGraw Hill, Chapters: 2(2.1 to 2.4), 3(3.1 to 3.3), 4(4.1 to 4.4), 5(5.1 to 5.4), 6(6.1 to 6.3), 7(7.1 to 7.3), 8(8.1 to 8.2), 9(9.1 to 9.3).

Books for Reference:

1. K.H. Rosen: Elementary Number Theory & its Applications, Pearson Addition Wesley.
2. I. Niven and H.S. Zuckerman: An Introduction to Theory of Numbers, Wiley Eastern Pvt. Ltd.

3. Tom M. Apostol: Introduction to Analytic Number Theory, Springer International Student Edn.
4. Neville Robinns: Beginning Number Theory (2nd Edition), Narosa Publishing House Pvt. Limited, Delhi, 2007.

4-BOOLEAN ALGEBRA & AUTOMATA THEORY

Unit-I

Definition, examples and basic properties of ordered sets, maps between ordered sets, duality principle, lattices as ordered sets, lattices as algebraic structures, sublattices, products and homomorphisms. Definition, examples and properties of modular and distributive lattices, Boolean algebras, Boolean polynomials, minimal forms of Boolean polynomials, QuinnMcCluskey method, Karnaugh diagrams, switching circuits and applications of switching circuits.

Unit-II

Introduction: Alphabets, strings, and languages. Finite Automata and Regular Languages: deterministic and non-deterministic finite automata, regular expressions, regular languages and their relationship with finite automata, pumping lemma and closure properties of regular languages.

Unit-III

Context Free Grammars and Pushdown Automata: Context free grammars (CFG), parse trees, ambiguities in grammars and languages, pushdown automaton (PDA) and the language accepted by PDA, deterministic PDA, Non- deterministic PDA, properties of context free languages; normal forms, pumping lemma, closure properties, decision properties.

Unit-IV

Turing Machines: Turing machine as a model of computation, programming with a Turing machine, variants of Turing machine and their equivalence. Undecidability: Recursively enumerable and recursive languages, undecidable problems about Turing machines: halting problem, Post Correspondence Problem, and undecidability problems About CFGs.

Books Recommended:

1. B A. Davey and H. A. Priestley, Introduction to Lattices and Order, Cambridge University Press, Cambridge, 1990.
2. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, (2nd Ed.), Pearson Education (Singapore) P.Ltd., Indian Reprint 2003.
3. Rudolf Lidl and Gnter Pilz, Applied Abstract Algebra, 2nd Ed., Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004.
4. J. E. Hopcroft, R. Motwani and J. D. Ullman, Introduction to Automata Theory, Languages, and Computation, 2nd Ed., Addison-Wesley, 2001.
5. H.R. Lewis, C.H. Papadimitriou, C. Papadimitriou, Elements of the Theory of Computation, 2nd Ed., Prentice-Hall, NJ, 1997.

6. J.A. Anderson, Automata Theory with Modern Applications, Cambridge University Press, 2006.

DSE-3

Total Marks:100-(Theory:80 Marks+Mid-Sem:20 Marks)

5 Lectures, 1 Tutorial (per week)

(Any one of the following)

1-DIFFERENTIAL GEOMETRY

Unit-I

Theory of Space Curves: Space curves, Planer curves, Curvature, torsion and Serret-Frenet formulae. Osculating circles, Osculating circles and spheres. Existence of space curves. Evolutes and involutes of curves.

Unit-II

Osculating circles, Osculating circles and spheres. Existence of space curves. Evolutes and involutes of curves.

Unit-III

Developables: Developable associated with space curves and curves on surfaces, Minimal surfaces.

Unit-IV

Theory of Surfaces: Parametric curves on surfaces. Direction coefficients. First and second Fundamental forms. Principal and Gaussian curvatures. Lines of curvature, Eulers theorem. Rodrigues formula, Conjugate and Asymptotic lines.

Book Recommended:

1. C.E. Weatherburn, Differential Geometry of Three Dimensions, Cambridge University Press 2003. Chapters:1(1-4, 7,8,10), 2(13, 14, 16, 17), 3, 4(29-31, 35, 37, 38).

Books for References

1. T.J. Willmore, An Introduction to Differential Geometry, Dover Publications, 2012.
2. S. Lang, Fundamentals of Differential Geometry, Springer, 1999.
3. B. O'Neill, Elementary Differential Geometry, 2nd Ed., Academic Press, 2006.
4. A.N. Pressley-Elementary Differential Geometry, Springer.
5. B.P. Acharya and R.N. Das-Fundamentals of Differential Geometry, Kalyani Publishers, Ludhiana, New Delhi.

2-MECHANICS

Unit-I

Moment of a force about a point and an axis, couple and couple moment, Moment of a couple about a line, resultant of a force system, distributed force system, free body diagram, free body involving interior sections, general equations of equilibrium, two point equivalent loading, problems arising from structures, static indeterminacy.

Unit-II

Laws of Coulomb friction, application to simple and complex surface contact friction problems, transmission of power through belts, screw jack, wedge, first moment of an area and the centroid, other centers, Theorem of Pappus-Guldinus, second moments and the product of area of a plane area, transfer theorems, relation between second moments and products of area, polar moment of area, principal axes.

Unit-III

Conservative force field, conservation for mechanical energy, work energy equation, kinetic energy and work kinetic energy expression based on center of mass, moment of momentum equation for a single particle and a system of particles.

Unit-IV

Translation and rotation of rigid bodies, Chasles theorem, general relationship between time derivatives of a vector for different references, relationship between velocities of a particle for different references, acceleration of particle for different references.

Book Recommended:

1. I.H. Shames and G. Krishna Mohan Rao, Engineering Mechanics: Statics and Dynamics, (4th Ed.), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2009. Chapters:3, 4, 5, 6(6.1-6.7), 7, 11, 12(12.5, 12.6), 13.

Books for Reference:

1. R.C. Hibbeler and Ashok Gupta, Engineering Mechanics: Statics and Dynamics, 11th Ed., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi.
2. Grant R Fowles, Analytical Mechanics, Cengage Learning India Pvt. Ltd.

3-MATHEMATICAL FINANCE

Unit-I

Basic principles: Comparison, arbitrage and risk aversion, Interest (simple and compound, discrete and continuous), time value of money, inflation, net present value, internal rate of return (calculation by bisection and Newton-Raphson methods), comparison of NPV and IRR. Bonds, bond prices and yields, Macaulay and modified duration, term structure of interest rates: spot and forward rates, explanations of term structure, running present value, floating-rate bonds, immunization, convexity, puttable and callable bonds.

Unit-II

Asset return, short selling, portfolio return, (brief introduction to expectation, variance, covariance

and correlation), random returns, portfolio mean return and variance, diversification, portfolio diagram, feasible set, Markowitz model (review of Lagrange multipliers for 1 and 2 constraints), Two fund theorem, risk free assets, One fund theorem, capital market line, Sharpe index. Capital Asset Pricing Model (CAPM), betas of stocks and portfolios, security market line, use of CAPM in investment analysis and as a pricing formula, Jensens index.

Unit-III

Forwards and futures, marking to market, value of a forward/futures contract, replicating portfolios, futures on assets with known income or dividend yield, currency futures, hedging (short, long, cross, rolling), optimal hedge ratio, hedging with stock index futures, interest rate futures, swaps.

Unit-IV

Lognormal distribution, Lognormal model / Geometric Brownian Motion for stock prices, Binomial Tree model for stock prices, parameter estimation, comparison of the models. Options, Types of options: put / call, European / American, pay off of an option, factors affecting option prices, put call parity.

Books Recommended:

1. David G. Luenberger, Investment Science, Oxford University Press, Delhi, 1998. Chapters:1, 2, 3, 4, 6, 7, 8(8.5-8.8), 10(except 10.11, 10.12), 11(except 11.2 11.8).
2. John C. Hull, Options, Futures and Other Derivatives (6th Edition), Prentice-Hall India, Indian reprint, 2006. Chapters: 3, 5, 6, 7(except 7.10, 7.11), 8, 9.
3. Sheldon Ross, An Elementary Introduction to Mathematical Finance (2nd Edition), Cambridge University Press, USA, 2003. Chapter:3

Books for References:

1. R.C. Hibbeler and Ashok Gupta, Engineering Mechanics: Statics and Dynamics, 11th Ed., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi.
2. Grant R Fowles, Analytical Mechanics, Cengage Learning India Pvt. Ltd.

4-RING THEORY & LINEAR ALGEBRA-II

Unit-I

Polynomial rings over commutative rings, division algorithm and consequences, principal ideal domains, factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, unique factorization in $\mathbb{Z}[x]$.

Unit-II

Divisibility in integral domains, irreducibles, primes, unique factorization domains, Euclidean domains.

Unit-III

Dual spaces, dual basis, double dual, transpose of a linear transformation and its matrix in the

dual basis, annihilators, Eigenspaces of a linear operator, diagonalizability, invariant subspaces and Cayley-Hamilton theorem, the minimal polynomial for a linear operator.

Unit-IV

Inner product spaces and norms, Gram-Schmidt orthogonalisation process, orthogonal complements, Bessels inequality, the adjoint of a linear operator, Least Squares Approximation, minimal solutions to systems of linear equations, Normal and self-adjoint operators, Orthogonal projections and Spectral theorem.

Books Recommended:

1. Joseph A. Gallian: Contemporary Abstract Algebra (4th Ed.), Narosa Publishing House, 1999. Chapters: 16, 17, 18.
2. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence: Linear Algebra (4th Edition), Prentice-Hall of India Pvt. Ltd., New Delhi, 2004. Chapters: 2(2.6 only), 5(5.1, 5.2, 5.4), 6(6.1, 6.4, 6.6), 7(7.3 only).

Books for Reference:

(For LINEAR ALGEBRA)

1. S Lang: Introduction to Linear Algebra (2nd edition), Springer, 2005
2. Gilbert Strang: Linear Algebra and its Applications, Thomson, 2007
3. S. Kumaresan: Linear Algebra- A Geometric Approach, Prentice Hall of India, 1999.
4. Kenneth Hoffman, Ray Alden Kunze: Linear Algebra 2nd Ed., Prentice-Hall Of India Pvt. Limited, 1971.

(For RING THEORY)

1. John B. Fraleigh: A first course in Abstract Algebra, 7th Edition, Pearson Education India, 2003.
2. Herstein: Topics in Algebra (2nd edition), John Wiley & Sons, 2006
3. Michael Artin: Algebra (2nd edition), Pearson Prentice Hall, 2011
4. Robinson, Derek John Scott.: An introduction to abstract algebra, Hindustan book agency, 2010.

DSE-4

PROJECT WORK/DISSERTATION (Compulsory)

Total Marks:100-(Project:75 Marks+Viva-Voce:25 Marks)

SKILL ENHANCEMENT COURSES (SEC)

(Credit: 2 each, Total Marks:50)

SEC-1 to SEC-4

SEC-1

COMMUNICATIVE ENGLISH & WRITING SKILL (Compulsory)

SEC-2

(Any one of the following)

1-COMPUTER GRAPHICS

Development of computer Graphics: Raster Scan and Random Scan graphics storages, displays processors and character generators, colour display techniques, interactive input/output devices. Points, lines and curves: Scan conversion, line-drawing algorithms, circle and ellipse generation, conic-section generation, polygon filling anti aliasing. Two-dimensional viewing: Coordinate systems, linear transformations, line and polygon clipping algorithms.

Books Recommended:

1. D. Hearn and M.P. Baker-Computer Graphics, 2nd Ed., PrenticeHall of India, 2004.
2. J.D. Foley, A van Dam, S.K. Feiner and J.F. Hughes-Computer Graphics: Principals and Practices, 2nd Ed., Addison-Wesley, MA, 1990.
3. D.F. Rogers-Procedural Elements in Computer Graphics, 2nd Ed., McGraw Hill Book Company, 2001.
4. D.F. Rogers and A.J. Admas-Mathematical Elements in Computer Graphics, 2nd Ed., McGraw Hill Book Company, 1990.

2-LOGIC & SETS

Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations. Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set. Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation, Partial ordering relations, nary relations.

Books Recommended:

1. 1. R.P. Grimaldi-Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998.
2. P.R. Halmos-Naive Set Theory, Springer, 1974.
3. E. Kamke-Theory of Sets, Dover Publishers, 1950.

3-COMBINATORIAL MATHEMATICS

Basic counting principles, Permutations and Combinations (with and without repetitions), Binomial theorem, Multinomial theorem, Counting subsets, Set-partitions, Stirling numbers Principle of Inclusion and Exclusion, Derangements, Inversion formulae Generating functions: Algebra of formal power series, Generating function models, Calculating generating functions, Exponential generating functions. Recurrence relations: Recurrence relation models, Divide and conquer relations, Solution of recurrence relations, Solutions by generating functions. Integer partitions, Systems of distinct representatives.

Books Recommended:

1. J.H. van Lint and R.M. Wilson-A Course in Combinatorics, 2nd Ed., Cambridge University Press, 2001.
2. V. Krishnamurthy-Combinatorics, Theory and Application, Affiliated East-West Press 1985.
3. P.J. Cameron-Combinatorics, Topics, Techniques, Algorithms, Cambridge University Press, 1995.
4. M. Jr. Hall-Combinatorial Theory, 2nd Ed., John Wiley & Sons, 1986.
5. S.S. Sane-Combinatorial Techniques, Hindustan Book Agency, 2013.
6. R.A. Brualdi-Introductory Combinatorics, 5th Ed., Pearson Education Inc., 2009.

4-INFORMATION SECURITY

Overview of Security: Protection versus security; aspects of security data integrity, data availability, privacy; security problems, user authentication, Orange Book. Security Threats: Program threats, worms, viruses, Trojan horse, trap door, stack and buffer over flow; system threats- intruders; communication threats- tapping and piracy. Security Mechanisms: Intrusion detection, auditing and logging, tripwire, system-call monitoring.

Books Recommended:

1. C. Pfleeger and S.L. Pfleeger-Security in Computing , 3rd Ed., Prentice-Hall of India, 2007.
2. D. Gollmann-Computer Security, John Wiley and Sons, NY, 2002.
3. J. Piwprzyk, T. Hardjono and J. Seberry-Fundamentals of Computer Security, Springer- Verlag Berlin, 2003.

4. J.M. Kizza-Computer Network Security, Springer, 2007.
5. M. Merkow and J. Breithaupt-Information Security: Principles and Practices, Pearson Education, 2006.

GENERIC ELECTIVES(Interdisciplinary)
(04 Papers, 02 papers each from two Allied disciplines)
(Credit: 06 each, Marks:100)
GE-1 to GE-4

**GE-1 : CALCULUS & ORDINARY DIFFERENTIAL
EQUATIONS**

Total Marks:100-(Theory: 80 Marks+Mid-Sem: 20 Marks)

Unit-I

Curvature, Asymptotes, Tracing of Curves (Cartenary, Cycloid, Folium of Descartes), Rectification, Quadrature, Elementary ideas about Sphere, Cones, Cylinders and Conicoids.

Unit-II

Review of limits, continuity and differentiability of functions of one variables and their properties, Limit and Continuity of functions of several variables, Partial derivatives, Partial derivatives of higher orders, Homogeneous functions, Change of variables, Mean value theorem, Taylors theorem and Maclaurins theorem for functions of two variables(statements & applications).

Unit-III

Maxima and Minima of functions of two and three variables, Implicit functions, Lagranges multipliers (Formulae & its applications), Concepts of Multiple integrals & its applications.

Unit-IV

Ordinary Differential Equations of order one and degree one (variables separable, homogeneous, exact and linear). Equations of order one but higher degree. Second order linear equations with constant coefficients, homogeneous forms, Second order equations with variable coefficients, Variation of parameters.

Books Recommended:

1. S.K. Sengar and S.P. Singh: Advanced Calculus, Cengage Learning India Pvt. Ltd.(6th Indian Reprint), Chapters: 1(1.11-1.14 restricted), 2(2.1-2.13 restricted), 4(4.1-4.11), 5, 7(7.1-7.3 restricted), 11(restricted).
2. Shantinayakan: Text Book of Calculus, Part-II, S. Chand and Co., Chapter-8 (Art. 24, 25, 26)
3. Shantinayakan: Text Book of Calculus, Part-III, S. Chand and Co., Chapter-1 (Art 1,2), 3, 4(Art. 10 to 12 ommitting Simpsons Rule), 5(Art-13) and 6(Art-15).
4. B.P. Acharya and D.C. Sahu: Analytical Geometry of Quadratic Surfaces, Kalyani Publishers, New Delhi, Ludhiana.

5. J. Sinharoy and S. Padhy: A Course of Ordinary and Partial Differential Equations, Kalyani Publishers. Chapters: 2(2.1 to 2.7), 3, 4(4.1 to 4.7), 5.

Books for Reference:

1. Shanti Narayan and P.K. Mittal: Analytical Solid Geometry, S. Chand & Company Pvt. Ltd., New Delhi.
2. David V. Weider: Advanced Calculus, Dover Publications.
3. Martin Braun: Differential Equations and their Applications-Martin Braun, Springer International.
4. M.D. Raisinghania: Advanced Differential Equations, S. Chand & Company Ltd., New Delhi.
5. G. Dennis Zill: A First Course in Differential Equations with Modelling Applications, Cengage Learning India Pvt. Ltd.

GE-2: LINEAR ALGEBRA, ABSTRACT ALGEBRA & NUMERICAL ANALYSIS

Total Marks:100-(Theory: 80 Marks+Mid-Sem: 20 Marks)

Unit-I

Vector space, Subspace, Span of a set, Linear dependence and Independence, Dimensions and Basis. Linear transformations, Range, Kernel, Rank, Nullity, Inverse of a linear map, Rank-Nullity theorem.

Unit-II

Matrices and linear maps, Rank and Nullity of a matrix, Transpose of a matrix, Types of matrices. Elementary row operations, System of linear equations, Matrix inversion using row operations, Determinant and Rank of matrices, Eigen values, Eigen vectors.

Unit-III

Group Theory: Definition and examples, Subgroups, Normal subgroups, Cyclic groups, Cosets, Quotient groups, Permutation groups, Homomorphism. Elementary ideas about Rings, Field (definitions, statements, and examples only).

Unit-IV

Convergence, Errors: Relative, Absolute, Round off, Truncation. Transcendental and Polynomial equations: Bisection method, Newtons method, Secant method. Rate of convergence of these methods. System of linear algebraic equations: Gaussian Elimination and Gauss Jordan methods. Interpolation: Lagrange and Newtons methods. Error bounds. Finite difference operators. Gregory forward and backward difference interpolation (statements, definitions and uses/examples only).

Books Recommended:

1. V. Krishnamurty, V. P. Mainra, J. L. Arora: An introduction to Linear Algebra, Affiliated East-West Press Pvt. Ltd., New Delhi, Chapters: 3, 4(4.1 to 4.7), 5(except 5.3), 6(6.1, 6.2, 6.5, 6.6, 6.8), 7(7.4 only).

2. I.N. Herstein: Topics in Algebra, Wiley Eastern Pvt. Ltd. Chapters: 2(2.1-2.7), 3(3.1, 3.2).
3. B.P. Acharya and R.N. Das: A Course on Numerical Analysis, Kalyani Publishers, New Delhi, Ludhiana. Chapters: 1, 2(2.1 to 2.4, 2.6, 2.8, 2.9), 3(3.1 to 3.4), 4(4.1, 4.2), 5(5.1- 5.3), 6(6.1-6.3, 6.10, 6.11).

Books for References:

1. I.H. Seth: Abstract Algebra, Prentice Hall of India Pvt. Ltd., New Delhi.
2. S. Kumaresan: Linear Algebra, A Geometric Approach, Prentice Hall of India.
3. Rao and Bhimasankaran: Linear Algebra, Hindustan Publishing House.
4. S. Singh: Linear Algebra, Vikas Publishing House Pvt. Ltd., New Delhi.
5. Gilbert Strang: Linear Algebra & its Applications, Cengage Learning India Pvt. Ltd.
6. Gallian: Contemporary Abstract Algebra, Narosa publishing House.
7. Artin: Algebra, Prentice Hall of India.
8. V.K. Khanna and S.K. Bhambri: A Course in Abstract Algebra, Vikas Publishing House Pvt. Ltd., New Delhi.

MATHEMATICS(PASS)

C-1A: CALCULUS & ANALYTICAL GEOMETRY

(Credit: 06, Marks:100)

Theory:80 Marks+Mid-Sem:20 Marks

5 Lectures, 1 Tutorial (per week).

Unit-I

Limit and Continuity (and definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitzs theorem, Partial differentiation, Eulers theorem on homogeneous functions.

Unit-II

Tangents and normals, Curvature, Asymptotes, Singular points, Tracing of curves. Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates.

Unit-III

Rolles theorem, Mean Value theorems, Taylors theorem with Lagranges and Cauchys forms of remainder, Taylors series, Maclaurins series of $\sin x$, $\cos x$, e^x , $\log(1+x)$, $(1+x)^m$, Maxima and Minima, Indeterminate forms.

Unit-IV

Sphere, Cones and Cylinders, Conicoid.

Books Recommended:

1. Shantinaraayan-Text Book of Calculus, Part-II, S. Chand and Co., Chapter-8 (Art. 24, 25, 26)
2. Shantinaraayan-Text Book of Calculus, Part-III, S. Chand and Co., Chapter-1 (Art 1,2), 3, 4(Art. 10 to 12 ommitting Simpsons Rule), 5(Art-13) and 6(Art-15).
3. B.P. Acharya and D.C. Sahu-Analytical Geometry of Quadratic Surfaces, Kalyani Publishers, New Delhi, Ludhiana. Chapters: 2, 4, 5, 6, 7, 11, 12, 13.
4. S.C. Mallik and S. Arora-Mathematical Analysis, New Age International Ltd., New Delhi.

Books for References:

1. Santosh K. Sengar-Advanced Calculus, Cinegaga India Publications.
2. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.
3. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.

C-1B: DIFFERENTIAL EQUATIONS
(Credit: 06, Marks:100)
Theory:80 Marks+Mid-Sem:20 Marks
5 Lectures, 1 Tutorial (per week per student).

Unit-I

First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x , y , p . Methods for solving higher-order differential equations. Basic theory of linear differential equations, Wronskian, and its properties. Solving a differential equation by reducing its order.

Unit-II

Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations.

Unit-III

Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagranges method, Charpits method.

Unit-IV

Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.

Book Recommended:

J.Sinha Roy and S. Padhy, A Course on Ordinary and Partial Differential Equations, Kalyani Publishers, New Delhi, Ludhiana, 2012.

Chapters:1, 2(2.1 to 2.7), 3, 4(4.1 to 4.7), 5, 11, 12, 13(13.1-13.5).

Books for References:

1. Martin Braun, Differential Equations and their Applications, Springer International.
2. M.D. Raisinghania-Advanced Differential Equations, S. Chand & Company Ltd., New Delhi.
3. G. Dennis Zill-A First Course in Differential Equations with Modelling Applications, Cengage Learning India Pvt. Ltd.
4. S.L. Ross, Differential Equations, John Wiley & Sons, India, 2004.
5. M.D. Raisinghania-Ordinary and Partial Differential Equations, S. Chand & Company Ltd., New Delhi.

C-1C: REAL ANALYSIS
(Credit: 06, Marks:100)
Theory:80 Marks+Mid-Sem:20 Marks
(5 Lectures, 1 Tutorial (per week per student)).

Unit-I

Finite and infinite sets, examples of countable and uncountable sets. Real line, bounded sets, suprema and infima, completeness property of \mathbb{R} , Archimedean property of \mathbb{R} , intervals. Concept of cluster points and statement of Bolzano-Weierstrass theorem.

Unit-II

theorem on limits, order preservation and squeeze theorem, monotone sequences and their convergence (monotone convergence theorem without proof).

Unit-III

Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series, Leibnitz test (Tests of Convergence without proof). Definition and examples of absolute and conditional convergence.

Unit-IV

Sequences and series of functions, Pointwise and uniform convergence. Mn-test, M-test, Statements of the results about uniform convergence, differentiability and integrability of functions, Power series and radius of convergence.

Book Recommended:

G. Das and S. Pattanayak-Fundamentals of Mathematics Analysis, TMH Pub-lishing Co. ,Chapters: 2(2.1 to 2.4, 2.5 to 2.7), 3(3.2, 3.3, except proofs of Thm 2 Thm 3, 3.4), 4(4.1 to 4.7, 4.10, 4.11), 5, 6(6.1 to 6.7, 6.9), 7(7.1 to 7.4, 7.6), 8(8.1-8.6), 9(9.1-9.7).

Books for References:

1. S.C. Mallik and S. Arora-Mathematical Analysis, New Age International Publications.
2. D. Smasundaram and B. Choudhury-A First Course in Mathematical Analysis, Narosa Publishing House.
3. R.G. Bartle and D.R. Sherbert, Introduction to Real Analysis, John Wiley & sons, Inc.
4. S.L. Gupta and Nisha Rani-Real Analysis, Vikas Publishing House Pvt. Ltd., New Delhi.

C-1D: ALGEBRA (Credit: 06, Marks:100)

Theory:80 Marks+Mid-Sem:20 Marks
5 Lectures, 1 Tutorial (per week per student).

Unit-I

Equivalence relations, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set, Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.

Unit-II

Definition and examples of groups, examples of abelian and non-abelian groups, the group \mathbb{Z}_n of

integers under addition modulo n and the group $U(n)$ of units under multiplication modulo n . Cyclic groups from number systems, complex roots of unity, circle group, the general linear group $GL_n(n, R)$, groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square, the permutation group $Sym(n)$, Group of quaternions.

Unit-III

Subgroups, cyclic subgroups, the concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group. Cosets, Index of subgroup, Lagrange's theorem, order of an element, Normal subgroups: their definition, examples, and characterizations, Quotient groups.

Unit-IV

Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, Z_n the ring of integers modulo n , ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions. Subrings and ideals, Integral domains and fields, examples of fields: Z_p , Q , R , and C . Field of rational functions.

Books Recommended:

1. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005. Chapters: 2(2.4), 3, 4(4.1-4.1.6, 4.2-4.2.11, 4.4(4.1-4.4.8), 4.3-4.3.9, 5(5.1-5.1.4).
2. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
3. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
4. Joseph A. Gallian, Contemporary Abstract Algebra(4th Edn.), Narosa Publishing House, New Delhi.

DISCIPLINE SPECIFIC ELECTIVE COURSES(DSE)

(Credit:06 each, Marks: 100)

Theory:80 Marks+Mid-Sem.:20 Marks

5 Lectures, 1 Tutorial (per week per student)

DSE-A (Any one of the following)

1. LINEAR ALGEBRA

Unit-I

Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.

Unit-II

Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations.

Unit-III

Dual Space, Dual Basis, Double Dual, Eigen values and Eigen vectors, Characteristic Polynomial.

Unit-IV

Isomorphisms, Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.

Book Recommended:

1. V. Krishnamurty, V. P. Mainra, J. L. Arora-An introduction to Linear Algebra, Affiliated East-West Press Pvt. Ltd., New Delhi.
2. Gilbert Strang-Linear Algebra & its Applications, Cengage Learning India Pvt. Ltd.

Books for References:

1. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, 4th Ed., Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
3. S. Lang, Introduction to Linear Algebra, 2nd Ed., Springer, 2005.

2. MECHANICS

Unit-I

Conditions of equilibrium of a particle and of coplanar forces acting on a rigid Body, Laws of friction.

Unit-II

Problems of equilibrium under forces including friction, Centre of gravity, Work and potential energy.

Unit-III

Velocity and acceleration of a particle along a curve: radial and transverse components (plane curve), tangential and normal components (space curve).

Unit-IV

Newtons Laws of motion, Simple harmonic motion, Simple Pendulum, Projectile Motion.

Books Recommended:

1. A.S. Ramsay, Statics, CBS Publishers and Distributors (Indian Reprint), 1998.
2. A.P. Roberts, Statics and Dynamics with Background in Mathematics, Cambridge University Press, 2003.

Books for References:

1. J. L. Synge and Griffith-Mechanics, Mc Graw Hill.
2. Grant R Fowles-Analytical Mechanics, Cengage Learning India Pvt. Ltd..

3. MATRICES

Unit-I

\mathbb{R} , \mathbb{R}^2 , \mathbb{R}^3 as vector spaces over \mathbb{R} . Standard basis for each of them. Concept of Linear Independence and examples of different bases. Subspaces of \mathbb{R}^2 , \mathbb{R}^3 .

Unit-II

Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigen values and eigen vectors for such transformations and eigen spaces as invariant subspaces.

Unit-III

Types of matrices. Rank of a matrix. Invariance of rank under elementary transformations. Reduction to normal form, Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns upto four.

Unit-IV

Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix. Solutions of a system of linear equations using matrices. Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.

Books Recommended:

1. S. H. Friedberg, A. L. Insel and L. E. Spence, Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
2. Richard Bronson, Theory and Problems of Matrix Operations, Tata McGraw Hill, 1989.

3. A.I. Kostrikin, Introduction to Algebra, Springer Verlag, 1984.

DSE-B (Any one of the following)

1. NUMERICAL METHODS

Unit-I

Algorithms, Convergence, Errors: Relative, Absolute, Round off, Truncation. Transcendental and Poly- nomial equations: Bisection method, Newtons method, Secant method. Rate of convergence of these methods.

Unit-II

System of linear algebraic equations: Gaussian Elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis.

Unit-III

Interpolation: Lagrange and Newtons methods. Error bounds. Finite difference operators. Gregory forward and backward difference interpolation.

Unit-IV

Numerical Integration: Trapezoidal rule, Simpsons rule, Simpsons 3/8th rule, Booles Rule. Midpoint rule, Composite Trapezoidal rule, Composite Simpsons rule. Ordinary Differential Equations: Eulers method. Runge-Kutta methods of orders two and four.

Books Recommended:

1. B.P. Acharya and R.N. Das-A Course on Numerical Analysis, Kalyani Publishers, New Delhi, Ludhiana. Chapters: 1, 2(2.1 to 2.4, 2.6, 2.8, 2.9), 3(3.1 to 3.4, 3.6 to 3.8, 3.10), 4(4.1, 4.2), 5(5.1, 5.2, 5.3), 6(6.1, 6.2, 6.3, 6.10, 6.11), 7(7.1, 7.2, 7.3, 7.4 &7.7).
2. Brian Bradie-A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.

Books for References:

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 6th Ed., New age International Publisher, India, 2007.
2. C.F. Gerald and P.O. Wheatley, Applied Numerical Analysis, Pearson Education, India, 2008.
3. Uri M. Ascher and Chen Greif, A First Course in Numerical Methods, 7th Ed., PHI Learning Private Limited, 2013.
4. John H. Mathews and Kurtis D. Fink, Numerical Methods using Matlab, 4th Ed., PHI Learning Private Limited, 2012.

2. LINEAR PROGRAMMING

Unit-I

Introduction to linear programming problem, Theory of simplex method, optimality and unbound- edness, the simplex algorithm, simplex method in tableau format, introduction to arti

cial variables, twophase method, BigM method and their comparison.

Unit-II

Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual.

Unit-III

Transportation problem and its mathematical formulation, northwestcorner method least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.

Unit-IV

Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.

Recommended Books:

1. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network Flows, 2nd Ed., John Wiley and Sons, India, 2004. Chapters:3(3.2-3.3, 3.5-3.8), 4(4.1-4.4), 6(6.1-6.3).
2. F.S. Hillier and G.J. Lieberman, Introduction to Operations Research, 9th Ed., Tata McGraw Hill, Singapore, 2009. Chapter:14
3. Hamdy A. Taha, Operations Research, An Introduction, 8th Ed., PrenticeHall India, 2006. Chapter:5(5.1, 5.3, 5.4).

Books for Reference:

1. G. Hadley, Linear Programming, Narosa Publishing House, New Delhi, 2002.
2. Kanti Swarup, P.K. Gupta and Man Mohan-Operations Research, S. Chand and Co. Pvt. Ltd.
3. N.V.R. Naidu, G. Rajendra and T. Krishna Rao-Operations Research, I.K. International Publishing House Pvt. Ltd., New Delhi, Bangalore.
4. R. Veerachamy and V. Ravi Kumar-Operations Research- I.K. International Publishing House Pvt. Ltd., New Delhi, Bangalore.
5. P.K. Gupta and D.S. Hira-Operations Research, S. Chand and Company Pvt. Ltd., New Delhi.

3. COMPLEX ANALYSIS

Unit-I

Limits, Limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability.

Unit-II

Analytic functions, examples of analytic functions, exponential function, Logarithmic function, trigonometric function, derivatives of functions, definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy- Goursat theorem, Cauchy integral formula.

Unit-III

Liouville's theorem and the fundamental theorem of algebra. Convergence of sequences and series, Taylor series and its examples. Laurent series and its examples, absolute and uniform convergence of power series.

Unit-IV

Singularities, Classification of singularities, Laurent series expansion around a singular point, Residues and Residue theorem, Evaluation of real integrals using calculus of residues.

Books Recommended:

S. Arumgam, A. Thangapandi Issac and A. Somasundaram-Complex Analysis, SCITECH Publications(India) Pvt. Ltd., Chapters: 1, 2(except 2.8 & 2.9), 4, 6, 7, 8. **Books for References:**

1. S. Ponnusamy-Foundations of Complex Analysis, Alpha Science International Ltd.
2. J.W. Brown and R.V. Churchill-Complex Variables & Applications, McGraw-Hill Publications.
3. J.B. Conway-Functions of one complex variable, Springer.
4. R.V. Churchill and J.W. Brown-Complex Variables and Applications, McGraw Hill Publications.
5. N. Das- Complex Function Theory, Allied Publishers Pvt. Ltd., Mumbai.

Skill Enhancement Courses(SEC)
(Credit:02 each, Marks: 50
Theory:40 Marks+Mid-Sem.:10 Marks)

SEC-I
COMMUNICATIVE ENGLISH & WRITING SKILL (Compulsory)

SEC-II
(Any one of the following)

1. VECTOR CALCULUS

Differentiation and partial differentiation of a vector function. Derivative of sum, dot product and cross product of two vectors. Gradient, divergence and curl.

Books Recommended:

1. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
2. H. Anton, I. Bivens and S. Davis, Calculus, John Wiley and Sons (Asia) P. Ltd. 2002.
3. P.C. Matthews, Vector Calculus, Springer Verlag London Limited, 1998.

2. DISCRETE MATHEMATICS

Recurrence relations, Counting using recurrence relations, Solving linear homogeneous recurrence relations with constant coefficients, Generating functions, Solving recurrence relations using generating functions, Partially ordered sets, Hasse diagram of partially ordered sets, Lattices, Boolean algebra.

Graphs: Basic concepts and graph terminology, representing graphs and graph isomorphism. Distance in a graph, Cut-vertices and Cut-edges, Connectivity, Euler and Hamiltonian path.

Books Recommended:

Kenneth H. Rosen- Discrete Mathematics and Applications, Tata McGraw Hill Publications, Chapters: 1(1.1 to 1.5), 4(4.1, 4.2, 4.5), 6(6.1, 6.2, 6.5, 6.6), 7(7.1, 7.2), 8,10(10.1,10.2).

Books for References:

1. C.B. Gupta, S.R. Singh and S. Kumar-Advance Discrete Structure, I.K. International Publishing House Pvt. Ltd., New Delhi, Bangalore.
2. D.S. Malik-Discrete Mathematics: Theory& Applications, Cengage Learning India Pvt. Ltd.
3. Kevin Ferland-Discrete Mathematical Structures, Cengage Learning India Pvt. Ltd.

3. BOOLEAN ALGEBRA

Definition, examples and basic properties of ordered sets, maps between ordered sets, duality principle, maximal and minimal elements, lattices as ordered sets, complete lattices, lattices as algebraic structures, sublattices, products and homomorphisms.

Definition, examples and properties of modular and distributive lattices, Boolean algebras, Boolean polynomials, minimal forms of Boolean polynomials, Quinn-McCluskey method, Karnaugh diagrams, switching circuits and applications of switching circuits.

Books Recommended:

1. B A. Davey and H. A. Priestley, Introduction to Lattices and Order, Cambridge University Press, Cambridge, 1990.
2. Rudolf Lidl and Gnter Pilz, Applied Abstract Algebra, 2nd Ed., Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004.

SEC-III

(Any one of the following)

1. PROBABILITY & STATISTICS

Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, continuous distributions: uniform, normal, exponential.

Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables.

Books Recommended:

1. Sheldon Ross, Introduction to Probability Model, 9th Ed., Academic Press, Indian Reprint, 2007.
2. Robert V. Hogg, Joseph W. McKean and Allen T. Craig, Introduction to Mathematical Statistics, Pearson Education, Asia, 2007.
3. Irwin Miller and Marylees Miller, John E. Freund, Mathematical Statistics with Application, 7th Ed., Pearson Education, Asia, 2006.

2. MATHEMATICAL MODELLING

Simple situations requiring Mathematical modelling. The technique of Mathematical modelling, Mathematical modelling through differential equations, linear growth and decay models, non-linear growth and decay models, compartment models, Mathematical modelling of geometrical problems through ordinary differential equations of first order.

Mathematical modelling in population dynamics, Mathematical modelling of epidemics through systems of ordinary differential equations of first order, compartment models through systems of ordinary differential equations, Mathematical modelling in economics through systems of ordinary differential equations of first order, Mathematical models in medicine, arms race, battles and international trade in terms of systems of ordinary differential equations, Mathematical modelling of planetary motions, Mathematical modelling of circular motion and motion of satellites, mathematical modelling through linear differential equations of second order.

Situation giving rise to partial differential equations models, mass balance equations: First method of getting PDE models, momentum balance equations. The second method of obtaining partial differential models, variational principles, third function, fourth method of obtaining partial differential equation models, models for traffic flow of a highway. Situation that can be modelled through graphs, mathematical models in terms of directed graphs, optimization principles and techniques, Mathematical modelling through calculus of variations.

Book Recommended: J.N. Kapur-Mathematical Modelling, Chapters: 1(1.1 and 1.2), 2(2.1 to 2.4, 2.6), 3(3.1 to 3.5), 4(4.1 to 4.3), 6(6.1 to 6.6), 7(7.1 to 7.2), 9(9.1 and 9.2).

3. FINANCIAL MATHEMATICS

Introduction: A simple market model, Risk free assets (time value of money, money market), Risky assets (Dynamics of stock price, Binomial free model), Discrete time model markets, Portfolio management (Risk, two or more securities, Capital assets pricing models).

Forward and future contracts, Options (General properties), Option pricing, Financial engineering (Heading Option Position).

Books Recommended: Marek Capinski and Tomasz Zastawnian-Mathematics for Finance, Springer, 2004.

Books for References

1. John C. Hull, Options, Futures and Other Derivatives, 6th Ed., Prentice-Hall India, Indian reprint, 2006.
2. Sheldon Ross, An Elementary Introduction to Mathematical Finance, 2nd Ed., Cambridge University Press, USA, 2003.

SEC-IV

(Any one of the following)

1. LOGIC & SETS

Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.

Sets, subsets, Set operations, the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set.

Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation.

Books Recommended:

1. R.P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998.
2. P.R. Halmos, Naive Set Theory, Springer, 1974.
3. E. Kamke, Theory of Sets, Dover Publishers, 1950.

2. TRANSPORTATION & GAME THEORY

Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.

Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure.

Books Recommended:

1. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network Flows, 2nd Ed., John Wiley and Sons, India, 2004.
2. F. S. Hillier and G. J. Lieberman, Introduction to Operations Research, 9th Ed., Tata McGraw Hill, Singapore, 2009.
3. Hamdy A. Taha, Operations Research, An Introduction, 8th Ed., PrenticeHall India, 2006.

3. NUMBER THEORY

Divisibility theorem in integers, Primes and their distributions, Fundamental theorem of arithmetic, Greatest common divisor, Euclidean algorithms, Modular arithmetic, Solutions of Linear Diophantine

equations.

Introduction to congruences, Linear Congruences, Chinese Remainder theorem, Polynomial congruences, System of linear congruences, Number theoretic functions(Eulers phi function, Multiplicative functions, Divisor functions, Sum of divisor functions, Mobius mu functions etc.).

Fermats little theorem, Wilsons theorem, Euler's generalisation of Fermat's theorem, Primitive roots and indices, Quadratic residues, Legendre and Jacobi symbol.

Book Recommended:

D.M. Burton-Elementary Number Theory, McGraw Hill, Chapters: 2(2.1 to 2.4), 3(3.1 to 3.3), 4(4.1 to 4.4), 5(5.1 to 5.4), 6(6.1 to 6.3), 7(7.1 to 7.3), 8(8.1 to 8.2), 9(9.1 to 9.3). **Books for**

References:

1. K.H. Rosen-Elementary Number Theory & its Applications, Pearson Addition Wesley.
2. I. Niven and H.S. Zuckerman-An Introduction to Theory of Numbers, Wiley Eastern Pvt. Ltd.
3. Tom M. Apostol-Introduction to Analytic Number Theory, Springer International Student Edn.

PHYSICS(HONOURS)

SEMESTER-I

C-I: MATHEMATICAL PHYSICS-I

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

The emphasis of course is on applications in solving problems of interest to physicists. The students are to be examined entirely on the basis of problems, seen and unseen.

UNIT-I

Calculus: Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials, Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers. (4 Lectures)

Vector Calculus: Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields. (5 Lectures)

UNIT-II

Orthogonal Curvilinear Coordinates: Orthogonal Curvilinear Coordinates, Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems. Comparison of velocity and acceleration in cylindrical and spherical coordinate system. (7 Lectures)

Dirac Delta function and its properties: Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function. (3 Lectures)

UNIT-III

Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities, Gradient, divergence, curl and Laplacian in spherical and cylindrical coordinates. (8 Lectures)

UNIT-IV

Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proofs). (13 Lectures)

Reference Books:

1. Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris, 2013, 7th Edn., Elsevier.
2. An introduction to ordinary differential equations, E.A. Coddington, 2009, PHI learning.

3. Differential Equations, George F. Simmons, 2007, McGraw Hill.
4. Mathematical Tools for Physics, James Nearing, 2010, Dover Publications.
5. Mathematical methods for Scientists and Engineers, D.A. McQuarrie, 2003, Viva Book
6. Advanced Engineering Mathematics, D.G. Zill and W.S. Wright, 5 Ed., 2012, Jones and Bartlett Learning
7. Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India.
8. Essential Mathematical Methods, K.F.Riley & M.P.Hobson, 2011, Cambridge Univ. Press
9. Mathematical Physics and Special Relativity-M. Das, P.K. Jena and B.K. Dash (Srikrishna Prakashan) 2nd Edition 2009
10. Mathematical Physics–H. K. Dass, Dr. Rama Verma (S. Chand Higher Academics), th Edition 2011.
11. Mathematical PhysicsC. Harper, (Prentice Hall India) 2006.
12. Mathematical Physics-Goswami (Cengage Learning) 2014
13. Mathematical Method for Physical Sciences- M. L. Boas (Wiley India) 2006

PHYSICS LAB-C:I

20 Classes (2 hrs. duration)

The aim of this Lab is not just to teach computer programming and numerical analysis but to emphasize its role in solving problems in Physics.

- Highlights the use of computational methods to solve physical problems.
- The course will consist of lectures (both theory and practical) in the Lab.
- Evaluation done not on the programming but on the basis of formulating the problem.
- Aim at teaching students to construct the computational problem to be solved.
- Students can use any one operating system Linux or Microsoft Windows.

Topics	Description with Applications
Introduction and Overview	Computer architecture and organization, memory and Input/output devices.
Basics of scientific computing	Binary and decimal arithmetic, Floating point numbers, algorithms, Sequence, Selection and Repetition, single and double precision arithmetic, underflow & overflow emphasize the importance of making equations in terms of dimensionless variables, Iterative methods.
Errors and error Analysis	Truncation and round off errors, Absolute and relative errors, Floating point computations.
Review of C & C++ programming fundamentals	Introduction to Programming, constants, variables and data types, operators and Expressions, I/O statements, scanf and printf, c in and c out, Manipulators for data formatting, Control statements (decision making and looping statements) (If-statement. If-else Statement. Nested if Structure. Else-if Statement. Ternary Operator.
	Goto Statement. Switch Statement. Unconditional and Conditional Looping. While Loop. Do-While Loop. FOR Loop. Break and Continue Statements. Nested Loops), Arrays (1D & 2D) and strings, user defined functions, Structures and Unions, Idea of classes and objects.
Programs	Sum & average of a list of numbers, largest of a given list of numbers and its location in the list, sorting of numbers in ascending descending order, Binary search.
Random number generation	Area of circle, area of square, volume of sphere, value of π .

Referred Books:

1. Introduction to Numerical Analysis, S.S. Sastry, 5th Edn. , 2012, PHI Learning Pvt. Ltd.
2. Schaum's Outline of Programming with C++. J. Hubbard, 2000, McGraw-Hill Pub.
3. Numerical Recipes in C: The Art of Scientific Computing, W.H. Press et al, 3rd Edn. 2007, Cambridge University Press.
4. A first course in Numerical Methods, U.M. Ascher & C. Greif, 2012, PHI Learning.
5. Elementary Numerical Analysis, K.E. Atkinson, 3 rd Edn. , 2007 , Wiley India Edition.
6. Numerical Methods for Scientists & Engineers, R.W. Hamming, 1973, Courier Dover Pub.
7. An Introduction to computational Physics, T. Pang, 2nd Edn., 2006, Cambridge Univ. Press.

C-2: MECHANICS

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

UNIT-I

Rotational Dynamics: Centre of Mass and Laboratory frames. Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation. (9 Lectures)

Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. (3 Lectures)

UNIT-II

Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire. (3 Lectures)

Fluid Motion: Kinematics of Moving Fluids: Poiseuilles Equation for Flow of a Liquid through a Capillary Tube . (3 Lectures)

Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (5 Lectures)

UNIT-III

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3 Lectures)

Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Keplers Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effects on astronauts.(5 Lectures)

UNIT-IV

Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Energy-Momentum Four Vector. (9 Lectures)

Reference Books:

1. An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
2. Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. 2007, Tata McGraw-Hill.
3. Physics, Resnick, Halliday and Walker 8/e. 2008, Wiley.
4. Analytical Mechanics, G.R. Fowles and G.L. Cassiday. 2005, Cengage Learning.

5. Feynman Lectures, Vol. I, R.P.Feynman, R.B.Leighton, M.Sands, 2008, Pearson Education
6. Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.
7. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
(Additional Books for Reference)
8. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000
9. University Physics. F.W Sears, M.W Zemansky, H.D Young 13/e, 1986, Addison Wesley
10. Physics for scientists and Engineers with Modern Phys., J.W. Jewett, R.A.Serway, 2010, Cengage Learning
11. Theoretical Mechanics, M.R. Spiegel, 2006, Tata McGraw Hill.
12. Mechanics - J. C. Slater and N. H. Frank (McGraw-Hill)

PHYSICS LAB-C:II

20 Classes (2 hrs. duration)

1. To study the random error in observations.
2. To determine the height of a building using a Sextant.
3. To study the Motion of Spring and calculate (a) Spring constant, (b) g and (c) Modulus of rigidity.
4. To determine the Moment of Inertia of a Flywheel.
5. To determine g and velocity for a freely falling body using Digital Timing Technique
6. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuilles method).
7. To determine the Young's Modulus of a Wire by Optical Lever Method.
8. To determine the Modulus of Rigidity of a Wire by Maxwells needle. 9. To determine the elastic Constants of a wire by Searles method.
9. To determine the value of g using Bar Pendulum.
10. To determine the value of g using Katers Pendulum

Reference Books:

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, AsiaPublishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal

SEMESTER-II

C-3: ELECTRICITY AND MAGNETISM

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

UNIT-I

Electric Field and Electric Potential: Electric field: Electric field lines. Electric flux. Gauss Law with applications to charge distributions with spherical, cylindrical and planar symmetry. (3 Lectures)

Conservative nature of Electrostatic Field. Electrostatic Potential. Laplaces and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole. (3 Lectures)

Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. (4 Lectures)

UNIT-II

Magnetic Field: Magnetic force between current elements and definition of Magnetic Field B. Biot-Savarts Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Amperes Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field. Ballistic Galvanometer: Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping. CDR. (10 Lectures)

UNIT-III

Dielectric Properties of Matter: Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector D. Relations between E, P and D. Gauss Law in dielectrics. (4 Lecturers)

Magnetic Properties of Matter: Magnetization vector (M). Magnetic Intensity (H). Magnetic Susceptibility and permeability. Relation between B, H, M. Ferromagnetism. B-H curve and hysteresis. (4 Lecturers)

Electromagnetic Induction: Faradays Law. Lenzs Law. Self Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. (2 Lectures)

UNIT-IV

Electrical Circuits: AC Circuits: Kirchhoffs laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width,. Parallel LCR Circuit. (5 Lectures)

Network theorems: Ideal Constant-voltage and Constant-current Sources. Network Theorems:

Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Growth & decay of currents in RC, RL, and LCR Series circuits for DC. (5 Lectures)

Reference Books:

1. Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, 2012, Tata McGraw
2. Electricity and Magnetism, Edward M. Purcell, 1986 McGraw-Hill Education
3. Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings.
4. Feynman Lectures Vol.2, R.P.Feynman, R.B.Leighton, M. Sands, 2008, Pearson Education
5. Elements of Electromagnetics, M.N.O. Sadiku, 2010, Oxford University Press.
6. Electricity and Magnetism, J.H.Fewkes & J.Yarwood. Vol. I, 1991, Oxford Univ. Press.

PHYSICS LAB-C:III

20 Classes (2 hrs. duration)

1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d) Capacitances, and (e) Checking electrical fuses.
2. To study the characteristics of a series RC Circuit.
3. To determine an unknown Low Resistance using Potentiometer.
4. To determine an unknown Low Resistance using Carey Fosters Bridge.
5. To compare capacitances using DeSautys bridge.
6. Measurement of field strength B and its variation in a solenoid (determine dB/dx)
7. To verify the Thevenin and Norton theorems.
8. To verify the Superposition, and Maximum power transfer theorems.
9. To determine self inductance of a coil by Andersons bridge.
10. To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.
11. To study the response curve of a parallel LCR circuit and determine its (a) Antiresonant frequency and (b) Quality factor Q.
12. Measurement of charge and current sensitivity and CDR of Ballistic Galvanometer
13. Determine a high resistance by leakage method using Ballistic Galvanometer.
14. To determine self-inductance of a coil by Rayleighs method.

15. To determine the mutual inductance of two coils by Absolute method.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.

C-4: WAVES AND OPTICS

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

UNIT-I

Geometrical optics: Fermats principle, reflection and refraction at plane interface, Matrix formulation of geometrical Optics. Idea of dispersion. Application to thick lense, Ramsden and Huygens eyepiece.(5 Lecturers)

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. Division of amplitude and wavefront. Youngs double slit experiment. Lloyds Mirror and Fresnels Biprism. Phase change on reflection: Stokes treatment. (5 Lecturers)

UNIT-II

Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves. (5 Lectures)

Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. Superposition of N harmonic waves. (3 Lectures)

UNIT-III

Interference: Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newtons Rings: Measurement of wavelength and refractive index. (5 Lecturers)

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer. . (5 Lectures)

UNIT-IV

Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. (6 Lectures)

Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (6 Lectures)

Reference Books:

1. Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.
2. Fundamentals of Optics, F.A. Jenkins and H.E. White, 1981, McGraw-Hill
3. Principles of Optics, Max Born and Emil Wolf, 7th Edn., 1999, Pergamon Press.
4. Optics, Ajoy Ghatak, 2008, Tata McGraw Hill
5. The Physics of Vibrations and Waves, H. J. Pain, 2013, John Wiley and Sons.
6. The Physics of Waves and Oscillations, N.K. Bajaj, 1998, Tata McGraw Hill.
7. Optics - Brijlal & Subramaniam- (S. Chand Publication) 2014.
8. Geometrical and Physical Optics R.S. Longhurst, Orient Blackswan, 01-Jan-1986
9. Vibrations and Waves - A. P. French, (CBS) Indian print 2003
10. Optics, E. Hecht (Pearson India)

PHYSICS LAB-C:IV

20 Classes (2 hrs. duration)

1. To determine the frequency of an electric tuning fork by Melde's experiment and verify 2 T law.
2. To investigate the motion of coupled oscillators.
3. To study Lissajous Figures.
4. Familiarization with: Schuster's focusing; determination of angle of prism.
5. To determine refractive index of the Material of a prism using sodium source.
6. To determine the dispersive power and Cauchy constants of the material of a prism using mercury source.
7. To determine the wavelength of sodium source using Michelson's interferometer.
8. To determine wavelength of sodium light using Fresnel Biprism.
9. To determine wavelength of sodium light using Newton's Rings.
10. To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film.

11. To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.
12. To determine dispersive power and resolving power of a plane diffraction grating.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D.P. Khandelwal, 1985, Vani

SEMESTER-III

C-5: MATHEMATICAL PHYSICS-II

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

The emphasis of the course is on applications in solving problems of interest to physicists. Students are to be examined on the basis of problems, seen and unseen.

UNIT-I

Fourier series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series. Expansion of functions with arbitrary period. Expansion of non-periodic functions over an interval. Even and odd functions and their Fourier expansions. Application. Summing of Infinite Series. Term-by-Term differentiation and integration of Fourier series. Parseval Identity. (11 Lectures)

UNIT-II

Frobenius Method and Special Functions: Singular Points of Second Order Linear Differential Equations and their importance, Frobenius method and its applications to differential equations: Legendre & Hermite Differential Equations. Properties of Legendre & Hermite Polynomials: Rodrigues Formula, Generating Function, Orthogonality. Simple recurrence relations. Expansion of function in a series of Legendre Polynomials. Associated Legendre polynomials and spherical harmonics. (10 Lectures)

UNIT-III

Some Special Integrals: Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions. Error Function (Probability Integral). (5 Lectures)
Theory of Errors: Systematic and Random Errors. Propagation of Errors. Normal Law of Errors. Standard and Probable Error. (4 Lectures)

UNIT-IV

Partial Differential Equations: Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. Conducting and dielectric sphere in an external uniform electric field. Wave equation and its solution for vibrational modes of a stretched string. (10 Lectures)

Reference Books:

1. Mathematical Methods for Physicists: Arfken, Weber, 2005, Harris, Elsevier.
2. Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill.
3. Mathematics for Physicists, Susan M. Lea, 2004, Thomson Brooks/Cole.
4. Differential Equations, George F. Simmons, 2006, Tata McGraw-Hill.
5. Partial Differential Equations for Scientists & Engineers, S.J. Farlow, 1993, Dover Pub.
6. Mathematical methods for Scientists & Engineers, D.A. McQuarrie, 2003, Viva Books
7. Mathematical Physics and Special Relativity –M. Das, P.K. Jena and B.K. Dash (Srikrishna Prakashan) 2nd Edition 2009
8. Mathematical Physics–H. K. Dass, Dr. Rama Verma (S. Chand Higher Academics) 6th Edition 2011.
9. Mathematical Physics C. Harper, (Prentice Hall India) 2006.
10. Mathematical Physics-Goswami (CENGAGE Learning) 2014
11. Mathematical Method for Physical Sciences – M. L. Boas (Wiley India) 2006
12. Mathematics for Physicists, P. Dennery and A. Krzywicki Dover)
13. Advanced Engineering Mathematics, E. Kreyszig (New Age Publication) 2011.

PHYSICS LAB-C:V

20 Classes (2 hrs. duration)

The aim of this Lab is to use the computational methods to solve physical problems. Course will consist of lectures (both theory and practical) in the Lab. Evaluation done not on the programming but on the basis of formulating the problem.

Topics	Description with Applications
Introduction to Numerical computation software Scilab	Introduction to Scilab, Advantages and disadvantages, Scilab environment, Command window, Figure window, Edit window, Variables and arrays, Initialising variables in Scilab, Multidimensional arrays, Subarray, Special values, Displaying output data, data file, Scalar and array operations, Hierarchy of operations, Built in Scilab functions, Introduction to plotting, 2D and 3D plotting (2), Branching Statements and program design, Relational & logical operators, the while loop, for loop, details of loop operations, break & continue statements, nested loops, logical arrays and vectorization (2) User defined functions, Introduction to Scilab functions, Variable passing in Scilab, optional arguments, preserving data between calls to a function, Complex and Character data, string function, Multidimensional arrays (2) an introduction to Scilab file processing, file opening and closing, Binary I/o functions, comparing binary and formatted functions, Numerical methods and developing the skills of writing a program (2).
Curve fitting, Least square fit, Goodness of fit, standard deviation	Ohms law to calculate R, Hookes law to calculate spring constant
Solution of Linear system of equations by Gauss elimination method and Gauss Seidal method. Diagonalization of matrices, Inverse of a matrix, Eigen vectors, eigen values problems.	Solution of mesh equations of electric circuits (3 meshes) Solution of coupled spring mass systems (3 masses)

Solution of ODE First order Differential equation Euler, modified Euler and Runge-Kutta second order methods Second order differential equation. Fixed difference method.	First order differential equation <ul style="list-style-type: none"> • Radioactive decay • Current in RC, LC circuits with DC source • Newtons law of cooling • Classical equations of motion Second order Differential Equation <ul style="list-style-type: none"> • Harmonic oscillator (no friction) • Damped Harmonic oscillator • Over damped • Critical damped • Oscillatory • Forced Harmonic oscillator • Transient and • Steady state solution • Apply above to LCR circuits also.
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Reference Books:

1. Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J.20 Bence, 3rd ed., 2006, Cambridge University Press
2. Complex Variables, A.S. Fokas & M.J. Ablowitz, 8th Ed., 2011, Cambridge Univ. Press
3. First course in complex analysis with applications, D.G. Zill and P.D. Shanahan, 1940, Jones & Bartlett
4. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific and Engineering Applications: A.V. Wouwer, P. Saucez, C.V. Fernandez. 2014 Springer
5. Scilab by example: M. Affouf 2012, ISBN: 978-1479203444
6. Scilab (A free software to Matlab): H.Ramchandran, A.S.Nair. 2011 S.Chand & Company
7. Scilab Image Processing: Lambert M. Surhone. 2010 Betascript Publishing

C-6: THERMAL PHYSICS

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

UNIT-I

Introduction to Thermodynamics: Recapitulation of Zeroth and First law of thermodynamics: Second Law of Thermodynamics: Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work. Heat Engines. Carnots Cycle, Carnot engine & efficiency. Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence. Carnots Theorem. Applications of Second Law of Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale. (5 Lectures)

Entropy: Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy. Entropy of a perfect gas. Principle of Increase of Entropy. Entropy Changes in Reversible and Irreversible processes with examples. Entropy of the Principle of Increase of Entropy. Temperature-Entropy diagrams for Carnots Cycle. Third Law of Thermodynamics. Unattainability of Absolute Zero. (6 Lectures)

UNIT-II

Thermodynamic Potentials: Extensive and Intensive Thermodynamic Variables. Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibbs Free Energy. Their Definitions, Properties and Applications. Surface Films and Variation of Surface Tension with Temperature. Magnetic Work, Cooling due to adiabatic demagnetization, first and second order Phase Transitions with examples, Clausius Clapeyron Equation and Ehrenfest equations (5 Lectures)

Maxwells Thermodynamic Relations: Derivations and applications of Maxwells Relations, Maxwells Relations: (1) Clausius Clapeyron equation, (2) Values of $C_p - C_v$, (3) Tds Equations, (4) Joule-Kelvin coefficient for Ideal and Van der Waal Gases, (5) Energy equations, (6) Change of Temperature during Adiabatic Process. (5 Lectures)

UNIT-III

Kinetic Theory of Gases

Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification. Sterns Experiment. Mean, RMS and Most Probable Speeds. Degrees of Freedom. Law of Equipartition of Energy (No proof required). Specific heats of Gases. (5 Lectures)

Molecular Collisions: Mean Free Path. Collision Probability. Estimates of Mean Free Path. Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion. Brownian motion and its Significance. (4 Lectures)

UNIT-IV

Real Gases: Behavior of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrews Experiments on CO_2 Gas. Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas. Boyle Temperature. Van der Waals Equation of State for Real Gases. Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves. P-V Diagrams. Joules Experiment. Free Adiabatic Expansion of a Perfect Gas. Joule-Thomson Porous Plug Experiment. Joule- Thomson Effect for Real and Van der Waal Gases. Temperature of Inversion. Joule- Thomson Cooling. (10 Lectures)

Reference Books:

1. Heat and Thermodynamics, M.W. Zemansky, Richard Dittman, 1981, McGraw-Hill.
2. A Treatise on Heat, Meghnad Saha, and B.N.Srivastava, 1958, Indian Press
3. Thermal Physics, S. Garg, R. Bansal and Ghosh, 2nd Edition, 1993, Tata McGraw-Hill
4. Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009, Springer.
5. Thermodynamics, Kinetic Theory & Statistical Thermodynamics, Sears & Salinger. 1988, Narosa.

6. Concepts in Thermal Physics, S.J. Blundell and K.M. Blundell, 2nd Ed., 2012, Oxford University Press
7. Heat and Thermal Physics-Brijlal & Subramaiaam (S.Chand Publication) 2014
8. Thermal Physics– C. Kittel and H. Kroemer (McMillan Education India) 2010

PHYSICS LAB-C:VI

20 Classes (2hr duration)

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barnes constant flow method.
2. To determine the Coefficient of Thermal Conductivity of Cu by Searles Apparatus.
3. To determine the Coefficient of Thermal Conductivity of Cu by Angstroms Method.
4. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charltons disc method.
5. To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT).
6. To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions.
7. To calibrate a thermocouple to measure temperature in a specified Range using (1) Null Method, (2) Direct measurement using Op-Amp difference amplifier and to determine Neutral Temperature.
8. To determine J by Calorimeter.

Reference Books:

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes,D.P.Khandelwal,1985, Vani Pub.

C-7: DIGITAL SYSTEMS AND APPLICATIONS

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

UNIT-I

Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. AND, OR and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity Checkers. (5 Lectures)

Boolean algebra: De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean algebra. Fundamental Products. Idea of Minterms and Maxterms. Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. (5 Lectures)

UNIT-II

Data processing circuits: Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders. (3 Lectures)

Arithmetic Circuits: Binary Addition. Binary Subtraction using 2's Complement. Half and Full Adders. Half & Full Subtractors, 4-bit binary Adder/Subtractor.(4 Lectures)

Timers: IC 555: block diagram and applications: Astable multivibrator and Monostable multivibrator. (3 Lectures)

UNIT-III

Integrated Circuits (Qualitative treatment only): Active & Passive components. Discrete components. Wafer. Chip. Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only). Classification of ICs. Examples of Linear and Digital ICs. (5 Lectures)

Introduction to CRO: Block Diagram of CRO. Electron Gun, Deflection System and Time Base. Deflection Sensitivity. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference. (5 Lectures)

UNIT-IV

Introduction to Computer Organization: Input/output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map. (4 Lectures)

Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits). (2 Lectures)

Counters (4 bits): Ring Counter. Asynchronous counters, Decade Counter. Synchronous Counter.(4 Lectures)

Reference Books:

1. Digital Principles and Applications, A.P. Malvino, D.P. Leach and Saha, 7th Ed., 2011, Tata McGraw
2. Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.
3. Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
4. Digital Systems: Principles & Applications, R.J. Tocci, N.S. Widmer, 2001, PHI Learning

5. Logic circuit design, Shimon P. Vingron, 2012, Springer.
6. Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning.
7. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.
8. Concept of Electronics: D.C.Tayal (Himalay Publication) 2011.
9. Electronics-V. K. Meheta (S. Chand Publication),2013
10. The Art of Electronics, P. Horowitz and W. Hill, CUP.

PHYSICS PRACTICAL-C:VII

20 Classes (2 hrs. duration)

1. To measure (a) Voltage, and (b) Time period of a periodic waveform using CRO.
2. To test a Diode and Transistor using a Multimeter.
3. To design a switch (NOT gate) using a transistor.
4. To verify and design AND, OR, NOT and XOR gates using NAND gates.
5. To design a combinational logic system for a specified Truth Table.
6. To convert a Boolean expression into logic circuit and design it using logic gate ICs.
7. To minimize a given logic circuit.
8. Half Adder, Full Adder and 4-bit binary Adder.
9. Half Subtractor, Full Subtractor, Adder-Subtractor using Full Adder I.C.
10. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates.
11. To build JK Master-slave flip-flop using Flip-Flop ICs
12. To build a 4-bit Counter using D-type/JK Flip-Flop ICs and study timing diagram.
13. To make a 4-bit Shift Register (serial and parallel) using D-type/JK Flip-Flop ICs.
14. To design an astable multivibrator of given specifications using 555 Timer.
15. To design a monostable multivibrator of given specifications using 555 Timer.

Reference Books:

1. Modern Digital Electronics, R.P. Jain, 4th Edition, 2010, Tata McGraw Hill.
2. Basic Electronics: A text lab manual, P.B. Zbar, A.P. Malvino, M.A. Miller, 1994, Mc-Graw Hill.

3. Microprocessor Architecture Programming and applications with 8085, R.S. Goankar, 2002, Prentice Hall.
4. Microprocessor 8085:Architecture, Programming and interfacing, A. Wadhwa, 2010, PHI Learning.

SEMESTER-IV

C-VIII: MATHEMATICAL PHYSICS-III

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

The emphasis of the course is on applications in solving problems of interest to physicists. Students are to be examined on the basis of problems, seen and unseen.

UNIT-I

Complex Analysis: Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula, De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Singular functions: poles and branch points, order of singularity, branch cuts. Integration of a function of a complex variable. Cauchy's Inequality. Cauchy's theorem, Cauchy's Integral formula. Simply and multiply connected. (10 Lectures)

UNIT-II

Integrals Transforms: Laurent and Taylor's expansion. Residues and Residue Theorem. Application in solving Definite Integrals. Fourier Transforms: Fourier Integral theorem. Fourier Transform. Examples. Fourier transform of trigonometric, Gaussian, finite wave train & other functions. Representation of Dirac delta function as a Fourier Integral. (10 Lectures)

UNIT-III

Integrals Transforms: Fourier transform of derivatives, Inverse Fourier transform, Convolution theorem. Properties of Fourier transform (translation, change of scale, complex conjugation, etc.). Three dimensional Fourier transforms with examples. Application of Fourier Transforms to differential equations: One dimensional Wave and Diffusion/Heat Flow Equations. (10 Lectures)

UNIT-IV

Laplace Transforms: Laplace Transform (LT) of Elementary functions. Properties of LTs: Change of Scale Theorem, Shifting Theorem. LTs of Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions. Convolution Theorem. Inverse LT. Application of Laplace Transforms to Differential Equations: Damped Harmonic Oscillator, Simple Electrical Circuits. (10 Lectures)

Reference Books:

1. Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, 3rd ed., 2006, Cambridge University Press
2. Mathematical Methods for Physicists: Arfken, Weber, 2005, Harris, Elsevier.
3. Advanced Engineering Mathematics, E. Kreyszig (New Age Publication) 2011.
4. Mathematics for Physicists, P. Dennery and A. Krzywicki, 1967, Dover Publications
5. Complex Variables, A. S. Fokas & M. J. Ablowitz, 8th Ed., 2011, Cambridge Univ. Press

6. Complex Variables and Applications, J.W. Brown & R.V. Churchill, 7th Ed. 2003, Tata McGraw-Hill
7. First course in complex analysis with applications, D.G. Zill and P.D. Shanahan, 1940, Jones & Bartlett.
8. Mathematical Physics–H. K. Dass, Dr. Rama Verma (S. Chand Higher Academics) 6th Edition 2011.
9. Mathematical Physics C. Harper, (Prentice Hall India) 2006.
10. Mathematical Physics-Goswami (Cengage Learning) 2014
11. Mathematical Method for Physical Sciences - M. L. Boas (Wiley India) 2006
12. Introduction to the theory of functions of a complex variable- E.T.Copson (Oxford) Univ. Press, 1970

PHYSICS PRACTICAL-C:VIII

20 Classes (2 hrs. duration)

Scilab based simulations experiments based on Mathematical Physics problems like

1. Solve differential equations:
 - (i) $\frac{dy}{dx} = e^{-x}$ with $y = 0$ for $x = 0$. (ii) $\frac{dy}{dx} + e^{-xy} = x^2$. (iii) $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} = -y$.
 - (iv) $\frac{d^2y}{dt^2} + e^{-t}\frac{dy}{dt} = -y$.
2. Dirac Delta Function: Evaluate $\frac{1}{\sqrt{2\pi\sigma^2}} \int e^{-(x-2)^2/2\sigma^2} (x+3) dx$ for $\sigma = 1, 0.1, 0.01$ and show it tends to 5.
3. Fourier Series: Program to $\sum_{n=1}^{\infty} (0.2)^n$.
Evaluate the Fourier coefficients of a given periodic function (square wave)
4. Frobenius method and Special functions: $\int_{-1}^1 P_n(\mu) P_m(\mu) d\mu = \delta_{n,m}$. Plot $P_n(x)$, $J(x)$. Show recursion relation.
5. Calculation of error for each data point of observations recorded in experiments done in previous semesters (choose any two).
6. Calculation of least square fitting manually without giving weightage to error. Confirmation of least square fitting of data through computer program.
7. Evaluation of trigonometric functions e.g. $\sin \theta$, Given Bessels function at N – points, find its value at an intermediate point. Complex analysis: Integrate $1/(x^2 + 2)$ numerically and check with computer integration.
8. Integral transform: FFT of e^{-x^2} .

Reference Books:

1. Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, 3rd ed., 2006, Cambridge University Press
2. Mathematics for Physicists, P. Dennery and A. Krzywicki, 1967, Dover Publications
3. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific and Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernandez. 2014 Springer ISBN: 978-3319067896
4. Scilab by example: M. Affouf, 2012. ISBN: 978-1479203444
5. Scilab (A free software to Matlab): H.Ramchandran, A.S.Nair. 2011 S.Chand & Company
6. Scilab Image Processing: Lambert M. Surhone. 2010 Betascript Publishing.

C-IX: ELEMENTS OF MODERN PHYSICS

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

UNIT-I

Atomic Spectra and Models: Inadequacy of classical physics, Brief Review of Black body Radiation , Photoelectric effect, Compton effect, dual nature of radiation, wave nature of particles. Atomic spectra, Line spectra of hydrogen atom, Ritz Rydberg combination principle. Alpha Particle Scattering, Rutherford Scattering Formula, Rutherford Model of atom and its limitations, Bohrs model of H atom, explanation of atomic spectra, correction for finite mass of the nucleus, Bohr correspondence principle, limitations of Bohr model, discrete energy exchange by atom, Frank Hertz Expt. Sommerfeld's Modification of Bohrs Theory. (11 Lectures)

UNIT-II

Wave Particle Duality: de Broglie hypothesis, Experimental confirmation of matter wave, Davisson Germer Experiment, velocity of de Broglie wave, wave particle duality, Complementarity. Superposition of two waves, phase velocity and group velocity , wave packets ,Gaussian Wave Packet , spatial distribution of wave packet, Localization of wave packet in time. Time development of a wave Packet ; Wave Particle Duality, Complementarity . Heisenberg Uncertainty Principle ,Illustration of the Principle through thought Experiments of Gamma ray microscope and electron diffraction through a slit. Estimation of ground state energy of harmonic oscillator and hydrogen atom, non existence of electron in the nucleus. Uncertainty and Complementarities. (11 Lectures)

UNIT-III

Nuclear Physics: Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy,

Nuclear Shell Model and magic numbers. Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life (8 Lectures)

UNIT-IV

Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus.

Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions). (10 Lectures)

Reference Books:

1. Concepts of Modern Physics, Arthur Beiser, 2002, McGraw-Hill.
2. Introduction to Modern Physics, Rich Meyer, Kennard, Coop, 2002, Tata McGraw Hill
3. Introduction to Quantum Mechanics, David J. Griffith, 2005, Pearson Education.
4. Physics for scientists and Engineers with Modern Physics, Jewett and Serway, 2010, Cengage Learning.
5. Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, 2004, Macmillan
6. Modern Physics Bernstein, Fishbane and Gasiorowicz (Pearson India) 2010
7. Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles – R. Eisberg (Wiley India), 2012.

(Additional Books for Reference)

8. Modern Physics, J.R. Taylor, C.D. Zafiratos, M.A. Dubson, 2004, PHI Learning.
9. Theory and Problems of Modern Physics, Schaum's outline, R. Gautreau and W. Savin, 2nd Edn, Tata McGraw-Hill Publishing Co. Ltd.
10. Quantum Physics, Berkeley Physics, Vol.4. E.H.Wichman, 1971, Tata McGraw-Hill Co.
11. Basic ideas and concepts in Nuclear Physics, K.Heyde, 3rd Edn., Institute of Physics Pub.
12. Six Ideas that Shaped Physics: Particle Behave like Waves, T.A.Moore, 2003, McGraw Hill
13. Modern Physics-Serway (CENGAGE Learnings) 2014
14. Modern Physics —Murugesan and Sivaprasad (S. Chand Higher Academics)
15. Physics of Atoms and Molecules Bransden (Pearson India) 2003

PHYSICS PRACTICAL-C:IX

20 Classes (2 hrs. duration)

1. Measurement of Planck's constant using black body radiation and photo-detector

2. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
3. To determine work function of material of filament of directly heated vacuum diode.
4. To determine the Planck's constant using LEDs of at least 4 different colours.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the ionization potential of mercury.
7. To determine the absorption lines in the rotational spectrum of Iodine vapour.
8. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
9. To setup the Millikan oil drop apparatus and determine the charge of an electron.
10. To show the tunneling effect in tunnel diode using I-V characteristics.
11. To determine the wavelength of laser source using diffraction of single slit.
12. To determine the wavelength of laser source using diffraction of double slits.
13. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal

C-X: ANALOG SYSTEMS AND APPLICATIONS

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

UNIT-I

Semiconductor Diodes: P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity. PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current Flow Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Derivation for Barrier Potential, Barrier Width and Current for Step Junction. (5 Lectures)

Two-terminal Devices and their Applications: (1) Rectifier Diode: Half-wave Rectifiers.

Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, (2) Zener Diode and Voltage Regulation. Principle and structure of (1) LEDs, (2) Photodiode, (3) Solar Cell. (5 Lectures)

UNIT-II

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Current gains α and β Relations between α and β . Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cutoff and Saturation Regions. (5 Lectures)

Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers. (5 Lectures)

UNIT:III

Coupled Amplifier: RC-coupled amplifier and its frequency response.(4 Lectures)

Feedback in Amplifiers: Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise. (2 Lectures)

Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency. Hartley & Colpitts oscillators.(4 Lectures)

UNIT-IV

Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground. (5 Lectures)

Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector (8) Wein bridge oscillator.(5 Lectures)

Reference Books:

1. Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
2. Electronics: Fundamentals and Applications, J.D. Ryder, 2004, Prentice Hall.
3. Solid State Electronic Devices, B.G.Streetman & S.K.Banerjee, 6th Edn.,2009, PHI Learning
4. Electronic Devices & circuits, S.Salivahanan & N.S.Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill
5. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall
6. Electronic circuits: Handbook of design & applications, U.Tietze, C.Schenk,2008, Springer
7. Semiconductor Devices: Physics and Technology, S.M. Sze, 2nd Ed., 2002, Wiley India
8. Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India
9. Concept of Electronics: D.C.Tayal (Himalay Publication) 2011
10. Electronic devices :Circuits and Applications :W.D. Stanley Prentice Hall

11. Electronics- V. K. Meheta (S. Chand Publication)2013
12. Electronic Circuits :L.Schilling and Velove: 3rd Ed Mc Graw Hill
13. ElectronicsRaskhit & Chattopadhyay (New age International Publication)2011
14. Electricity and Electronic-D.C.Tayal (Himalaya Pub.)2011
15. Electronic devices and circuits R.L. Boylstad (Pearson India) 2009.

PHYSICS PRACTICAL-C:X

20 Classes (2 hrs. duration)

1. To study V-I characteristics of PN junction diode, and Light emitting diode.
2. To study the V-I characteristics of a Zener diode and its use as voltage regulator.
3. Study of V-I & power curves of solar cells, and find maximum power point & efficiency.
4. To study the characteristics of a Bipolar Junction Transistor in CE configuration.
5. To study the various biasing configurations of BJT for normal class A operation.
6. To design a CE transistor amplifier of a given gain (mid-gain) using voltage divider bias.
7. To study the frequency response of voltage gain of a RC-coupled transistor amplifier.
8. To design a Wien bridge oscillator for given frequency using an op-amp.
9. To design a phase shift oscillator of given specifications using BJT.
10. To study the Colpitt's oscillator.
11. To design a digital to analog converter (DAC) of given specifications.
12. To study the analog to digital convertor (ADC) IC.
13. To design an inverting amplifier using Op-amp (741,351) for dc voltage of given gain
14. To design inverting amplifier using Op-amp (741,351) and study its frequency response
15. To design non-inverting amplifier using Op-amp (741,351) & study its frequency response
16. To study the zero-crossing detector and comparator
17. To add two dc voltages using Op-amp in inverting and non-inverting mode
18. To design a precision Differential amplifier of given I/O specification using Op-amp.
19. To investigate the use of an op-amp as an Integrator.
20. To investigate the use of an op-amp as a Differentiator.

21. To design a circuit to simulate the solution of a 1st/2nd order differential equation.

Reference Books:

1. Basic Electronics: A text lab manual, P.B. Zbar, A.P. Malvino, M.A. Miller, 1994, Mc-Graw Hill.
2. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall.
3. Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.
4. Electronic Devices & circuit Theory, R.L. Boylestad & L.D. Nashelsky, 2009, Pearson

SEMESTER-V

C-XI: QUANTUM MECHANICS AND APPLICATIONS

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1hr duration)

UNIT:I

Schrodinger equation & the operators: Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Interpretation of Wave Function Probability and probability current densities in three dimensions; Conditions for Physical Acceptability of Wave Functions. Normalization. Linearity and Superposition Principles. Hermitian operator, Eigen values and Eigen functions. Position, momentum and Energy operators; commutator of position and momentum operators; Expectation values of position and momentum. Wave Function of a Free Particle. (8 Lectures)

UNIT:II

Time independent Schrodinger equation: Hamiltonian, stationary states and energy eigen values; expansion of an arbitrary wave function as a linear combination of energy eigen functions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states; Application to spread of Gaussian wave-packet for a free particle in one dimension; wave packets, Fourier transforms and momentum space wave function; Position-momentum uncertainty principle. (6 Lectures)

UNIT:III

General discussion of bound states in an arbitrary potential: continuity of wave function, boundary condition and emergence of discrete energy levels; application to one-dimensional problem-square well potential; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigen functions ground state, zero point energy & uncertainty principle. One dimensional infinitely rigid box- energy eigen values and eigen functions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension-across a step potential & rectangular potential barrier. (14 Lectures)

UNIT-IV

Atoms in Electric & Magnetic Fields: Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmors Theorem. Spin Magnetic Moment. Stern-Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magnetron.

Atoms in External Magnetic Fields: Normal and Anomalous Zeeman Effect. Paschen Back and Stark Effect (Qualitative Discussion only). (12 Lectures)

Reference Books:

1. A Text book of Quantum Mechanics, P. M.Mathews and K.Venkatesan, 2nd Ed., 2010, McGraw Hill
2. Quantum Mechanics, Robert Eisberg and Robert Resnick, 2nd Edn., 2002, Wiley.

3. Quantum Mechanics, Leonard I. Schiff, 3rd Edn. 2010, Tata McGraw Hill.
4. Quantum Mechanics, G. Aruldas, 2nd Edn. 2002, PHI Learning of India.
5. Quantum Mechanics, Bruce Cameron Reed, 2008, Jones and Bartlett Learning. Quantum Mechanics: Foundations & Applications, Arno Bohm, 3rd Edn., 1993, Springer
6. Quantum Mechanics for Scientists & Engineers, D.A.B. Miller, 2008, Cambridge University Press
7. Quantum Physics-S. Gasiorowicz (Wiley India) 2013
8. Quantum Mechanics -J.L. Powell and B. Craseman (Narosa) 1988
9. Introduction to Quantum Mechanics- M.Das, P.K.Jena,(SriKrishna Prakashan)
10. Basic Quantum Mechanics A.Ghatak (Mc Millan India) 2012
11. Introduction to Quantum Mechanics R. Dicke and J. Wittke
12. Quantum Mechanics- Eugen Merzbacher, 2004, John Wiley and Sons, Inc.
13. Introduction to Quantum Mechanics, D.J. Griffith, 2nd Ed. 2005, Pearson Education
14. Quantum Mechanics, Walter Greiner, 4th Edn., 2001, Springer
15. Quantum Mechanics - F. Mandl (CBS) 2013
16. Cohen-Tannoudji, B Diu and F Lalo, Quantum Mechanics (2 vols) Wiley-VCH 1977

PHYSICS PRACTICAL-C:XI

20 Classes (2hr duration)

Use C/C++/Scilab for solving the following problems based on Quantum Mechanics like

1. Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom:
Here, m is the reduced mass of the electron. Obtain the energy eigenvalues and plot the corresponding wavefunctions. Remember that the ground state energy of the hydrogen atom is -13.6 eV. Take $e = 3.795$ (eV)^{1/2}, $c = 1973$ (eV) and $m = 0.511 \times 10^6$ eV/c².
2. Solve the s-wave radial Schrodinger equation for an atom:
where m is the reduced mass of the system (which can be chosen to be the mass of an electron), for the screened coulomb potential Find the energy (in eV) of the ground state of the atom to an accuracy of three significant digits. Also, plot the corresponding wavefunction. Take $e = 3.795$ (eV)^{1/2}, $m = 0.511 \times 10^6$ eV/c², and $a = 3, 5, 7$. In these units $c = 1973$ (eV). The ground state energy is expected to be above -12 eV in all three cases.

3. Solve the s-wave radial Schrodinger equation for a particle of mass m :
For the anharmonic oscillator potential for the ground state energy (in MeV) of particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose $m = 940 \text{ MeV}/c^2$, $k = 100 \text{ MeV fm}^{-2}$, $b = 0, 10, 30 \text{ MeV fm}^{-3}$ In these units, $c = 197.3 \text{ MeV fm}$. The ground state energy is expected to lie between 90 and 110 MeV for all three cases.
4. Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen molecule:
Where μ is the reduced mass of the two-atom system for the Morse potential Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function.
Take: $m = 940 \times 10^6 \text{ eV}/c^2$, $D = 0.755501 \text{ eV}$, $\alpha = 1.44$, $\rho = 0.131349$ Laboratory based experiments:
5. Study of Electron spin resonance- determine magnetic field as a function of the resonance frequency.
6. Study of Zeeman effect: with external magnetic field; Hyperfine splitting
7. To show the tunneling effect in tunnel diode using I-V characteristics.
8. Quantum efficiency of CCDs

Reference Books:

1. Schaum's outline of Programming with C++. J.Hubbard, 2000, McGraw-Hill Publication
2. Numerical Recipes in C: The Art of Scientific Computing, W.H. Press et al., 3rd Edn., 2007, Cambridge University Press.
3. An introduction to computational Physics, T.Pang, 2nd Edn., 2006, Cambridge Univ. Press
4. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific & Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernandez. 2014 Springer.
5. Scilab (A Free Software to Matlab): H. Ramchandran, A.S. Nair. 2011 S. Chand & Co.
6. Scilab Image Processing: L.M. Surhone. 2010 Betascript Publishing ISBN: 978-6133459274

C-XII: SOLID STATE PHYSICS

(Credits: Theory-04, Practicals-02)

Marks: 100 (Theory: 70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

UNIT: I

Crystal Structure: Solids- Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis Central and Non-Central Elements. Unit Cell. Miller Indices. Types of Lattices, Reciprocal Lattice. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and

Geometrical Factor. (8 Lectures)

UNIT:II

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petits Law, Einstein and Debye theories of specific heat of solids. T₃ law (6 Lectures)

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of diaand Paramagnetic Domains. Curies law, Weiss Theory of Ferromagnetism and Ferromagnetic Domains. (6 Lectures)

UNIT:III

Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. (4 Lectures)

Lasers: Einsteins A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three-Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. (4 Lectures)

UNIT-IV

Elementary band theory: Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. (8 Lectures)

Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, Londons Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation).(4 Lectures)

Reference Books:

1. Introduction to Solid State Physics, Charles Kittel, 8th Edition, 2004, Wiley India Pvt. Ltd.
2. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India
3. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill
4. Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning
5. Solid-state Physics, H. Ibach and H. Luth, 2009, Springer
6. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India
7. Solid State Physics, M.A. Wahab, 2011, Narosa Publications
8. Solid State Physics S. O. Pillai (New Age Publication)
9. Solid State Physics- R.K.Puri & V.K. Babbar (S.Chand Publication)2013
10. Lasers and Non linear Optics B.B.Laud-Wiley Eastern.
11. LASERS: Fundamentals and Applications Thyagarajan and Ghatak (McMillanIndia), 2012

PHYSICS PRACTICAL-C:XII

20 Classes (2 hrs. duration)

1. Measurement of susceptibility of paramagnetic solution (Quinck's Tube Method)
2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. To measure the Dielectric Constant of a dielectric Materials with frequency
5. To determine the complex dielectric constant and plasma frequency of metal using Surface Plasmon resonance (SPR)
6. To determine the refractive index of a dielectric layer using SPR
7. To study the PE Hysteresis loop of a Ferroelectric Crystal.
8. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis.
9. To measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to 150 oC) and to determine its band gap.
10. To determine the Hall coefficient of a semiconductor sample.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
4. Elements of Solid State Physics, J.P. Srivastava, 2nd Ed., 2006, Prentice-Hall of India.

C-XIII: ELECTROMAGNETIC THEORY

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

UNIT:I

Maxwell Equations: Maxwells equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at Interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density. (8 Lectures)

UNIT:II

EM Wave Propagation in Unbounded Media: Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance.

Propagation through conducting media, relaxation time, skin depth. Electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere. (8 Lectures)

UNIT:III

EM Wave in Bounded Media: Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection, evanescent waves. Metallic reflection (normal Incidence).

Optical Fibres: Numerical Aperture. Step and Graded Indices (Definitions Only). Single and Multiple Mode Fibres (Concept and Definition Only). (12 Lectures)

UNIT-IV

Polarization of Electromagnetic Waves: Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel's Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction. Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation Plates: Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of Polarized Light.

Rotatory Polarization: Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. Calculation of angle of rotation. Experimental verification of Fresnel's theory. Specific rotation. Laurent's half-shade polarimeter. (12 Lectures)

UNIT-IV

Reference Books:

1. Introduction to Electrodynamics, D.J. Griffiths, 3rd Ed., 1998, Benjamin Cummings.
2. Elements of Electromagnetics, M.N.O. Sadiku, 2001, Oxford University Press.
3. Introduction to Electromagnetic Theory, T.L. Chow, 2006, Jones & Bartlett Learning
4. Fundamentals of Electromagnetics, M.A.W. Miah, 1982, Tata McGraw Hill
5. Electromagnetic field Theory, R.S. Kshetrimayun, 2012, Cengage Learning
6. Electromagnetic Field Theory for Engineers & Physicists, G. Lehner, 2010, Springer
7. Electricity and Magnetism —D C Tayal (Himalaya Publication) 2014
8. Introduction to Electrodynamics-A.Z.Capri & P.V.Panat (Alpha Science) 2002
9. Optics E.Hecht, (Pearson India) (**Additional Books for Reference**)
10. Electromagnetic Fields & Waves, P.Lorrain & D.Corson, 1970, W.H.Freeman & Co.

11. Electromagnetics, J.A. Edminster, Schaum Series, 2006, Tata McGraw Hill.
12. Electromagnetic field theory fundamentals, B. Guru and H. Hiziroglu, 2004, Cambridge University Press
13. Electromagnetic Theory-A. Murthy (S. Chand Publication)2014
14. Classical Electrodynamics, J. D. Jackson (Wiley India)

PHYSICS PRACTICAL-C:XIII

20 Classes (2 hrs. duration)

1. To verify the law of Malus for plane polarized light.
2. To determine the specific rotation of sugar solution using Polarimeter.
3. To analyze elliptically polarized Light by using a Babinet's compensator.
4. To study dependence of radiation on angle for a simple Dipole antenna.
5. To determine the wavelength and velocity of ultrasonic waves in a liquid (Kerosene Oil, Xylene, etc.) by studying the diffraction through ultrasonic grating.
6. To study the reflection, refraction of microwaves
7. To study Polarization and double slit interference in microwaves.
8. To determine the refractive index of liquid by total internal reflection using Wollaston's air-film.
9. To determine the refractive Index of (1) glass and (2) a liquid by total internal reflection using a Gaussian eyepiece.
10. To study the polarization of light by reflection and determine the polarizing angle for air- glass interface.
11. To verify the Stefan's law of radiation and to determine Stefan's constant.
12. To determine the Boltzmann constant using V-I characteristics of PN junction diode.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
4. Electromagnetic Field Theory for Engineers & Physicists, G. Lehner, 2010, Springer

C-XIV: STATISTICAL MECHANICS

(Credits: Theory-04, Practicals-02)

Marks:100 (Theory:70, Practical: 30)

Theory: 40 Classes (1 hr. duration)

UNIT:I

Classical Statistics: Macrostate & Microstate, Elementary Concept of Ensemble, Microcanonical, Canonical and grand canonical ensemble. Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression. (12 Lectures)

UNIT:II

Gibbs Paradox, Sackur Tetrode equation, Law of Equipartition of Energy (with proof) Applications to Specific Heat and its Limitations, Thermodynamic Functions of a Two-Energy Levels System, Negative Temperature.(8 Lectures)

UNIT:III

Radiation: Properties of Thermal Radiation. Blackbody Radiation. Pure temperature dependence. Kirchhoffs law. Stefan-Boltzmann law: Thermodynamic proof. Radiation Pressure. Wiens Displacement law. Wiens Distribution Law. Sahas Ionization Formula. Rayleigh-Jeans Law. Ultraviolet Catastrophe. Plancks Law of Blackbody Radiation: Experimental Verification. Deduction of (1) Wiens Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wiens Displacement law from Plancks law.(12 Lectures)

UNIT=IV

Quantum Statistics: Identical particles, macrostates and micro states. Fermions and Bosons, Bose Einstein distribution function and Fermi-Dirac Distribution function. Bose-Einstein Condensation, Bose deviation from Planck's law, Effect of temperature on F-D distribution function, degenerate Fermigas, Density of States, Fermi energy.(8 Lectures)

Reference Books:

1. Statistical Mechanics-R.K.Pathria & Paul D. Beale (Academic Press) 3rd Edition (2011)
2. Statistical Physics, Berkeley Physics Course, F. Reif, 2008, Tata McGraw-Hill
3. Statistical and Thermal Physics, S. Lokanathan and R.S. Gambhir. 1991, Prentice Hall
4. Thermodynamics, Kinetic Theory and Statistical Thermodynamics, Francis W. Sears and Gerhard L. Salinger, 1986, Narosa.
5. Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009, Springer
6. An Introduction to Statistical Mechanics & Thermodynamics, R.H. Swendsen, 2012, Oxford Univ. Press.
7. An introduction to Equilibrium Statistical Mechanics: Palash Das (I.K.International Publication) 2012
8. Statistical Physics - F. Mandl (CBS) 2012

9. Statistical Physics of Particles-M. Kardar (CUP 2007)

PHYSICS PRACTICAL-C:XIV

20 Classes (2 hrs. duration)

Use C/C++/Scilab for solving the problems based on Statistical Mechanics like

1. Plot Plancks law for Black Body radiation and compare it with Weins Law and Raleigh- Jeans Law at high temperature (room temperature) and low temperature.
2. Plot Specific Heat of Solids by comparing (a) Dulong-Petit law, (b) Einstein distribution function, (c) Debye distribution function for high temperature (room temperature) and low temperature and compare them for these two cases
3. Plot Maxwell-Boltzmann distribution function versus temperature.
4. Plot Fermi-Dirac distribution function versus temperature.
5. Plot Bose-Einstein distribution function versus temperature.

Reference Books:

1. Elementary Numerical Analysis, K.E. Atkinson, 3rd Edn. 2007, Wiley India Edition
2. Statistical Mechanics, R.K. Pathria, Butterworth Heinemann: 2nd Ed., 1996, Oxford University Press.
3. Thermodynamics, Kinetic Theory and Statistical Thermodynamics, Francis W. Sears and Gerhard L. Salinger, 1986, Narosa.
4. Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009, Springer
5. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific and Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernandez. 2014 Springer ISBN: 978-3319067896
6. Scilab by example: M. Affouf, 2012. ISBN: 978-1479203444
7. Scilab Image Processing: L.M. Surhone. 2010, Betascript Pub., ISBN: 978- 6133459274

Discipline Specific Elective (DSE)
(4 papers including the Project)
DSE-1 to DSE-4 (6 Credits each)

CLASSICAL DYNAMICS
(Credits: Theory-05, Tutorial-01)
Theory: 50 Classes (1 hr. duration)

The emphasis of the course is on applications in solving problems of interest to physicists. Students are to be examined on the basis of problems, seen and unseen.

UNIT-I

Classical Mechanics of Point Particles: Generalised coordinates and velocities. Hamilton's Principle, Lagrangian and Euler-Lagrange equations. Applications to simple systems such as coupled oscillators. Canonical momenta & Hamiltonian. Hamilton's equations of motion. Applications: Hamiltonian for a harmonic oscillator, particle in a central force field. Motion of charged particles in external electric and magnetic fields. (25 Lectures)

UNIT-II

Special Theory of Relativity: Postulates of Special Theory of Relativity. Lorentz Transformations. Minkowski space. The invariant interval, light cone and world lines. Space-time diagrams. Time-dilation, length contraction & twin paradox. Four-vectors: space-like, time-like & light-like. Four-velocity and acceleration. Metric and alternating tensors. Four-momentum and energy-momentum relation. Doppler effect from a four vector perspective. Concept of four-force. Conservation of four-momentum. Relativistic kinematics. Application to two-body decay of an unstable particle. (25 Lectures)

Reference Books:

1. Classical Mechanics, H.Goldstein, C.P. Poole, J.L. Safko, 3rd Edn. 2002,Pearson Education.
2. Mechanics, L. D. Landau and E. M. Lifshitz, 1976, Pergamon.
3. Classical Mechanics: An introduction, Dieter Strauch, 2009, Springer.
4. Solved Problems in classical Mechanics, O.L. Delange and J. Pierrus, 2010, Oxford Press
5. Classical Mechanics-J. C.Upadhyay (Himalaya Publication) 2014
6. Classical Dynamics of Particles and Systems S. T. Thornton (Cengage Learning) 2012
7. Introduction to Classical Mechanics-R. K. Takwale, S.Puranik-(Tata Mc Graw Hill)
8. Classical Mechanics-M. Das, P.K.Jena, M. Bhuyan, R.N.Mishra (Srikrishna Prakashan)

NUCLEAR & PARTICLE PHYSICS

(Credits: Theory-05, Tutorials-01)

Theory: 50 Classes (1 hr. duration)

UNIT-I

General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excited states.

Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model,

Radioactivity decay: (a) α -decay: basics of α -decay processes, theory of α -emission, Gamow factor, Geiger Nuttall law. (b) β -decay: energy kinematics for β -decay, positron emission, electron capture, neutrino hypothesis. (c) Elementary idea of Gamma decay.

Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, (25 Lectures)

UNIT-II

Detector for Nuclear Radiations: Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector.

Particle Accelerators: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons.

Particle physics: Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm. Elementary ideas of quarks and gluons. (25 Lectures)

Reference Books:

1. Introductory nuclear Physics by Kenneth S. Krane (Wiley India Pvt. Ltd., 2008).
2. Concepts of nuclear physics by Bernard L. Cohen. (Tata Mcgraw Hill, 1998).
3. Introduction to High Energy Physics, D.H. Perkins, Cambridge Univ. Press
4. Introduction to Elementary Particles, D. Griffith, John Wiley & Sons
5. Basic ideas and concepts in Nuclear Physics - An Introductory Approach by K. Heyde (IOP-Institute of Physics Publishing, 2004).
6. Theoretical Nuclear Physics, J.M. Blatt & V.F. Weisskopf (Dover Pub. Inc., 1991)
7. Atomic and Nuclear Physics -A. B. Gupta, Dipak Ghosh. (Books and Allied Publishers)
8. Physics of Atoms and Molecules Bransden (Pearson India) 2003
9. Subatomic Physics - Henley and Gracia (World Scientific) 2012

10. Introduction to Nuclear and Particle Physics-A.Das and T.Ferbel (World Scientific)
11. Radiation detection and measurement, G.F. Knoll (John Wiley & Sons, 2000).

COMPUTATIONAL PHYSICS
(Credits: Theory-05, Tutorials-01)
Theory: 50 Classes (1 hr. duration)

The aim of this course is not just to teach computer programming and numerical analysis but to emphasize its role in solving problems in Physics.

- Highlights the use of computational methods to solve physical problems
- Use of computer language as a tool in solving physics problems (applications)
- Course will consist of hands on training on the Problem solving on Computers.

UNIT-I

Introduction: Importance of computers in Physics, paradigm for solving physics problems for solution. Usage of linux as an Editor. **Algorithms and Flowcharts:** Algorithm- Definition, properties and development. Flowchart- Concept of flowchart, symbols, guidelines, types. Examples: Cartesian to Spherical Polar Coordinates, Roots of Quadratic Equation, Sum of two matrices, Sum and Product of a finite series, calculation of $\sin(x)$ as a series, algorithm for plotting (1) Lissajous figures and (2) trajectory of a projectile thrown at an angle with the horizontal.

Scientific Programming: Some fundamental Linux Commands (Internal and External commands). Development of FORTRAN, Basic elements of FORTRAN: Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program. Operators: Arithmetic, Relational, Logical and Assignment Operators. Expressions: Arithmetic, Relational, Logical, Character and Assignment Expressions. Fortran Statements: I/O Statements (unformatted/formatted), Executable and Non-Executable Statements, Layout of Fortran Program, Format of writing Program and concept of coding, Initialization and Replacement Logic. Examples from physics problems. (25 Lectures)

UNIT-II

Control Statements: Types of Logic (Sequential, Selection, Repetition), Branching Statements (Logical IF, Arithmetic IF, Block IF, Nested Block IF, SELECT CASE and ELSE IF Ladder statements), Looping Statements (DO-CONTINUE, DO-ENDDO, DOWHILE, Implied and Nested DO Loops), Jumping Statements (Unconditional GOTO, Computed GOTO, Assigned GOTO) Subscripted Variables (Arrays: Types of Arrays, DIMENSION Statement, Reading and Writing Arrays), Functions and Subroutines (Arithmetic Statement Function, Function Subprogram and Subroutine), RETURN, CALL, COMMON and EQUIVALENCE Statements), Structure, Disk I/O Statements, open a file, writing in a file, reading from a file. Examples from physics problems.

Programming:

1. Exercises on syntax on usage of FORTRAN
2. To print out all natural even/ odd numbers between given limits.
3. To find maximum, minimum and range of a given set of numbers.
4. To find a set of prime numbers and Fibonacci series.

(25 Lectures)

Reference Books:

1. Introduction to Numerical Analysis, S.S. Sastry, 5th Edn., 2012, PHI Learning Pvt. Ltd.
2. Computer Programming in Fortran 77. V. Rajaraman (Publisher: PHI).
3. Schaums Outline of Theory and Problems of Programming with Fortran, S Lipsdutz and A Poe, 1986Mc-Graw Hill Book Co.
4. Computational Physics: An Introduction, R. C. Verma, et al. New Age International Publishers, New Delhi(1999)
5. A first course in Numerical Methods, U.M. Ascher and C. Greif, 2012, PHI Learning
6. Elementary Numerical Analysis, K.E. Atkinson, 3 rd Edn., 2007, Wiley India Edition.

NANO MATERIALS & APPLICATIONS

(Credits: Theory-05, Tutorial-01)

Theory: 50 Classes (1 hr. duration)

UNIT-I

Nanoscale Systems: Length scales in physics, Nanostructures: 1D, 2D and 3D nanostructures (nanodots, thin films, nanowires, nanorods), Band structure and density of states of materials at nanoscale, Size Effects in nano systems, Quantum confinement: Applications of Schrodinger equation- Infinite potential well, potential step, potential box, quantum confinement of carriers in 3D, 2D, 1D nanostructures and its consequences.

Synthesis Of Nanostructure Materials: Top down and Bottom up approach, Photolithography. Ball milling. Gas phase condensation. Vacuum deposition. Physical vapor deposition (PVD): Thermal evaporation, E-beam evaporation, Pulsed Laser deposition. Chemical vapor deposition (CVD). Sol-Gel. Electro deposition. Spray pyrolysis. Hydrothermal synthesis. Preparation through colloidal methods. MBE growth of quantum dots. (25 Lectures)

UNIT-II

Characterization: X-Ray Diffraction. Optical Microscopy. Scanning Electron Microscopy. Transmission Electron Microscopy. Atomic Force Microscopy. Scanning Tunneling Microscopy.

Applications: Applications of nanoparticles, quantum dots, nanowires and thin films for photonic devices (LED, solar cells). Single electron devices (no derivation). CNT based transistors. Nano-material Devices: Quantum dots heterostructure lasers, optical switching and optical data storage. Magnetic quantum well; magnetic dots - magnetic data storage. Micro Electromechanical Systems (MEMS), Nano Electromechanical Systems (NEMS). (25 Lectures)

Reference books:

1. C.P. Poole, Jr. Frank J. Owens, Introduction to Nanotechnology (Wiley India Pvt. Ltd.).
2. S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publishing Company)

3. K.K. Chattopadhyay and A. N. Banerjee, Introduction to Nanoscience and Technology (PHI Learning Private Limited).
4. Richard Booker, Earl Boysen, Nanotechnology (John Wiley and Sons).
5. M. Hosokawa, K. Nogi, M. Naita, T. Yokoyama, Nanoparticle Technology Handbook (Elsevier, 2007).
6. Bharat Bhushan, Springer Handbook of Nanotechnology (Springer-Verlag, Berlin, 2004).
7. Nanotechnology- Rakesh Rathi (S Chand & Company, New Delhi)

BIO-PHYSICS

(Credits: Theory-05, Tutorials-01)

Theory: 50 Classes (1 hr. duration)

UNIT-I

Building Blocks & Structure of Living State: Atoms and ions, molecules essential for life, what is life. Living state interactions: Forces and molecular bonds, electric & thermal interactions, electric dipoles, Casimir interactions, domains of physics in biology.

Heat Transfer in bio-materials: Heat Transfer Mechanism, The Heat equation, Joule heating of tissue.

Living State Thermodynamics: Thermodynamic equilibrium, first law of thermodynamics and conservation of energy. Entropy and second law of thermodynamics, Physics of many particle systems, Two state systems, continuous energy distribution, Composite systems, Casimir contribution of free energy, Protein folding and unfolding. (25 Lectures)

UNIT-II

Open systems and chemical thermodynamics: Enthalpy, Gibbs Free Energy and chemical potential, activation energy and rate constants, enzymatic reactions, ATP hydrolysis & synthesis, Entropy of mixing, The grand canonical ensemble, Hemoglobin.

Diffusion and transport: Maxwell-Boltzmann statistics, Fick's law of diffusion, sedimentation of Cell Cultures, diffusion in a centrifuge, diffusion in an electric field, Lateral diffusion in membranes, Navier Stokes equation, low Reynolds Number Transport, Active and passive membrane transport.

Fluids: Laminar and turbulent fluid flow, Bernoulli's equation, equation of continuity, Venturi effect, Fluid dynamics of circulatory systems, capillary action.

Bio-energetics and Molecular motors: Kinesins, Dyneins, and microtubule dynamics, Brownian motion, ATP synthesis in Mitochondria, Photosynthesis in Chloroplasts, Light absorption in biomolecules, vibrational spectra of bio-biomolecules. (25 Lectures)

Reference Books:

1. Introductory Biophysics, J. Claycomb, JQP Tran, Jones & Bartlett Publishers
2. Aspects of Biophysics, Hugh S W, John Wiley and Sons.
3. Essentials of Biophysics by P Narayanan, New Age International.

4. Molecular Biophysics- P.K.Banarjee (S. Chand Publication), 2014.
5. Essentials of Biophysics : P. Narayanan, (New Age International, New Delhi), 2005 .
6. Biophysics: An introduction : Rodney Cotterill, John Wiley and Sons Ltd, 2002.
7. Biophysics- Dr.G.R.Chatwal (Himalaya Pub.),2011.

Project Work
(Credits: 06) (Compulsory)

SKILL ENHANCEMENT COURSE

(Credit: 04 each)- SEC-1 and SEC-2

1-Communicative English and English Writing Skill(Compulsory) (Credits: 02) Theory: 20 Classes (1 hr. duration)

2-BASIC INSTRUMENTATION SKILLS

(Credits: 02)

Theory: 20 Classes (1 hr. duration)

This course is to get exposure with various aspects of instruments and their usage through hands-on mode. Experiments listed below are to be done in continuation of the topics.

UNIT-I

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects.

Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance.

AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter, specifications and their significance.

Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance. Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working. (10 Lectures)

UNIT-II

Signal Generators and Analysis Instruments: Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis.

Digital Instruments: Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter.

Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time-base stability, accuracy and resolution. (10 Lectures)

The test of lab skills will be of the following test items:

1. Use of an oscilloscope.
2. CRO as a versatile measuring device.
3. Circuit tracing of Laboratory electronic equipment,
4. Use of Digital multimeter/VTVM for measuring voltages
5. Circuit tracing of Laboratory electronic equipment,
6. Winding a coil / transformer.
7. Study the layout of receiver circuit.
8. Trouble shooting a circuit
9. Balancing of bridges

Laboratory Exercises:

1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance.
2. To observe the limitations of a multimeter for measuring high frequency voltage and currents.
3. To measure Q of a coil and its dependence on frequency, using a Q- meter.
4. Measurement of voltage, frequency, time period and phase angle using CRO.
5. Measurement of time period, frequency, average period using universal counter/ frequency counter.
6. Measurement of rise, fall and delay times using a CRO.
7. Measurement of distortion of a RF signal generator using distortion factor meter.
8. Measurement of R, L and C using a LCR bridge/ universal bridge.

Open Ended Experiments:

1. Using a Dual Trace Oscilloscope.
2. Converting the range of a given measuring instrument (voltmeter, ammeter).

Reference Books:

1. A text book in Electrical Technology - B L Theraja - S Chand and Co.
2. Performance and design of AC machines - M G Say ELBS Edn.
3. Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
4. Logic circuit design, Shimon P. Vingron, 2012, Springer.

5. Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning.
6. Electronic Devices and circuits, S. Salivahanan & N. S.Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill.
7. Electronic circuits: Handbook of design and applications, U.Tietze, Ch.Schenk, 2008, Springer
8. Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India.

3-RENEWABLE ENERGY & ENERGY HARVESTING

(Credits: 02)

Theory: 20 Classes (1hr duration)

The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible.

UNIT-I

Fossil fuels and Alternate Sources of energy: Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity.

Solar energy: Solar energy, its importance, storage of solar energy, solar pond, non plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.(10 Lectures)

UNIT-II

Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices. Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass. Geothermal Energy: Geothermal Resources, Geothermal Technologies.

Hydro Energy: Hydropower resources, hydropower technologies, environmental impact of hydro power sources. (10 Lectures)

Reference Books:

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
2. Solar energy - M P Agarwal - S Chand and Co. Ltd.
3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
4. Godfrey Boyle, Renewable Energy, Power for a sustainable future, 2004, Oxford University Press, in association with The Open University.
5. Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009

6. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
7. [http://en.wikipedia.org/wiki/Renewable energy](http://en.wikipedia.org/wiki/Renewable_energy).

4-APPLIED OPTICS
(Credits: 02)
THEORY: 20 Classes (1 hr. duration)

Theory includes only qualitative explanation. Minimum five experiments should be performed covering minimum three sections.

UNIT-I

Sources and Detectors: Lasers, Spontaneous and stimulated emissions, Theory of laser action, Einsteins coefficients, Light amplification, Characterization of laser beam, He-Ne laser, Semiconductor lasers.

Elementary ideas of Fourier Optics.

Concept of Spatial frequency filtering, Fourier transforming property of a thin lens. (10 Lectures)

UNIT-II

Holography

Basic principle and theory: coherence, resolution, Types of holograms, white light reflection hologram, application of holography in microscopy, interferometry, and character recognition.

Photonics: Fibre Optics

Optical fibres and their properties, Principal of light propagation through a fibre, The numerical aperture, Attenuation in optical fibre and attenuation limit, Single mode and multimode fibres, Fibre optic sensors: Fibre Bragg Grating. (10 Lectures)

Reference Books:

1. Fundamental of optics, F. A. Jenkins & H. E. White, 1981, Tata McGraw Hill.
2. LASERS: Fundamentals & applications, K.Thyagrajan & A.K.Ghatak, 2010, Tata McGraw Hill
3. Fibre optics through experiments, M.R.Shenoy, S.K.Khijwania, et.al. 2009, Viva Books.
4. Nonlinear Optics, Robert W. Boyd, (Chapter-I), 2008, Elsevier.
5. Optics, Karl Dieter Moller, Learning by computing with model examples, 2007, Springer.
6. Optical Systems and Processes, Joseph Shamir, 2009, PHI Learning Pvt. Ltd.
7. Optoelectronic Devices and Systems, S.C. Gupta, 2005, PHI Learning Pvt. Ltd.
8. Optical Physics, A.Lipson, S.G.Lipson, H.Lipson, 4th Edn., 1996, Cambridge Univ. Press.
9. Optics E.Hecht, (Pearson India).

GENERIC ELECTIVE (GE) (Minor-Physics)
For other Departments/Disciplines-(Credit: 06 each)

**GE:I-MECHANICS & PROPERTIES OF MATTER,
OSCILLATION & WAVES, THERMAL PHYSICS,
ELECTRICITY, MAGNETISM & ELECTRONICS**

(Credits: Theory - 04, Practicals 02)

Theory: 40 classes (1 hr. duration each)-Full Marks: 70

UNIT-I: Mechanics & Properties of Matter

Moment of Inertia Parallel axis and perpendicular axis theorem, M.I. of a Solid sphere and Solid cylinder, Gravitational potential and field due to a thin spherical shell and a solid sphere at external points and internal points. Relation among elastic constants, depression at free end of a light cantilever. Surface tension, pressure difference across a curved membrane, viscous flow, Poiseulles formula. (8 classes) 14 Marks

UNIT-II: Oscillation and Waves

Simple harmonic motion, damped harmonic motion, under damped, over damped and critically damped motion, Forced vibration, Resonance. Wave equation in a medium, Velocity of Longitudinal waves in an elastic medium and velocity of transverse wave in a stretched string. Composition of SHM, Lissajous figures for superposition of two orthogonal simple harmonic vibrations (a) with same frequency, (b) frequency with 2:1.(8 classes) 14 Marks

UNIT-III: Thermal Physics

Entropy, change in entropy in reversible and irreversible process, Carnot engine and its efficiency. Carnot Theorem, Second law of thermodynamics, Kelvin-Planck, Clausius formula. Thermal conductivity, differential equation for heat flow in one dimension. Maxwell thermodynamic relation (statement only), Clausius-Clapeyron equation. Black body radiation, Planck radiation formula (No derivation).(8 classes) 14 Marks

UNIT-IV: Electricity and Magnetism

Gauss law of electrostatics, use of Gauss law to compute electrostatic field due to a linear charge distribution. Magnetic induction B, Lorentz force law. Biot-Savarts law, Magnetic induction due to long straight current carrying conductor, and in the axis of a current carrying circular coil. Amperes Circuital law, its differential form. The law of electromagnetic equations, its differential and integral form. Maxwells electro-magnetic equations and their physical significance.

Growth and decay of currents in LR and RC circuits, time constant, alternating currents in RC, RL and LCR circuits, impedance, power factor, resonance.(8 classes) 14 Marks

UNIT-V: Electronics

Extrinsic and intrinsic semiconductors, P-type and N-type semiconductors. PN-Junction as rectifier, Half wave and Full wave rectifiers (Bridge type), efficiency, ripple factor, use of RC, LC, and filters, working of PNP and NPN transistors, transistor configurations in CE and CB circuits and relation between α and β . JFET, its operation and characteristics of V-I curve.(8 classes) 14 Marks

Reference Books:

1. Properties of Matter D.S. Mathur (S. Chand Publication).
2. Heat and Thermodynamics A.B. Gupta & H.B. Ray (New Central Book Agency).
3. Sound M. Ghosh (S. Chand Publication).
4. Introduction to Electrodynamics D.I. Griffith (Prentice Hall of India).
5. Foundations of Electronics Chattopadhyaya and Rakshit.
6. Physics of Degree students Vol.I M. Das, P.K. Jena, M. Bhuyan, D.K. Rout (Srikrishna Prakashan).
7. Physics of Degree students Vol.I M. Das, P.K. Jena, M. Bhuyan, and others (Srikrishna Prakashan).
8. University Physics Sears, Zemansky, H.D. Young (Addison Wesley).

GE:I LAB.

20 classes (2 hours duration each)-Full Marks: 30

1. Measurement of length (or diameter) using Vernier calipers, Screw gauge and travelling microscope.
2. To determine the moment of inertia of a fly wheel.
3. To determine the Youngs modulus Y of a wire by Searls method.
4. To determine the modulus of rigidity of a wire by Maxwells needle/Torsion Pendulum (Dynamic method).
5. To determine g by bar pendulum.
6. To determine the elastic constants of a wire by Searls method.
7. To determine the value of Y of a rubber by using travelling microscope.
8. To determine the Rigidity of modulus by static method.
9. To determine the frequency of a telescope by using Sonometer.
10. Verification of Laws of Vibration of a string by using Sonometer.
11. To compare capacitances using DeSauty bridge.
12. To determine the Law of resistance by using Foster bridge.
13. To determine the Mechanical equivalent of heat J by Callender and Barnes constants flow method.
14. To determine the J by Joules Calorimeter.
15. To determine the coefficient of viscosity of water by Capillary flow method (Poiseilles method).
16. Compare the specific heat of two liquids by method of Cooling.

Reference Books:

1. Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971, Asia Publishing House B.B. Swain.
2. A Laboratory Manual of Physics for Undergraduate Classes, D.P.Khandelwal (1985), Vani Publication.
3. A Text book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition (2011), Kitab Mahal, New Delhi.

GE:II-OPTICS, SPECIAL THEORY OF RELATIVITY, ATOMIC PHYSICS, QUANTUM MECHANICS & NUCLEAR PHYSICS

(Credits: Theory - 04, Practicals 02)

Theory: 40 classes (1hr duration each)-Full Marks: 70

UNIT-I: Optics-I

Elementary ideas of monochromatic aberrations and their minimization, chromatic aberration, achromatic combination. Theory of formation of Primary and Secondary rainbow. Condition of interference. Coherent sources. Youngs Double Slit experiment. Biprism and measurement of wave length of light of by it. Colour of thin films and Newtons rings. Fresnel and Fraunhofer diffraction, diffraction by Single slit Plane transmission grating.(8 classes) 14 Marks

UNIT-II: Optics-II and Relativity

Electromagnetic nature of light, polarized and unpolarized light, polarization by reflection and refraction. Brewsters Law, Malus Law, Double refraction. Ordinary and extraordinary rays.

Galilean transformation, Newtonian relativity and its limitation, Michelson Morley experiment and its consequence, postulates of special theory of relativity. Lorentz transformation, length contraction, time dilation, relativistic mass and momentum, mass energy relation.(8 classes) 14 Marks

UNIT-III: Atomic Physics

Inadequacy of classical physics, brief outline of Rayleigh Jeans theory and Plancks quantum theory of radiation, particle nature of electromagnetic radiation photo electric effect, Compton effect, dual nature of radiation, wave nature of particles, de-Broglie hypothesis, matter wave, wave-particle duality, Davisson-Germer experiment.

Bohrs theory of Hydrogen atom, explanation of Hydrogen Spectra correction for finite mass of the nucleus. Bohrs correspondence principle, limitations of Bohrs theory. Discrete energy, exchange by atom Frank Hertz experiment.(8 classes) 14 Marks

UNIT-IV: Quantum Mechanics

Heisenbergs Uncertainty relation. Time dependent Schrodingers wave equation in one dimension and three dimensions. The physical interpretation of the wave function. Probability density and probability current density. Equation of continuity. Normalization of the Wave function, Expectation value of an observable, Ehrenfests theorem.

Time independent Schrodingers wave equation in one dimension particle in a box, energy eigen values and eigen functions.(8 classes) 14 Marks

UNIT-V: Nuclear Physics

Properties of the nucleus Charge, Size, Spin, Magnetic Moment, Mass, Mass defect, Binding energy, Packing fraction, Nuclear force, and its characteristics features. Radioactive decay laws, average life, half life, nuclear fission, nuclear fusion, Linear accelerators, and cyclotron.(8 classes) 14 Marks

Reference Books:

1. Principles of Optics A.B. Gupta.
2. Fundamentals of Optics Jenkins and White.
3. Relativity R. Resnick.
4. Modern Physics H.S. Mani and G.K. Meheta.

5. Quantum Mechanics J.L. Powel and B. Craseman.
6. Atomic and Nuclear Physics Gupta and Ghosh (Books and allied).
7. Physics of Degree students Vol. III M. Das, P.K. Jena and others (Srikrishna Prakashan).
8. Physics of Degree students Vol. IV M. Das, P.K. Jena and others (Srikrishna Prakashan).
9. Concept of Modern Physics Arthur Beiser (Mc-graw Hill) (2009).
10. University Physics Sears, Zemansky, H.D. Young (Addison Wesley).

GE:II LAB.

20 classes (2 hours duration each)-Full Marks: 30

1. Determination of Horizontal component of Earth's magnetic field and magnetic moment of a bar magnet using deflection and oscillation magnetometer.
2. Determination of E.C.E. of a Copper by taking 3 readings.
3. Familiarization with Schuster focusing and determination of angle of prism.
4. Determination of Refractive index of the material of a prism using Sodium light.
5. To determine the wavelength of light using plane diffraction grating.
6. To determine the wavelength of light using Newton's ring.
7. Determination of refractive index of (a) glass and (b) liquid by using travelling microscope.
8. Determination of radius of curvature of a convex/concave mirror by using Kohlrausch's method.
9. To determine the magnifying power of a given telescope.
10. Verification of inverse square law of magnetism by using a deflection magnetometer.
11. To draw the static characteristics of a P-N junction diode.
12. Obtain the static characteristics of a P-N-P / N-P-N transistor / Triode Valve.
13. To determine the reduction factor of a tangent Galvanometer.
14. Variation of magnetic field along the axis of a circular coil carrying current.
15. To study the characteristics of a series RC circuit.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House.
2. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal (1985), Vani Publication.
3. A Text book of Practical Physics, Indu Prakash And Ramakrishna, 11th Edition (2011), Kitab Mahal, New Delhi.

PHYSICS(PASS)

SEMESTER-I

DSC 1A: MECHANICS

(Credits: Theory-04, Practicals-02)

Theory: 40 Classes (1 hr. duration)-Marks: 70

UNIT-I

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. (2 Lectures)

Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. (2 Lectures)

Laws of Motion: Frames of reference. Newtons Laws of motion. Dynamics of a system of particles. Centre of Mass. (4 Lectures)

Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. (2 Lectures)

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. (3 Lectures)

Gravitation: Newtons Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Keplers Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. (7 Lectures)

UNIT-II

Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. (6 Lectures)

Elasticity: Hookes law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poissons Ratio-Expression for Poissons ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion - Torsional pendulum-Determination of Rigidity modulus and moment of inertia - q , η and σ by Searles method. (8 Lectures)

Special Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities. (6 Lectures)

Note: *Students are not familiar with vector calculus. Hence all examples involve differentiation either in one dimension or with respect to the radial coordinate.*

Reference Books:

1. University Physics. F.W. Sears, M.W. Zemansky and H.D. Young, 13/e, 1986. Addison-Wesley
2. Mechanics Berkeley Physics, v.1: Charles Kittel, et. al. 2007, Tata McGraw-Hill.

3. Physics Resnick, Halliday & Walker 9/e, 2010, Wiley
4. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
5. Properties of Matter - D.S. Mathur (S.Chand publication) 2013
6. Mechanics- D.C.Tayal (Himalaya Publication) 2013
7. Classical Dynamics of Particles and Systems S. T. Thornton (Cengage Learning) 2012
8. Analytical Mechanics-Fowles (Cengage Learnings) 2014

DSC 1A-LAB: MECHANICS
20 Classes (2 hrs. duration)-Marks:30

1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.
2. To determine the Height of a Building using a Sextant.
3. To determine the Moment of Inertia of a Flywheel.
4. To determine the Young's Modulus of a Wire by Optical Lever Method.
5. To determine the Modulus of Rigidity of a Wire by Maxwells needle.
6. To determine the Elastic Constants of a Wire by Searles method.
7. To determine g by Bar Pendulum.
8. To determine g by Katers Pendulum.
9. To study the Motion of a Spring and calculate (a) Spring Constant, (b) g.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

SEMESTER-II

DSC 1B: ELECTRICITY, MAGNETISM AND EMT
(Credits: Theory-04, Practicals-02)
Theory: 40 Classes (1 hr. duration)-Marks:70

UNIT-I

Vector Analysis: Scalar and Vector product, gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only). (8 Lectures)

Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric. (12 Lectures)

UNIT-II

Magnetism:

Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para-and ferromagnetic materials. (6 Lectures)

Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field. (4 Lectures)

Maxwell's equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization. (10 Lectures)

Reference Books:

1. Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education
2. Electricity & Magnetism, J.H. Fewkes & J.Yarwood. Vol. I, 1991, Oxford Univ. Press
3. Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
4. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
5. D.J.Griffiths, Introduction to Electrodynamics, 3rd Edn, 1998, Benjamin Cummings.
6. Electricity and Magnetism- K.K Tewari (S. Chand Higher Academics)2013
7. Electricity and Magnetism -D. C. Tayal (Himalay Pub.)2014

DSC 1B-LAB: ELECTRICITY, MAGNETISM AND EMT

20 Classes (2 hrs. duration)-Marks:30

1. To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses.
2. Ballistic Galvanometer:
 - (i) Measurement of charge and current sensitivity
 - (ii) Measurement of CDR
 - (iii) Determine a high resistance by Leakage Method

- (iv) To determine Self Inductance of a Coil by Rayleighs Method. 3. To compare capacitances using DeSautys bridge.
4. Measurement of field strength B and its variation in a Solenoid (Determine dB/dx) 5. To study the Characteristics of a Series RC Circuit.
6. To study a series LCR circuit LCR circuit and determine its (a) Resonant frequency, (b) Quality factor
7. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q
8. To determine a Low Resistance by Carey Fosters Bridge.
9. To verify the Thevenin and Norton theorems.
10. To verify the Superposition, and Maximum Power Transfer Theorems.

Reference Books:

1. Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed.2011, Kitab Mahal

SEMESTER-III

DSC 1C: THERMAL PHYSICS AND STATISTICAL MECHANICS

(Credits: Theory-04, Practicals-02)

Theory: 40 Classes (1 hr. duration)-Marks: 70

UNIT-I

Laws of Thermodynamics: Thermodynamic Description of system: Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between CP and CV, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Coefficient, Reversible and irreversible processes, Second law and Entropy, Carnots cycle & theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams, Third law of thermodynamics, Unattainability of absolute zero. (10 Lectures)

Thermodynamical Potentials: Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwells relations and applications - Joule-Thompson Effect, Clausius- Clapeyron Equation, Expression for (CP - CV), CP/CV, TdS equations. (10 Lectures)

UNIT-II

Kinetic Theory of Gases: Derivation of Maxwells law of distribution of velocities and its experimental verification, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases. (10 Lectures)

Theory of Radiation: Blackbody radiation, Spectral distribution, Concept of Energy Density,

Derivation of Planck's law, Deduction of Wiens distribution law, Rayleigh- Jeans Law, Stefan Boltzmann Law and Wiens displacement law from Plancks law. (6 Lectures)

Statistical Mechanics: Maxwell-Boltzmann law - distribution of velocity - Quantum statistics - Phase space - Fermi-Dirac distribution law - electron gas - Bose-Einstein distribution law - photon gas - comparison of three statistics. (4 Lectures)

Reference Books:

1. Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1993, Tata McGraw-Hill.
2. A Treatise on Heat, Meghnad Saha, and B.N. Srivastava, 1969, Indian Press.
3. Thermodynamics, Enrico Fermi, 1956, Courier Dover Publications.
4. Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears and G.L. Salinger. 1988, Narosa
5. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
6. Thermal and Statistical Physics —M. Das , P. K. Jena and others (Sri Krishna Prakashan)
7. Heat and Thermal Physics-Brijlal & Subramaiam (S.Chand Publication) 2014
8. Thermal Physics– C. Kittel and H. Kroemer (McMillan Education India) 2010
9. Thermodynamics & Statistical Physics-J.K.Sharma, K.K.Sarkar (Himalaya Pub.)2014

DSC 1C-LAB: THERMAL PHYSICS AND STATISTICAL MECHANICS

20 Classes (2 hrs. duration)-Marks:30

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barnes constant flow method.
2. Measurement of Plancks constant using black body radiation.
3. To determine Stefans Constant.
4. To determine the coefficient of thermal conductivity of Cu by Searles Apparatus.
5. To determine the Coefficient of Thermal Conductivity of Cu by Angstroms Method.
6. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charltons disc method.
7. To determine the temperature co-efficient of resistance by Platinum resistance thermometer.
8. To study the variation of thermo emf across two junctions of a thermocouple with temperature.
9. To record and analyze the cooling temperature of an hot object as a function of time using a thermocouple and suitable data acquisition system.
10. To calibrate Resistance Temperature Device (RTD) using Null Method/Off- Balance Bridge.

Reference Books:

1. Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971, Asia Publishing House.

2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
3. A Laboratory Manual of Physics for Undergraduate Classes, D.P.Khandelwal, 1985, Vani Publication.

SEMESTER-IV

DSC 1D: WAVES AND OPTICS

(Credits: Theory-04, Practicals-02)

Theory: 40 Classes (1hr duration)-Marks: 70

UNIT-I

Fluids: Surface Tension- Synclastic and anticlastic surface - Excess of pressure - Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegars method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuilles formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of liquid with temperature- lubrication. (6 Lectures)

Sound: Simple harmonic motion - forced vibrations and resonance - Fouriers Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabines formula - measurement of reverberation time - Acoustic aspects of halls and auditoria. (6 Lectures)

Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. (2 Lectures)

Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. (2 Lectures)

Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. (2 Lectures)

UNIT-II

Interference: Interference: Division of amplitude and division of wavefront. Youngs Double Slit experiment. Lloyds Mirror and Fresnels Biprism. Phase change on reflection: Stokes treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newtons Rings: measurement of wavelength and refractive index. (10 Lectures)

Michelsons Interferometer: (1) Idea of form of fringes (no theory needed), (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, and (5) Visibility of fringes.(2 Lectures)

Diffraction: Fraunhofer diffraction- Single slit; Double Slit. Multiple slits and Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis. (7 Lectures)

Polarization: Transverse nature of light waves. Plane polarized light production and analysis. Circular and elliptical polarization. (3 Lectures)

Reference Books:

1. Fundamentals of Optics, F.A Jenkins and H.E White, 1976, McGraw-Hill
2. Principles of Optics, B.K. Mathur, 1995, Gopal Printing
3. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publications
4. University Physics. F.W. Sears, M.W. Zemansky and H.D. Young. 13/e, 1986. Addison-Wesley.

DSC 1D-LAB: WAVES AND OPTICS

20 Classes (2 hrs. duration)-Marks: 30

1. To investigate the motion of coupled oscillators.
2. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's Experiment and to verify $2\pi T$ Law.
3. To study Lissajous Figures.
4. Familiarization with Schuster's focussing; determination of angle of prism.
5. To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
6. To determine the Refractive Index of the Material of a Prism using Sodium Light.
7. To determine Dispersive Power of the Material of a Prism using Mercury Light.
8. To determine the value of Cauchy Constants.
9. To determine the Resolving Power of a Prism.
10. To determine wavelength of sodium light using Fresnel Biprism.
11. To determine wavelength of sodium light using Newton's Rings.
12. To determine the wavelength of Laser light using Diffraction of Single Slit.
13. To determine wavelength of (1) Sodium and (2) Spectral lines of the Mercury light using plane diffraction Grating
14. To determine the Resolving Power of a Plane Diffraction Grating.
15. To measure the intensity using photosensor and laser in diffraction patterns of single and double slits.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

DISCIPLINE SPECIFIC ELECTIVE(DSE)

(Select Two Papers).

DSE: DIGITAL AND ANALOG CIRCUITS AND INSTRUMENTATION

(Credits: Theory-04, Practicals-02)

Theory: 40 Lectures-Marks: 70

UNIT-1:

Digital Circuits

Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates. (5 Lectures)

De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Minterms and Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. (5 Lectures)

UNIT-2:

Semiconductor Devices and Amplifiers:

Semiconductor Diodes: p and n type semiconductors. Barrier Formation in PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode. PN junction and its characteristics. Static and Dynamic Resistance. Principle and structure of (1) LEDs (2) Photodiode (3) Solar Cell. (5 Lectures)

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Current gains α and β . Relations between α and β . Load Line analysis of Transistors. DC Load line and Q-point. Active, Cutoff, and Saturation Regions. Voltage Divider Bias Circuit for CE Amplifier. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Class A, B, and C Amplifiers. (10 Lectures)

UNIT-3:

Operational Amplifiers (Black Box approach):

Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop & Closed-loop Gain. CMRR, concept of Virtual ground. Applications of Op-Amps: (1) Inverting and Non-inverting Amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Zero Crossing Detector. (7 Lectures)

Instrumentations:

Introduction to CRO: Block Diagram of CRO. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference.(3 Lectures)

Power Supply: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers Calculation of Ripple Factor and Rectification Efficiency, Basic idea about capacitor filter, Zener Diode and Voltage Regulation (5 Lectures)

Reference Books:

1. Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
2. Electronic devices and circuits, S. Salivahanan and N.Suresh Kumar, 2012, Tata Mc-Graw Hill.
3. Microelectronic Circuits, M.H. Rashid, 2ndEdn.,2011, Cengage Learning.
4. Modern Electronic Instrumentation & Measurement Tech.,Helfrick & Cooper,1990, PHI Learning
5. Digital Principles & Applications, A.P.Malvino, D.P.Leach & Saha, 7th Ed.,2011, Tata Mc-Graw Hill
6. Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd.
7. OP-AMP and Linear Digital Circuits, R.A. Gayakwad, 2000, PHI Learning Pvt. Ltd.

DSC-LAB: DIGITAL AND ANALOG CIRCUITS AND INSTRUMENTATION
20 Classes (2 hrS. duration)-Marks:30

1. To measure (a) Voltage, and (b) Frequency of a periodic waveform using a CRO.
2. To verify and design AND, OR, NOT and XOR gates using NAND gates.
3. To minimize a given logic circuit.
4. Half adder, Full adder and 4-bit Binary Adder.
5. Adder-Subtractor using Full Adder I.C.
6. To design an astable multivibrator of given specifications using 555 Timer.
7. To design a monostable multivibrator of given specifications using 555 Timer.
8. To study IV characteristics of PN diode, Zener and Light emitting diode.
9. To study the characteristics of a Transistor in CE configuration.
10. To design a CE amplifier of a given gain (mid-gain) using voltage divider bias.
11. To design an inverting amplifier of given gain using Op-amp 741 and study its frequency response.
12. To design a non-inverting amplifier of given gain using Op-amp 741 and study its Frequency Response.
13. To study a precision Differential Amplifier of given I/O specification using Opamp.
14. To investigate the use of an op-amp as a Differentiator.
15. To design a Wien Bridge Oscillator using an op-amp.

Reference Books:

1. Basic Electronics: A text lab manual, P.B.Zbar, A.P.Malvino, M.A.Miller, 1994,Mc-Graw Hill.
2. Electronics: Fundamentals and Applications, J.D. Ryder, 2004, Prentice Hall.
3. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall.
4. Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.

DSE: SOLID STATE PHYSICS

(Credits: Theory-04, Practicals-02)

Theory: 40 Lectures-Marks: 70

Prerequisites: Knowledge of Elements of Modern Physics

UNIT-1:

Crystal Structure: Solids-Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Braggs Law. Atomic and Geometrical Factor. (8 Lectures)

Elementary Lattice Dynamics: Lattice Vibrations and Phonons-Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petits Law, Einstein and Debye theories of specific heat of solids. T₃ law (6 Lectures)

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curies law, Weiss Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss. (8 Lectures)

UNIT-II

Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeier relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons. (6 Lectures)

Elementary band theory: Kronig Penny model. Band Gaps. Conductors, Semiconductors and insulators. P and N type Semiconductors. Conductivity of Semiconductors, mobility, Hall Effect, Hall coefficient. (6 Lectures)

Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, Londons Equation and Penetration Depth. Isotope effect. (6 Lectures)

Reference Books:

1. Introduction to Solid State Physics, Charles Kittel, 8th Ed., 2004, Wiley India Pvt. Ltd.
2. Elements of Solid State Physics, J.P. Srivastava, 2nd Ed., 2006, Prentice-Hall of India
3. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill
4. Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning
5. Solid-state Physics, H. Ibach and H. Luth, 2009, Springer
6. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India

7. Solid State Physics, M.A. Wahab, 2011, Narosa Publications

DSC LAB: SOLID STATE PHYSICS

20 Classes (2 hrs. duration)-Marks: 30

1. Measurement of susceptibility of paramagnetic solution (Quinck's Tube Method).
2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. To measure the Dielectric Constant of a dielectric Materials with frequency.
5. To determine the complex dielectric constant and plasma frequency of metal using Surface Plasmon resonance (SPR).
6. To determine the refractive index of a dielectric layer using SPR.
7. To study the PE Hysteresis loop of a Ferroelectric Crystal.
8. To study the BH curve of iron using a Solenoid and determine the energy loss.
9. To measure the resistivity of a semiconductor (Ge) crystal with temperature by four-probe method (room temperature to 150 oC) and to determine its band gap.
10. To determine the Hall coefficient of a semiconductor sample.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Edn., 2011, Kitab Mahal
4. Elements of Solid State Physics, J.P. Srivastava, 2nd Ed., 2006, Prentice-Hall of India

DSE: ELEMENTS OF MODERN PHYSICS

(Credits: Theory-04, Practicals-02)

Theory: 40 Lectures-Marks: 70

UNIT-I

Plancks quantum, Plancks constant and light as a collection of photons; Photoelectric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson-Germer experiment.(6 Lectures)

Problems with Rutherford model-instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra. (4 Lectures)

Position measurement-gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle- impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle. (4 Lectures)

Two slit interference experiment with photons, atoms & particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of wavefunction, probabilities and normalization; Probability and probability current densities in one dimension. (8 Lectures)

UNIT-II

One dimensional infinitely rigid box-energy eigenvalues and eigenfunctions, normalization; Quantum dot as an example; Quantum mechanical scattering and tunnelling in one dimension - across a step potential and across a rectangular potential barrier. (8 Lectures)

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, semi-empirical mass formula and binding energy. (4 Lectures)

Radioactivity: stability of nucleus; Law of radioactive decay; Mean life and half-life; α decay; β decay-energy released, spectrum and Pauli's prediction of neutrino; γ -ray emission.(4 Lectures)

Fission and fusion-mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions. (2 Lectures)

Reference Books:

1. Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill.
2. Modern Physics, J.R. Taylor, C.D. Zafiratos, M.A. Dubson, 2009, PHI Learning
3. Six Ideas that Shaped Physics: Particle Behave like Waves, Thomas A. Moore, 2003, McGraw Hill
4. Quantum Physics, Berkeley Physics, Vol.4. E.H. Wichman, 2008, Tata McGraw-Hill Co.
5. Modern Physics, R.A. Serway, C.J. Moses, and C.A. Moyer, 2005, Cengage Learning

DSC LAB: ELEMENTS OF MODERN PHYSICS

20 Classes (2 hrs. duration)-Marks: 30

1. To determine value of Boltzmann constant using V-I characteristic of PN diode.
2. To determine work function of material of filament of directly heated vacuum diode.
3. To determine the ionization potential of mercury.
4. To determine value of Planck's constant using LEDs of at least 4 different colours.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the absorption lines in the rotational spectrum of Iodine vapour.
7. To study the diffraction patterns of single and double slits using laser and measure its intensity variation using Photosensor & compare with incoherent source Na.
8. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light.
9. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.

10. To setup the Millikan oil drop apparatus and determine the charge of an electron.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

SKILL ENHANCEMENT COURSE(Four)

(Credit: 02 each)-SEC:1 to SEC:4

1. COMMUNICATIVE ENGLISH & ENGLISH WRITING SKILL(Compulsory)

(Credits: Theory-02)

2. COMPUTATIONAL PHYSICS

(Credits: Theory-02)

Theory: 20 Classes (1 hr. duration)

UNIT-I

Introduction: Importance of computers in Physics, paradigm for solving physics problems for solution. Usage of linux as an Editor. Algorithms and Flowcharts: Algorithm: Definition, properties and development. Flowchart: Concept of flowchart, symbols, guidelines, types. Examples: Cartesian to Spherical Polar Coordinates, Roots of Quadratic Equation, Sum of a finite series.

Scientific Programming: Development of FORTRAN, Basic elements of FORTRAN: Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program. Fortran Statements: I/O Statements (unformatted/formatted), Executable and Non-Executable Statements, Layout of Fortran Program, Format of writing. (10 Lectures)

UNIT-II

Control Statements: Types of Logic (Sequential, Selection, Repetition), Branching Statements (Logical IF, Arithmetic IF, Block IF, Nested Block IF, SELECT CASE and ELSE IF Ladder statements), DO Loop Statements, Jumping Statements (Unconditional GOTO, Computed GOTO, Assigned GOTO) Subscripted Variables (Arrays: Types of Arrays, DIMENSION Statement, Reading and Writing Arrays), Functions and Subroutines (Arithmetic Statement Function, Function Subprogram and Subroutine), RETURN, CALL Statements), open a file, writing in a file, reading from a file.

Programming:

1. Exercises on syntax on usage of FORTRAN.
2. To print out all natural even/ odd numbers between given limits.
3. To find maximum, minimum and range of a given set of numbers.
4. To find a set of prime numbers and Fibonacci series. (10 Lectures)

Reference Books:

1. Introduction to Numerical Analysis, S.S. Sastry, 5th Edn., 2012, PHI Learning Pvt. Ltd.
2. Computer Programming in Fortran 77. V. Rajaraman (Publisher: PHI).
3. Schaums Outline of Theory and Problems of Programming with Fortran, S Lipsdutz and A Poe, 1986Mc-Graw Hill Book Co.

4. Computational Physics: An Introduction, R. C. Verma, et al. New Age International Publishers, New Delhi(1999).
5. A first course in Numerical Methods, U.M. Ascher and C. Greif, 2012, PHI Learning.
6. Elementary Numerical Analysis, K.E. Atkinson, 3 r d Edn., 2007, Wiley India Edition.

3. BASIC INSTRUMENTATION SKILLS

(Credits: Theory-02)

Theory: 20 Classes (1 hr. duration)

This course is to get exposure with various aspects of instruments and their usage through hands-on mode. Experiments listed below are to be done in continuation of the topics.

UNIT-I

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance.

AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter, specifications and their significance.

Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance.

Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working. (10 Lectures)

UNIT-II

Signal Generators and Analysis Instruments: Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis.

Digital Instruments: Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter.

Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time-base stability, accuracy and resolution. (10 Lectures)

The test of lab skills will be of the following test items:

1. Use of an oscilloscope.
2. CRO as a versatile measuring device.

3. Circuit tracing of Laboratory electronic equipment.
4. Use of Digital multimeter/VTVM for measuring voltages,
5. Circuit tracing of Laboratory electronic equipment.
6. Winding a coil / transformer.
7. Study the layout of receiver circuit.
8. Trouble shooting a circuit.
9. Balancing of bridges.

Laboratory Exercises:

1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance.
2. To observe the limitations of a multimeter for measuring high frequency voltage and currents.
3. To measure Q of a coil and its dependence on frequency, using a Q- meter.
4. Measurement of voltage, frequency, time period and phase angle using CRO.
5. Measurement of time period, frequency, average period using universal counter/ frequency counter.
6. Measurement of rise, fall and delay times using a CRO.
7. Measurement of distortion of a RF signal generator using distortion factor meter.
8. Measurement of R, L and C using a LCR bridge/ universal bridge.

Open Ended Experiments:

1. Using a Dual Trace Oscilloscope.
2. Converting the range of a given measuring instrument (voltmeter, ammeter).

Reference Books:

1. A text book in Electrical Technology - B L Theraja - S Chand and Co.
2. Performance and design of AC machines - M G Say ELBS Edn.
3. Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
4. Logic circuit design, Shimon P. Vingron, 2012, Springer.
5. Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning.
6. Electronic Devices and circuits, S. Salivahanan & N. S.Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill.
7. Electronic circuits: Handbook of design and applications, U.Tietze, Ch.Schenk, 2008, Springer.
8. Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India.

4. RENEWABLE ENERGY AND ENERGY HARVESTING

(Credits: Theory-02)

Theory: 20 Classes (1 hr. duration)

The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible.

UNIT-I

Fossil fuels and Alternate Sources of energy: Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy, Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity.

Solar energy: Solar energy, its importance, storage of solar energy, solar pond, non plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems. (10 Lectures)

UNIT-II

Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices.

Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass.

Geothermal Energy: Geothermal Resources, Geothermal Technologies.

Hydro Energy: Hydropower resources, hydropower technologies, environmental impact of hydro power sources.(10 Lectures)

Reference Books:

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
2. Solar energy - M P Agarwal - S Chand and Co. Ltd.
3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
4. Godfrey Boyle, Renewable Energy, Power for a sustainable future, 2004, Oxford University Press, in association with The Open University.
5. Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
6. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
7. [http://en.wikipedia.org/wiki/Renewable energy](http://en.wikipedia.org/wiki/Renewable_energy).

5. APPLIED OPTICS

(Credits: Theory-02)

Theory: 20 Classes (1 hr. duration)

Theory includes only qualitative explanation. Minimum five experiments should be performed covering minimum three sections.

UNIT-I

Sources and Detectors: Lasers, Spontaneous and stimulated emissions, Theory of laser action, Einsteins coefficients, Light amplification, Characterization of laser beam, He-Ne laser, Semiconductor lasers.

Elementary ideas of Fourier Optics: Concept of Spatial frequency filtering, Fourier transforming property of a thin lens. (10 Lectures)

UNIT-II

Holography

Basic principle and theory: coherence, resolution, Types of holograms, white light reflection hologram, application of holography in microscopy, interferometry, and character recognition. **Photonics:** Fibre Optics, Optical fibres and their properties, Principal of light propagation through a fibre, The numerical aperture, Attenuation in optical fibre and attenuation limit, Single mode and multimode fibres, Fibre optic sensors: Fibre Bragg Grating. (10 Lectures)

Reference Books:

1. Fundamental of optics, F. A. Jenkins & H. E. White, 1981, Tata McGraw hill.
2. LASERS: Fundamentals & applications, K.Thyagrajan & A.K.Ghatak, 2010, Tata McGraw Hill
3. Fibre optics through experiments, M.R.Shenoy, S.K.Khijwania, et.al. 2009, Viva Books
4. Nonlinear Optics, Robert W. Boyd, (Chapter-I), 2008, Elsevier.
5. Optics, Karl Dieter Moller, Learning by computing with model examples, 2007, Springer.
6. Optical Systems and Processes, Joseph Shamir, 2009, PHI Learning Pvt. Ltd.
7. Optoelectronic Devices and Systems, S.C. Gupta, 2005, PHI Learning Pvt. Ltd.
8. Optical Physics, A.Lipson, S.G.Lipson, H.Lipson, 4th Edn., 1996, Cambridge Univ. Press.

PSYCHOLOGY(HONOURS)

SEMESTER-I

C:1-INTRODUCTORY PSYCHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The course is designed to give the student a basic understanding of the psychology of human behavior. The students will be given exposure to concepts, terminology, principles, and theories that comprise an introductory course in psychology.

Learning Objectives:

1. To help the students to know the sources and processes of development of modern scientific psychology.
2. To help the students to develop a scientific temperament in studying and understanding human behavior.

Expected outcomes: Students will be able to

1. Define the term psychology and demonstrate command of the basic terminology, concepts, and principles of the discipline.
2. Gain knowledge of scientific methodologythe variety of ways in which psychological data are gathered and evaluated / interpreted.
3. Identify and compare the major perspectives in psychology: Recognize how each approach views human thought and behavior.
4. Understand the physiological and biochemical links of human behavior.

UNIT-I: Introducing Psychology

- (i) Concept and definition of psychology, Roots of psychology, Psychology as a scientific discipline.
- (ii) Key Perspectives in Psychology- Behavioral, Cognitive, Humanistic, Psychodynamic, and Sociocultural

UNIT-II: Methods in Psychology

- (i) Natural Observation, Survey and Case Study- Nature, advantages and limitations.
- (ii) Experimental and Correlational methods-Nature, advantages and limitations.

UNIT-III: Biological Bases of Behavior

- (i) Structure and functions of the neurons, Communication within and between neurons, Chemical regulation of the endocrine glands.
- (ii) Structure and functions of the Central nervous system and Autonomic nervous system.

UNIT-IV: States of Mind

- (i) Nature of consciousness; changes in consciousness- sleep-wake schedules
- (ii) Extended states of Consciousness- Hypnosis, Meditation and Hallucinations

PRACTICAL

- (i) **R.L. by Method of Limits:** To find out the R. L. of volar surface of the right arm of a subject by method of limits.
- (ii) **D.L. by Method of Constant Stimuli:** To find out the D.L. for lifted weight of your subject by method of constant stimuli.

Recommended Books

1. Baron, R. A. (2002). Psychology (5th Edition), New Delhi: Pearson Education.
2. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
3. Feldman, R.S. (2004). Understanding Psychology (6th Edition), New Delhi, Tata-McGraw Hill.
4. Gerrig, R.J. & Zimbardo, P.G. (2010). Psychology and Life (19th Ed.). Delhi: Allyn & Bacon.
5. Hilgard & Atkinson- Introduction to Psychology (2003) 14th Edition, Thomson Learning Inc.
6. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, Divya Prakashani, Samantarapur, Bhubaneswar.
7. Morgan, C.T., King, R.A., Weisz, J.R., & Schopler, J. (2008). Introduction to psychology (7th edition) Bombay: Tata-McGraw Hill.
8. Morris, C. G. (1990). Psychology: An Introduction. New Delhi: Prentice Hall.
9. Passer, M.W. & Smith, R.E. (2007). Psychology: The Science of Mind and Behaviour (3rd Ed.). New Delhi: Tata McGraw-Hill
10. Zimbardo, P.G. & Weber, A.L. (1997 Ed.)- Psychology- New York, Harper Collins College Publishers

C:2-BASIC DEVELOPMENTAL PROCESSES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The course is designed to expose students to a basic understanding about the fundamental concerns of developmental psychology and provide examples of the following three dimensions of development: growth, differentiation, and orderly progression.

Learning Objectives:

1. To help students gain some key ideas about human development and the perspectives to understand and explain such developments.
2. To help the students to understand the significance of prenatal period for human development.
3. To help the students to understand the developmental preparations of the childhood and the implications of developmental milestones for the normal human development.

Expected outcomes: Students will be able to

1. Understand the nature, types, and principle of development.
2. Understand the processes of formation of life and development during pre- and post-natal periods.
3. Understand about the different aspects of preparation for future life.

UNIT-I: Basics of development

- (i) Meaning, nature, and types of development; Principles of development; Factors influencing development
- (ii) Perspectives of development- Psychoanalytic; Mechanistic; Organismic; Humanistic

UNIT-II: Life in formation

- (i) Fertilization, determination of sex, multiple birth; Prenatal development- germinal stage, embryonic stage, fetal stage; Factors influencing prenatal development
- (ii) Physical and motor developments, Social and emotional developments during childhood.

UNIT-III: Life in preparation

- (i) Physical and motor developments, Social and emotional developments during adolescence.
- (ii) Piagets stage of cognitive development; Kohlbergs stages of moral development

UNIT-IV: Self and identity

- (i) Emergence of self; Structure of the self; Development of personal identity

- (ii) Development of self control; Development of gender differences and gender roles

PRACTICAL

- (i) **Locus of Control:** To assess the Locus of Control of four college students by using Rotter's Locus of Control Scale.
- (ii) **Emotional Intelligence:** To measure the emotional intelligence of four college students by using the Schutte's Emotional Intelligence Scale

Recommended Books

1. Baron, R. A. (2002). Psychology (5th Edition), New Delhi, Pearson Education.
2. Berk, L. E. (2010). Child Development (8th Ed.). New Delhi: Prentice Hall.
3. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
4. Hurlock, E. Developmental Psychology (1995). IV Edition. New Delhi: Tata McGraw Hill.
5. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
6. Papalia, Diane E., Sally Wendos Olds (2006). Human Development. 9th Edition. New Delhi: Tata McGraw Hill
7. Santrock, J. W. (2008). Child Development (11th Ed.). New Delhi: Tata McGraw Hill.
8. Sigelman, G.K. & Schaffer, D.R. (1995). Life-span Human Development, Brooks / Cole Publishing Co. Pacific Grove, California

GE:1-INTRODUCTORY PSYCHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The course is designed to give the student a basic understanding of the psychology of human behavior. The students will be given exposure to concepts, terminology, principles, and theories that comprise an introductory course in psychology.

Learning Objectives:

1. To help the students to know the sources and processes of development of modern scientific psychology.
2. To help the students to develop a scientific temperament in studying and understanding human behavior.

Expected outcomes: Students will be able to

1. Define the term psychology and demonstrate command of the basic terminology, concepts, and principles of the discipline.
2. Gain knowledge of scientific methodologythe variety of ways in which psychological data are gathered and evaluated / interpreted.
3. Identify and compare the major perspectives in psychology: Recognize how each approach views human thought and behavior.
4. Understand the physiological and biochemical links of human behavior.

UNIT-I: Introducing Psychology

- (i) Concept and definition of psychology, Roots of psychology, Psychology as a scientific discipline.
- (ii) Key Perspectives in Psychology- Behavioral, Cognitive, Humanistic, Psychodynamic, and Sociocultural

UNIT-II: Methods in Psychology

- (i) Natural Observation, Survey and Case Study- Nature, advantages and limitations.
- (ii) Experimental and Correlational methods-Nature, advantages and limitations.

UNIT-III: Biological Bases of Behavior

- (i) Structure and functions of the neurons, Communication within and between neurons, Chemical regulation of the endocrine glands.
- (ii) Structure and functions of the Central nervous system and Autonomic nervous system.

UNIT-IV: States of Mind

- (i) Nature of consciousness; changes in consciousness- sleep-wake schedules
- (ii) Extended states of Consciousness- Hypnosis, Meditation and Hallucinations

PRACTICAL

- (i) **R.L. by Method of Limits:** Students are required to find out the R. L. of volar surface of the right arm of a subject by method of limits
- (ii) **D.L. by Method of Constant Stimuli:** To find out the D.L. for lifted weight of your subject by method of constant stimuli.

Recommended Books

1. Baron, R. A. (2002). Psychology (5th Edition), New Delhi: Pearson Education.

2. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
3. Feldman, R.S. (2004). Understanding Psychology (6th Edition), New Delhi, Tata-McGraw Hill.
4. Gerrig, R.J. & Zimbardo, P.G. (2010). Psychology and Life (19th Ed.). Delhi: Allyn & Bacon.
5. Hilgard & Atkinson- Introduction to Psychology (2003) 14th Edition, Thomson Learning Inc.
6. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, Divya Prakashani, Samantarapur, Bhubaneswar.
7. Morgan, C.T., King, R.A., Weisz, J.R., & Schopler, J. (2008). Introduction to psychology (7th edition) Bombay: Tata-McGraw Hill.
8. Morris, C. G. (1990). Psychology: An Introduction. New Delhi: Prentice Hall.
9. Passer, M.W. & Smith, R.E. (2007). Psychology: The Science of Mind and Behaviour (3rd Ed.). New Delhi: Tata McGraw-Hill
10. Zimbardo, P.G. & Weber, A.L. (1997 Ed.)- Psychology- New York, Harper Collins College Publishers

SEMESTER-II

C:3-BASIC PSYCHOLOGICAL PROCESSES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The course is designed to provide the student a basic understanding of the psychological processes from sensation to thought and communication. The student will be given exposure to the concepts, terminology, principles, and theories relating to each of the mental processes that constitute human psychology.

Learning Objectives:

1. To help the students to understand the mental processes to begin with sensation and perception up to how it results in thoughts and communication.
2. To help the students gather knowledge about the structural and functional dynamics of each of the mental processes and their interconnectedness.

Expected outcomes: Students will be able to

1. Understand the bases sensory actions and the processes of integration of sensory actions in creating and interpreting perceptual events.

2. Gain knowledge of the important processes and principles of human learning as well as the structural functional attributes of human memory to help conserve the learning outcomes.
3. Understand the structural and functional properties of language and the way it helps thought, communication, problem solving and decision making through development of concepts, ideas, images, and so on.

UNIT-I: Sensation and Perception

- (i) Basics of sensation- Sensory receptors (eye and ear), transduction, sensory thresholds, and sensory adaptation
- (ii) Nature of perceptual process- Figure and ground, Grouping (Gestalt laws), Perceptual constancies, and illusions, Perception of distance and depth.

UNIT-II: Learning and Memory

- (i) Nature and principles of Classical conditioning, Operant conditioning, and Observational learning
- (ii) The Atkinson and Shiffrin Model of Memory; Types of Memory- episodic, semantic and procedural; Causes of Forgetting- interference, repression, and amnesia

UNIT-III: Language and Communication

- (i) Properties and structure of language, Linguistic hierarchy, Language acquisition-predisposition, Nature of effective communication
- (ii) Stages of language development; critical period controversy; speech error and its implications

UNIT-IV: Thinking and Reasoning

- (i) Thinking process; concepts, categories and prototypes, Decision making and factors of influencing decision making.
- (ii) Inductive and deductive reasoning; Problem solving approaches; Steps in problem solving

PRACTICAL

- (i) **Learning Curve:** To demonstrate the Learning Curve as a function of Learning trials using Non-sense Syllables.
- (ii) **Serial Position Effect:** To demonstrate the serial position effect on memory in learning a list of nonsense syllables.

Recommended Books

1. Baron, R. A. (2002). Psychology (5th Edition), New Delhi, Pearson Education.
2. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
3. Feldman, R.S. (2004). Understanding Psychology (6th Edition), New Delhi, Tata Mc. Graw Hill.
4. Gallotti, K.M.: Cognitive Psychology In and Out of the Laboratory. 3rd Ed, Int. Thomson Pub. Co. Bangalore, 2004

5. Gerrig, R.J. & Zimbardo, P.G. (2010). Psychology and Life (19th Ed.). Delhi: Allyn & Bacon.
6. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
7. Morgan, C.T., King, R.A., Weisz, J.R., & Schopler, J. (2008). Introduction to psychology (7th edition) Bombay: Tata-McGraw Hill.
8. Morris, C. G. (1990). Psychology: An Introduction. New Delhi: Prentice Hall.
9. Passer, M.W. & Smith, R.E. (2007). Psychology: The Science of Mind and Behavior (3rd Ed.). New Delhi: Tata McGraw-Hill
10. Solso, R.L. (2000). Cognitive Psychology (6th Edition), USA, Allyn Bacon.
11. Zimbardo, P.G. & Weber, A.L. (1997 Ed.)- Psychology- New York, Harper Collins College Publishers

C:4-PROCESSES OF HUMAN EMPOWERMENT

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

Human empowerment is ultimately an individual condition of gaining the power to control and modulate changes in one's own life those are considered important to one's identity and adjustment. The purpose of the course is to introduce students to the basics of human empowerment and how the empowerment processes are strengthened and improved.

Learning Objectives:

1. To help students gain ideas about intelligence and personality as foundations of human empowerment.
2. To make students understand how motivation and emotion are empowering processes to human development.
3. To help students gain insight into human behavior as products of empowerment

Expected outcomes: Students will be able to

1. Know the structural components and functional dynamics of both intelligence and personality.
2. Understand the significance of emotion and motivation in behavior management.
3. Understand significant aspects of social behavior as resulting in happiness, well-being and personal growth.

UNIT-I: Basics of empowerment

- (i) Intelligence- Theories of Gardner, and Stenberg; Heredity, environment, and intelligence

- (ii) Measuring Intelligence: intelligence tests; Interpretation of test score, Cross-cultural issues in testing intelligence

UNIT-II: Sources of Power (1)

- (i) Personality- Freuds theory, Humanistic theories, and Social cognitive theory
- (ii) Personality-Trait and type approach, Biological and sociocultural determinants, Psychometric and projective assessment.

UNIT-III: Sources of Power(2)

- (i) Motivation-Drive theory, Arousal theory, Expectancy theory, Maslows need hierarchy
- (ii) Emotion-Theories of James-Lange, Cannon-Bard, Schachter-Singer, and Opponent-Process

UNIT-IV: Proving empowered

- (i) Social behavior- Meaning of attribution and errors in attribution, Meaning of social cognition and processing of social information Motivation-Drive theory, Arousal theory, Expectancy theory, Maslows need hierarchy
- (ii) Positive Psychology-Scope and aims, Nature and characteristics of happiness, Subjective well-being and personal growth

PRACTICAL

- (i) **Intelligence test-** To test the non-verbal intelligence of Two college students using Ravens Standard Progressive Matrices
- (ii) **Personality Type-** To assess the personality type of a student obtaining responses from the student and two other significant persons in his /her life by using Glazers test of Personality Type

Recommended Books

1. Baron, R. A. & Byrne, D. (2003). Social Psychology, 10th Edition, Prentice Hall
2. Baron, R.A. (1995). Psychology- The Essential Science, Pearson Education Company of India Pvt. Ltd.
3. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
4. Gerrig, R.J. & Zimbardo, P.G. (2010). Psychology and Life (19th Ed.). Delhi: Allyn & Bacon
5. Hilgard & Atkinson. Introduction to Psychology (2003). 14th Edition Thomson Learning Inc.
6. Misra, G. (2009). Psychology in India, Vol 1: Basic Psychological Processes and Human Development. India: Pearson

7. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
8. Sigelman, G.K. & Schaffer, D.R. (1995 Eds.) Lifespan Human Development, Brooks/ Cole Publishing Co. , Pacific Group
9. Snyder, C.R. & Shane, J.L. (2005) Handbook of Positive Psychology: Oxford University Press.

GE:2-BASIC PSYCHOLOGICAL PROCESSES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The course is designed to provide the student a basic understanding of the psychological processes from sensation to thought and communication. The student will be given exposure to the concepts, terminology, principles, and theories relating to each of the mental processes that constitute human psychology.

Learning Objectives:

1. To help the students to understand the mental processes to begin with sensation and perception up to how it results in thoughts and communication.
2. To help the students gather knowledge about the structural and functional dynamics of each of the mental processes and their interconnectedness.

Expected outcomes: Students will be able to

1. Understand the bases sensory actions and the processes of integration of sensory actions in creating and interpreting perceptual events.
2. Gain knowledge of the important processes and principles of human learning as well as the structural functional attributes of human memory to help conserve the learning outcomes.
3. Understand the structural and functional properties of language and the way it helps thought, communication, problem solving and decision making through development of concepts, ideas, images, and so on.

UNIT-I: Sensation and Perception

- (i) Basics of sensation- Sensory receptors (eye and ear), transduction, sensory thresholds, and sensory adaptation
- (ii) Nature of perceptual process- Figure and ground, Grouping (Gestalt laws), Perceptual constancies, and illusions, Perception of distance and depth.

UNIT-II: Learning and Memory

- (i) Nature and principles of Classical conditioning, Operant conditioning, and Observational learning
- (ii) The Atkinson and Shiffrin Model of Memory; Types of Memory- episodic, semantic and procedural; Causes of Forgetting- interference, repression, and amnesia

UNIT-III: Language and Communication

- (i) Properties and structure of language, Linguistic hierarchy, Language acquisition-predisposition, Nature of effective communication
- (ii) Stages of language development; critical period controversy; speech error and its implications

UNIT-IV: Thinking and Reasoning

- (i) Thinking process; concepts, categories and prototypes, Decision making and factors of influencing decision making.
- (ii) Inductive and deductive reasoning; Problem solving approaches; Steps in problem solving

PRACTICAL

- (i) **Learning Curve:** To demonstrate the Learning Curve as a function of Learning trials using Non-sense Syllables.
- (ii) **Serial Position Effect:** To demonstrate the serial position effect on memory in learning a list of nonsense syllables.

Recommended Books

1. Baron, R. A. (2002). Psychology (5th Edition), New Delhi, Pearson Education.
2. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
3. Feldman, R.S. (2004). Understanding Psychology (6th Edition), New Delhi, Tata Mc. Graw Hill.
4. Gallotti, K.M.: Cognitive Psychology In and Out of the Laboratory. 3rd Ed, Int. Thomson Pub. Co. Bangalore, 2004

5. Gerrig, R.J. & Zimbardo, P.G. (2010). Psychology and Life (19th Ed.). Delhi: Allyn & Bacon.
 6. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
 7. Morgan, C.T., King, R.A., Weisz, J.R., & Schopler, J. (2008). Introduction to psychology (7th edition) Bombay: Tata-McGraw Hill.
 8. Morris, C. G. (1990). Psychology: An Introduction. New Delhi: Prentice Hall.
 9. Passer, M.W. & Smith, R.E. (2007). Psychology: The Science of Mind and Behavior (3rd Ed.). New Delhi: Tata McGraw-Hill
 10. Solso, R.L. (2000). Cognitive Psychology (6th Edition), USA, Allyn Bacon.
 11. Zimbardo, P.G. & Weber, A.L. (1997 Ed.)- Psychology- New York, Harper Collins College Publishers
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SEMESTER-III

C:5-PSYCHOLOGICAL STATISTICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The course is designed to equip students with knowledge in the fundamentals of statistics and research methods so that they understand the application of statistics to different research problems in psychology.

Learning Objectives:

1. To help students develop knowledge and understanding of the application of Statistics within Psychology
2. To help students develop Critical Thinking for application of appropriate statistical analysis in Psychological research

Expected outcomes: Students will be able to

1. The nature psychological variables and how to measure them with appropriate scale.
2. The processes of describing and reporting statistical data.
3. The methods of drawing inferences and conclusions for hypothesis testing by using appropriate statistical analysis.

UNIT-I: Fundamentals of statistics

- (i) Meaning and scope of statistics, Nature of variables- Categorical and Continuous, Levels of Measurement- Nominal, Ordinal, Interval, and Ratio
- (ii) Drawing frequency distribution; Graphical representation of grouped data-Polygon, Histogram, Ogive.

UNIT-II: Measures of Statistics

- (i) Measures of Central Tendency- Characteristics of mean, median and mode; Computation of mean, median, and mode
- (ii) Measures of Variability- Concept of variability, computation of semi-inter quartile range, Standard deviation and variance, Co-efficient of variation

UNIT-III: Sources and Applications

- (i) Concept of Probability; Characteristics of Normal Probability curve, Applications of NPC, Deviation from NPC- Skewness and Kurtosis
- (ii) Concept of correlation, Product-moment correlation (ungrouped data), Rank order correlation, Chi-square test (Contingency Table)

UNIT-IV: Hypothesis Testing

- (i) Level of significance; Type I and Type II error; Computation of t for independent and dependent samples, The Mann-Whitney U test
- (ii) Purpose and assumptions of ANOVA; One-way and two-way ANOVA; Kruskal-Wallis H test

PRACTICAL

- (i) **Reporting of Statistical Results:** To collect data of 60 (30 boys and 30 girls) High School students about their Annual examination marks in four subjects and to report by descriptive statistical analyses.
- (ii) **Computer Awareness:** To be familiar with software packages of statistics and their applications.

Recommended Books

1. Aron, A., Aron, E.N., & Coups, E.J. (2007). Statistics for Psychology. (4thEd.) India: Pearson Education, Prentice Hall.
2. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
3. Ferguson, G.A. & Takane, Y. (1989). Statistical Analysis in Psychology & Education, Tata McGraw Hill Publishing Company, New Delhi

4. Garrett, H. E. & Woodworth, R.S. (1985). Psychology in Statistics and Education, Vakils, Feffer & Simons Ltd. Mumbai
5. Mangal, S.K. (2002) Statistics in Psychology and Education. (2ndedt). New Delhi: Prentice Hall of India.
6. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
7. Siegal, S. (1994). Nonparametric Statistics. McGraw Hill, New Delhi
8. Singh, A.K. (1986). Tests, Measurements, & Research Methods in Behavioral Sciences, Tata McGraw Hill Publishing Company, New Delhi
9. Walaram, G. Statistics for Behavioral Sciences

C:6-SOCIAL PSYCHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

Social psychology is the scientific study of the nature and causes of human behavior in a social context. This course is designed to introduce the students to the field of social psychology, to explain how social psychologists think about and study human behavior; to introduce the body of knowledge and underlying principles that currently exist in the field and to encourage reflection about the implications of social psychology for the situations we encounter in everyday life.

Learning Objectives:

1. To help students develop awareness of the concepts, problems and issues in the discipline of social psychology
2. To make students understand the individuals and groups in respect to patterns of social behavior and attitudes
3. To help students gain insight into the dynamics of intergroup relationships, conflict, prejudice and cooperation.

Expected outcomes: Students will be able to

1. Know the scope of studying social psychology and the methods to gather data in the social context to explain them.
2. Understand the significance of social cognition, attitudes, stereotypes and prejudices in explaining human behavior in the social contexts.
3. Understand the significant aspects group behavior and social influence that constitute the core of human relationships.

UNIT-I: Introduction

- (i) Nature, goal, and scope of Social Psychology; Methods of Social Psychology- Observation; Questionnaire, Interview, and Experiment
- (ii) Social Cognition- Perceiving ourselves: self-concept, self-esteem, self-presentation and self expression; Perceiving others and forming impressions

UNIT-II: Attitude, Prejudice and Stereotypes

- (i) Attitudes- Nature, characteristics and functions of attitude; Attitude formation and change; Attitude measurement
- (ii) Measures of Variability- Concept of variability, computation of semi-inter quartile range, Standard deviation and variance, Co-efficient of variation

UNIT-III: Group and Leadership

- (i) Group- Group structure and function, Task performance: Social facilitation, Social loafing; Conformity, Obedience and social modeling; Group cohesiveness-
- (ii) Leadership- Definitions and functions, Trait, situational, interactional and contingency approaches to leadership; Leadership effectiveness, The charismatic leadership

UNIT-IV: Social Behavior

- (i) Prosocial behavior-Cooperation and helping, personal, situational and socio-cultural determinants, Theoretical explanations of prosocial behavior.
- (ii) Aggression- Theoretical perspectives, Trait, situational and social learning approaches, social and personal determinants of aggression, prevention and control of aggression.

PRACTICAL

- (i) **Ethical Values:** To assess the ethical values of five adolescents by using Donelsons Ethical Position Questionnaire (EPQ)
- (ii) **Attitude towards Women:** To measure the attitude of three boys and three girls towards Women by using Spence, Helmrich & Stapps Attitude towards Women scale.

Recommended Books

1. Baron R. A & Byrne. D. (2003). Social Psychology. 10th Edition, Prentice Hall
2. Baron. R.A., Byrne, D. & Bhardwaj. G (2010). Social Psychology (12th Ed). New Delhi: Pearson
3. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar

4. Developments (ICSSR survey of advances in research). New Delhi: Pearson.
5. Misra, G. (1990) .Applied Social Psychology. New Delhi: Sage.
6. Misra, G. (2009). Psychology in India, Volume 4: Theoretical and Methodological
7. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
8. Myers, David G. (2002). Social Psychology. 7th Edition, McGraw Hill Book Co.
9. Taylor,S.E., Peplau,L.A. & Sears, D.O. (2006). Social Psychology (12th Ed). New Delhi: Pearson

C:7-ENVIRONMENTAL PSYCHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

Environmental psychology is an interdisciplinary field focused on the interplay between individuals and their surroundings. The field defines the term environment broadly, encompassing natural environments, social settings, built environments, learning environments, and informational environments. The course is designed to introduce to the students about all these aspects of environment.

Learning Objectives:

1. To highlight the simultaneous mutual interaction of environment and behavior.
2. To delineate psychological approaches to the study of environment.
3. To discuss the impact of ecological degradation and the need for enhanced awareness programs

Expected outcomes: Students will be able to

1. understand the interactional relationships between environment and behavior
2. understand the problems occurring to ecology and environment at the present time
3. understand different psychological approaches to the study of man-environment relationship.

UNIT-I: Environment and Behavior

- (i) Earth as a living system: The gala hypothesis, Deep ecology; Man-environment relationship-physical, social, cultural, orientation and product.
- (ii) Effects of Environment on behavior: Noise pollution, Air pollution, Crowding and population explosion.

UNIT-II: Ecology and Development

- (i) Human behavior Environmental Problems: Global warming, Greenhouse effect, energy depletion; Pro-environmental behaviors.
- (ii) Ecosystem and their components; Sustainable development; Resource use: Common property resources. Ecology: Acculturation and psychological adaptation

UNIT-III: Psychological Approaches to environment

- (i) Field theory approach; Eco-cultural Psychology (Berry); Biosocial Psychology (Dawson);
- (ii) Person environment transaction (Sokols & Ittelson); Ecological Psychology (Barker); Ecological system approach (Bronfenbrenner)

UNIT-IV: Environmental Assessment

- (i) Socio-psychological dimensions of environmental impact; Environmental deprivation-nature and consequences.
- (ii) Creating environmental awareness; Social movements- Chipko, Tehri, Narmada.

PRACTICAL

- (i) To assess the environmental literacy of 4 college students using Bob Simpsons Environment literacy and awareness survey questionnaire.
- (ii) To assess the environmental attitude, concern and sensitivity of 4 college students using Bob Simpsons Environment literacy and awareness survey questionnaire.

Recommended Books

1. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
2. Dreze, J. and Sen, A. (1992). Indian Development. Delhi: Oxford University Press.
3. Gadgil, M. and Guha. R. (1995). Ecology and Equity. New Delhi, Penguin Books
4. Goldsmith, E. (1991). The way: The ecological World View. Boston: Shambhala
5. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.

GE:3-PSYCHOLOGICAL STATISTICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The course is designed to equip students with knowledge in the fundamentals of statistics and research methods so that they understand the application of statistics to different research problems in psychology.

Learning Objectives:

1. To help students develop knowledge and understanding of the application of Statistics within Psychology
2. To help students develop Critical Thinking for application of appropriate statistical analysis in Psychological research

Expected outcomes: Students will be able to

1. The nature psychological variables and how to measure them with appropriate scale.
2. The processes of describing and reporting statistical data.
3. The methods of drawing inferences and conclusions for hypothesis testing by using appropriate statistical analysis.

UNIT-I: Fundamentals of statistics

- (i) Meaning and scope of statistics, Nature of variables- Categorical and Continuous, Levels of Measurement- Nominal, Ordinal, Interval, and Ratio
- (ii) Drawing frequency distribution; Graphical representation of grouped data-Polygon, Histogram, Ogive.

UNIT-II: Measures of Statistics

- (i) Measures of Central Tendency- Characteristics of mean, median and mode; Computation of mean, median, and mode
- (ii) Measures of Variability- Concept of variability, computation of semi-inter quartile range, Standard deviation and variance, Co-efficient of variation

UNIT-III: Sources and Applications

- (i) Concept of Probability; Characteristics of Normal Probability curve, Applications of NPC, Deviation from NPC- Skewness and Kurtosis
- (ii) Concept of correlation, Product-moment correlation (ungrouped data), Rank order correlation, Chi-square test (Contingency Table)

UNIT-IV: Hypothesis Testing

- (i) Level of significance; Type I and Type II error; Computation of t for independent and dependent samples, The Mann-Whitney U test
- (ii) Purpose and assumptions of ANOVA; One-way and two-way ANOVA; Kruskal-Wallis H test

PRACTICAL

- (i) **Reporting of Statistical Results:** To collect data of 60 (30 boys and 30 girls) High School students about their Annual examination marks in four subjects and to report by descriptive statistical analyses.

- (ii) **Computer Awareness:** To be familiar with software packages of statistics and their applications.

Recommended Books

1. Aron, A., Aron, E.N., & Coups, E.J. (2007). Statistics for Psychology. (4thEd.) India: Pearson Education, Prentice Hall.
2. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
3. Ferguson, G.A. & Takane, Y. (1989). Statistical Analysis in Psychology & Education, Tata McGraw Hill Publishing Company, New Delhi
4. Garrett, H. E. & Woodworth, R.S. (1985). Psychology in Statistics and Education, Vakils, Feffer & Simons Ltd. Mumbai
5. Mangal, S.K. (2002) Statistics in Psychology and Education. (2ndedt). New Delhi: Prentice Hall of India.
6. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
7. Siegal, S. (1994). Nonparametric Statistics. McGraw Hill, New Delhi
8. Singh, A.K. (1986). Tests, Measurements, & Research Methods in Behavioral Sciences, Tata McGraw Hill Publishing Company, New Delhi
9. Walaram, G. Statistics for Behavioral Sciences

C:8-PSYCHOPATHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

Psychopathology refers to the study of mental illness. This course is designed to expose students to the key concepts in psychopathology as well as the major theories associated with the etiology and treatment of psychological disorders and disabilities. Students will be able to understand the distinction between normal and abnormal and the qualities that are used to differentiate what is typical versus atypical through citations of different disorders.

Learning Objectives:

1. To help students define and understand the basic concepts underlying psychopathology and the perspectives which contributed to the development of modern psychopathology.
2. To help students understand the assessment techniques for identifying and classifying mal-adaptive behavior and mental disorders.

3. To guide students to gain specific knowledge about different types of mental disorders.

Expected outcomes: Students will be able to

1. Understand the differences between normality and abnormality along with the perspectives explaining them.
2. Know the importance and the use of assessment techniques in identifying different forms of maladaptive behavior.
3. Learn the symptoms, causes and treatment of anxiety disorders, mood disorders and schizophrenia.

UNIT-I: Basics of Pathology

- (i) Concept of abnormality; Perspectives of abnormal behavior- Psychodynamic, Behavioral, Cognitive, Humanistic-Existential, and Sociocultural
- (ii) Classification of maladaptive behavior-DSM-IV; Assessment techniques- Diagnostic tests, Rating scales, History taking interview, Projective tests

UNIT-II: Anxiety and Mood disorder

- (i) Symptoms, causes and treatment of Generalized anxiety disorder, Phobic disorder, Obsessive-Compulsive disorder
- (ii) Depressive disorder Symptoms, causes and treatment of Bipolar affective disorder, and Dysthymia

UNIT-III: Personality Disorders

- (i) Paranoid, Schizoid, Dissociative, Impulsive
- (ii) Borderline, Anxious, Avoidance, Dependent personality

UNIT-IV: Schizophrenia and Therapies

- (i) Characteristics, Major subtypes, Causes and treatment of Schizophrenia
- (ii) Psychodynamic, and Cognitive Behavior therapy.

PRACTICAL

- (i) **Anxiety:** Assessment of Anxiety of a subject by Hamilton Anxiety Rating Scale (HARS)
- (ii) **Depression:** Assessment of Depression Profile of a subject by Becks Depression Inventory (BDI)

Recommended Books

1. Ahuja N. (2011). A Short Textbook of Psychiatry (7th Ed). New Delhi: Jaypee

2. Barlow D.H. and Durand V.M. (2005). *Abnormal Psychology: An Integrated Approach* (4th Ed.).Wadsworth: New York.
3. Baron, R.A. (1995 Edition)-*Psychology- The Essential Science*, Pearson Education Company of India Pvt. Ltd.
4. Carson R.C., Butcher J.N., Mineka, S., & Hooley J.M. (2007). *Abnormal Psychology* (13th Ed.).ND: Pearson Education.
5. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). *Practical Exercises in Psychology: Learning about Yourself and Others*. Panchasila, Bhubaneswar
6. Irwin G. Sarason, Barbara Sarason (2005). *Abnormal Psychology*. New Delhi: Prentice Hall Publication
7. James C. Coleman (1981). *Abnormal Psychology and Modern Life*. D.B. Taraporevala with Scott, Foresman and Company, Mumbai
8. Kring,A.M.,Johnson,S.L.,Davison G.C. & Neale J.M. (2010). *Abnormal Psychology* (11th Ed.).NY: John Wiley
9. Mohanty, N. (2008). *Psychological Disorders: Text and Cases*. New Delhi: Neelkamal Publications Pvt. Ltd.
10. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). *Explorations of Human Nature and Strength: Practicals in Psychology*, DivyaPrakashani, Samantarapur, Bhubaneswar.

C:9-EDUCATIONAL PSYCHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

This course provides an introduction to concepts, theories, and research in educational psychology. The topics covered include cognitive development during the school years, classroom management, instructional approaches, motivation, assessment, and individual differences.

Learning Objectives:

1. To provide students with an overview of the purposes and uses of educational psychology.
2. To help students understand human development focusing mainly on the years of formal education including those with ability differences
3. To make students understand the ways that educators motivate their students to learn and strive for excellence
4. To make students explore the ways that educators manage learning environments to maximize learning and social cohesion

Expected outcomes: Students will be able to

1. Define educational psychology and give examples of the different topics educational psychologists study.
2. Describe the developmental issues faced by school age children.
3. Describe the challenges presented by children with ability differences.
4. Explain the role of motivation on learning and classroom behavior.
5. Describe classroom management techniques.
6. Identify commonly used standardized tests, their strengths and limitations, and use in school settings.

UNIT-I Foundations of Educational Psychology

- (i) Concepts and principles of educational psychology, The teaching-learning process, Goals of teaching and objectives for learning.
- (ii) Theories of cognitive development-Piaget, Bruner and Vygotsky.

UNIT- II Motivation and Classroom Management

- (i) Meaning of motivation, Intrinsic and extrinsic motivation, Approaches to understand classroom motivation, Motivational techniques in classroom teaching.
- (ii) The goals of classroom management, Creating a positive learning environment, Characteristics of an effective teacher, Teacher expectation and students performance.

UNIT III Creativity and Aptitude

- (i) Nature and characteristics of creativity; Theories of creativity; Fostering creativity among children.
- (ii) Nature and characteristics of aptitude; Types of aptitude; Measurement of aptitude; Utility of aptitude tests.

UNIT -IV Dealing with ability differences and Testing

- (i) Teaching children with mental retardation, learning disability, social class differences, and attention deficit Hyperactive disorder.
- (ii) Types of standardized tests- Achievement test, and aptitude tests, Advantages and limitations of standardized test.

PRACTICAL

- (i) Academic Behavior: To assess the academic attitude and behavior of college students by using Sias Academic Behavior Scale.
- (ii) Academic Stress: To assess the academic stress of two higher Secondary students using Raos Academic Stress Scale.

Recommended Books

1. Agrawal, J.C. (2009). Essentials of Educational Psychology (2ndEdn.) Vikas Publishing House, New Delhi.
2. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar

3. Gage, N. L., & Berliner, D. C. (2009) Educational psychology (5th ed.). Boston, MA: Houghton Mifflin.
4. Mangal, S.K. (2013). Advanced Educational Psychology (2ndEdn.) PHI Learning Pvt. Ltd., New Delhi
5. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
6. Slavin, Robert E. (2012). Educational Psychology: Theory and Practice. Delhi, Pearson,
7. Woolfolk, A.E. (2004). Educational Psychology (9th Ed.), Allyn & Bacon, London / Boston.

C:10-PSYCHOLOGICAL ASSESSMENT

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The course is designed to expose students to a basic understanding about approaches to psychological assessment and develop skill in the administration and interpretation of psychological tests.

Learning Objectives:

1. To train students in various psychological assessment techniques
2. To impart skills necessary for selecting and applying different tests for different purposes such as evaluation, training, rehabilitation etc.

Expected outcomes: Students will be able to

1. Understand the basic facts about psychological assessment.
2. Understand the processes of test construction and standardization.
3. Understand about the assessment of different types of skills and abilities.

UNIT-I Introduction

- (i) Nature and Scope of human assessment;Parameters of assessment.
- (ii) Psychological scaling, Methods of scaling.

UNIT- II Psychological Tests

- (i) Principles of test construction and standardization- Item analysis, reliability, validity and development of norms.
- (ii) Types of psychological tests- Individual, group, performance, verbal, nonverbal.

UNIT III Assessment of Ability

- (i) Assessment of general abilities- Intelligence, interest, interpersonal interaction.
- (ii) Assessment of personality- Use of self report inventories, interview, projective and non-projective tests.

UNIT IV Classroom Assessment

- (i) Classroom as assessment context, Traditional tests, Alternative assessment.
- (ii) Grading and reporting of performance, Computer and assessment.

PRACTICAL

- (i) Empathy: To assess the empathy behavior of Five college students using Sprengs Empathy questionnaire.
- (ii) Sense of Humor: To assess the Sense of Humor of 4 College Students Using McGhees Scale of Sense of Humor (MSSH).

Recommended Books

1. Baron, R. A. (2002). Psychology (5th Edition), New Delhi, Pearson Education.

2. Berk, L. E. (2010). Child Development (8th Ed.). New Delhi: Prentice Hall.
3. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
4. Hurlock, E. Developmental Psychology (1995). IV Edition. New Delhi: Tata McGraw Hill.
5. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
6. Papilia, Diane E., Sally Wendos Olds (2006). Human Development. 9th Edition. New Delhi: Tata McGraw Hill
7. Santrock, J. W. (2008). Child Development (11th Ed.). New Delhi: Tata McGraw Hill.
8. Sigelman, G.K. & Schaffer, D.R. (1995). Life-span Human Development, Brooks / Cole Publishing Co. Pacific Grove, California

GE:6-PSYCHOPATHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

Psychopathology refers to the study of mental illness. This course is designed to expose students to the key concepts in psychopathology as well as the major theories associated with the etiology and treatment of psychological disorders and disabilities. Students will be able to understand the distinction between normal and abnormal and the qualities that are used to differentiate what is typical versus atypical through citations of different disorders **Learning Objectives:**

1. To help students define and understand the basic concepts underlying psychopathology and the perspectives which contributed to the development of modern psychopathology.
2. To help students understand the assessment techniques for identifying and classifying maladaptive behavior and mental disorders.
3. To guide students to gain specific knowledge about different types of mental disorders.

Expected outcomes: Students will be able to

1. Understand the differences between normality and abnormality along with the perspectives explaining them.
2. Know the importance and the use of assessment techniques in identifying different forms of maladaptive behavior.
3. Learn the symptoms, causes and treatment of anxiety disorders, mood disorders and schizophrenia.

UNIT-I Basics of Pathology

- (i) Concept of abnormality; Perspectives of abnormal behavior- Psychodynamic, Behavioral, Cognitive, Humanistic-Existential, and Sociocultural.
- (ii) Classification of maladaptive behavior-DSM-IV; Assessment techniques- Diagnostic tests, Rating scales, History taking interview, Projective tests.

UNIT- II Anxiety and Mood disorder

- (i)Symptoms, causes and treatment of Generalized anxiety disorder, Phobic disorder, Obsessive-Compulsive disorder.
- (ii) Depressive disorder Symptoms, causes and treatment of Bipolar affective disorder, and Dysthymia.

UNIT III Personality Disorders

- (i) Paranoid, Schizoid, Dissociative, Impulsive.
- (ii)Borderline, Anxious, Avoidance, Dependent personality.

UNIT IV Schizophrenia and Therapies

- (i)Characteristics, Major subtypes, Causes and treatment of Schizophrenia.
- (ii)Psychodynamic, and Cognitive Behavior therapy.

PRACTICAL

- (i) Anxiety: Assessment of Anxiety of a subject by Hamilton Anxiety Rating Scale (HARS).
- (ii) Depression: Assessment of Depression Profile of a subject by Becks Depression Inventory (BDI).

Recommended Books

1. Ahuja N. (2011). A Short Textbook of Psychiatry (7th Ed). New Delhi: Jaypee.
2. Barlow D.H. and Durand V.M. (2005). Abnormal Psychology: An Integrated Approach (4th Ed.).Wadsworth: New York.
3. Baron, R.A. (1995 Edition)-Psychology- The Essential Science, Pearson Education Company of India Pvt. Ltd.
4. Carson R.C., Butcher J.N., Mineka, S., & Hooley J.M. (2007). Abnormal Psychology (13th Ed.).ND: Pearson Education.
5. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar.
6. Irwin G. Sarason, Barbara Sarason (2005). Abnormal Psychology. New Delhi: Prentice Hall Publication.
7. James C. Coleman (1981). Abnormal Psychology and Modern Life. D.B. Taraporevala with Scott, Foresman and Company, Mumbai.
8. Kring,A.M.,Johnson,S.L.,Davison G.C. & Neale J.M. (2010). Abnormal Psychology (11th Ed.).NY: John Wiley.
9. Mohanty, N. (2008). Psychological Disorders: Text and Cases. New Delhi: Neelkamal Publications Pvt. Ltd.

10. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
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SEMESTER-V

C:11-ORGANIZATIONAL BEHAVIOR

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The course provides an overview of the main fields of organizational and personnel psychology. It focuses on topics such as organizational system; work behavior, attitudes and motivation as related to organizational set up; management of power and politics in the organizations; and finally development and evaluation of human resources for sustainable growth of an organizations.

Learning Objectives:

1. To help students able to understand the structure, functions, and designs of different organizations.
2. To make students understand the processes of group decision making and leadership functions in different organizations.
3. To make students understand the theories of work motivation and related issues of power and politics in the organizational set up.
4. To help students demonstrate professional skills in the evaluation, management, and development of human resources in the organizations.

Expected outcomes: Students will be able to

1. Understand different concepts and dynamics related to organizational system, behavior, and management.
2. Identify steps managers can take to motivate employees in the perspectives of the theories of work motivation.
3. Understand the tricks of power and politics management in the organizations.
4. Understand significance of human resource development, evaluation and management for the interest and benefit of the organization.

UNIT-I Historical context of organizational behavior

(i) Contributions of Taylor, Weber and Fayoll; Challenges, Scope and opportunities for OB.

(ii) OB perspectives-Open system approach, Human relations perspective, Socio-technical approach, OB model responsive to Indian realities.

UNIT- II Organization System

- (i) Structure and functions of organization, Common organizational designs, Management roles, functions and skills.
- (ii) Group decision making processes in organizations, Organizational leadership and types of leadership in organizations.

UNIT III Work, Power and Politics

- (i) Contemporary theories of work motivation- ERG theory, McClelland's theory of needs, Cognitive evaluation theory, Goal-setting theory, Reinforcement theory.
- (ii) Defining power in organization, Bases of power, Power tactics, Nature of organizational politics, Impression management, and defensive behavior.

UNIT IV Human resource development and Evaluation

- (i) Human Skills and Abilities, Selection Practices for Optimal Use of Human Resources; Training Programs for the Development of Human Resources.
- (ii) Performance Evaluation- Purpose, Methods, Potential Problems and methods to overcome them.

PRACTICAL

- (i) **Leadership Style:** To measure his basic leadership style of 4 college students by using Greenberg Basic Leadership Style scale.
- (ii) **Conflict-Handling:** To measure the conflict-handling style of 4 college students by using Rahims scale to identify their conflict handling style.

Recommended Books

1. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar.
2. Greenberg, J. & Baron, R.A. (2007). Behaviour in Organizations (9th Ed.). India: Dorling Kindersley.
3. Luthans, F. (2009). Organizational behavior. New Delhi: McGraw Hill.
4. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
5. Pareek, U.(2010). Understanding organizational behaviour. Oxford: Oxford University Press.
6. Robbins, S.P.; Timothy, A.J. & Vohra, N. (2012). Organizational Behavior, 15th Edn. Pearson Education: New Delhi
7. Schultz, D. and Schultz, S.E. (2004). Psychology and Work Today. Delhi: Pearson Inc.
8. Singh, K. (2010). Organizational Behaviour: Texts & Cases. India: Dorling Kindersley.

C:12-HEALTH PSYCHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

Health psychology is a specialty area that focuses on how biology, psychology, behavior and social factors influence health and illness. This course is designed to provide an introduction to the area of health psychology to help students understand how Health Psychology as a specialty within psychology addresses the role of behavioral factors in health and illness. Basic theories, models and applications are also included. **Learning Objectives:**

1. To help the students understand the issues of Health Psychology and how to address them by the bio-psychosocial model of health and illness.
2. To help the students to describe behavioral factors that influence health and illness.
3. To guide the students understand about health enhancing behaviors including coping with illness.

Expected outcomes: Students will be able to

1. Know the basics of health and illness from the Bio-psychosocial perspectives.
2. Understand the significance of behavioral and psychological correlates of health and illness.
3. Understand the significant aspects coping and importance of health enhancing behavior.

UNIT-I Introduction

- (i)Goals of Health Psychology, , Biopsychosocial model of health and illness.
- (ii) Basic nature of stress, Cognitive appraisal of stressors, Some major causes of stress, Management of stress.

UNIT- II Health and Illness

- (i) Behavioral and psychological correlates of illness, Approaches to promoting wellness, Some common health beliefs and their implications.
- (ii) Models of health- The cognition models- The health belief model, The protection motivation model, Leventhals self regulatory model.

UNIT III Health and Coping

- (i) Individual differences in symptom perception, Coping with the crises of illness; Compliance behavior and improving compliance.
- (ii) Health enhancing behavior- Diet management, Yoga and Exercise.

UNIT IV Health Issues

- (i) Children health issues- Malnutrition, Immunization, Autism, ADHD.
- (ii) Health issues of women and elderly:Diabetes,Osteoporosis, Alzheimers Disease, Depression.

PRACTICAL

- (i) **Sleep Quality:** To assess the Sleep quality of 4 college students The Pittsburgh Sleep Quality Index (PSQI).
- (ii) **Coping Strategies:** To assess of the Coping Strategies of 4 college students by Tobins Coping Strategy Inventory (TCSI).

Recommended Books

1. Baron, R.A. (1995 Edition)-Psychology- The Essential Science, Pearson Education Company of India Pvt. Ltd.
2. Brannon and Feist. Health Psychology.
3. Carr, A. (2004). Positive Psychology: The science of happiness and human strength.UK: Routledge.
4. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
5. Edward P.Sarafino (1994). Health Psychology. Joha Wiley and Sons
6. Khatoon, N. (2012). Health Psychology, Dorling Kindersley (India) Pvt. Ltd. New Delhi
7. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
8. Sarafino, E.P. (2002). Health psychology: Bio psychosocial interactions (4th Ed.).NY: Wiley.
9. Snyder, C.R., & Lopez,S.J.(2007).Positive psychology :The scientific and practical explorations of human strengths. Thousand Oaks, CA: Sage.
10. Taylor, S.E. (2006). Health Psychology (6th Ed.). New York: Tata McGraw Hill

DISCIPLINE SPECIFIC ELECTIVES

DSE-1: PSYCHOLOGICAL RESEARCH & MEASUREMENT

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The research methods course is among the most frequently required in the psychology and with good reason. It helps the students know about the difference between an experiment and a correlational study, the function of independent and dependent variables, the importance of reliability and validity in psychological measurement, and the need for replication in psychological research. In other words, psychologists research methods are at the very core of their discipline. The course is designed to train the students in psychological research and measurement. **Learning Objectives:**

1. To provide an overview of scientific approaches to psychological research in term of sampling techniques, scientific method, and experimental designs.
2. To acquaint the students with respect to psychometric, projective techniques and non-testing approaches like interview.

Expected outcomes: Students will be able to

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UNIT-I Psychological Research

- (i) Assumptions of science, Characteristics of scientific methods, Psychological research: Correlational and experimental.
- (ii) Sampling frame: probability and non-probability samples, sample size, sampling error.

UNIT- II Psychological Scaling and Construction of test

- (i) Purpose of scaling and types of psychological data, Psychological scaling methods: Familiarity with Thurstone, Likert and Guttman scale.
- (ii) Construction of test: Theory of measurement error; Operationalizing a concept, Generating items, Item analysis, Item response theory.

UNIT III Experimental Designs

- (i) Pretest- post-test design, Factorial designs, RandomizedBlock design Standardization of tests.
- (ii) Reliability and validity of tests, Development of norms and interpreting test scores.

UNIT IV Assessment of Personality

- (i) Psychometric and projective techniques, Familiarity with MMPI, Rorachs, WAT, and TAT Interviewing.
- (ii) Principles and procedures of interviewing, gaining cooperation, motivating respondents, training of interviewers, ethics of interviewing.

PRACTICAL

- (i) **TAT** : To administer the TAT on a subject and give summary report.
- (ii) **Word Association test**: To administer the Jung / Kent-Rosanoff list of WAT on a subject and report on his areas of emotional difficulties.

Recommended Books

1. Anastasi, A. (1988). Psychological Testing. New York: MacMillan.
2. Minium, E.W., King, B.M. & Bear, G. (1993). Statistical Reasoning in Psychology and Education. New York: John Willey.
3. Kerlinger, F.N. (1983). Foundations of Behavioral Research. New York: Surjeet Publications.
4. Freeman, F.S. (1972). Theory and Practice of Psychological Testing. New Delhi: Oxford & IBH.

DSE-2: PSYCHOLOGY & SOCIAL ISSUES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

Psychologists can play a larger role in the solution of important social problems. Psychology brings two important qualities to the study of social problems: attention to psychological process and rigorous methodology. The key task in the designed course is to define social problems in part as psychological problems. **Learning Objectives:**

1. The course will provide social psychological analysis of some major social issues in India.

Expected outcomes: Students will be able to

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UNIT-I Understanding Social Systems

- (i) Indian Family System; Social stratification; caste, class, power, Religious ethics Poverty and Deprivation.
- (ii) Theories of poverty, Concomitants of poverty, Sources of deprivation, inequality and social justice.

UNIT- II Health and wellbeing

- (i) Role of behavior in health problems, Shortcomings of the biomedical model, Behavioral sciences in disease prevention and control, India's health scenario.

Political Behavior

- (ii) Development of ideology, Use of small groups in politics, Issues of human and social development, Quality of life and development. **UNIT III Antisocial Behavior**
- (i) Corruption and bribery, Juvenile delinquency, terrorism, Crime and criminal behavior, Alcoholism and drug abuse.

(ii) Crime and criminal behavior, Alcoholism and drug abuse, Psychopath.

UNIT IV Social integration

(i) The concept of social integration; Causal factors of social conflicts and prejudices; Psychological strategies for handling the conflicts and prejudices; Measures to achieve social integration.

Violence

(ii) Nature and categories of violence, violence in family and marriage, rape, Collective violence for social change.

PRACTICAL

(i) **Quality of Life:** To assess the quality of life family of 4 families using Beach Center Family Quality of Life Scale.

(ii) **Community Integration:** To assess the community integration of a village by using Community integration questionnaire (CIQ) of Barry Willer.

Recommended Books

1. Banerjee, D. (1998). Poverty, class and health culture in India, Vol. I, Delhi Prachi Prakashan
2. Dube, S.C. (1987) Modernization and Development. ND: Sage
3. Fonsea, M. (1998). Family and Marriage in India. Jaipur: Sachin
4. Mishra, G. (1990). Applied Social Psychology in India. ND: Sage
5. Mishra, G. (1999). Psychological perspectives on stress and Health. New Delhi: Concept
6. Mishra, H.C. and Misra, S. (2009). Psychology of Deviants, Divya Prakashani, Bhubaneswar
7. Mohanty, A .K. and Mishra, G. (Eds.) (2000). Psychology of Poverty and Disadvantage. New Delhi: Concept
8. Sen, A. & Sen A.K. (Eds.). (1998). Challenges of contemporary Realities: A psychological Perspective. New Delhi: New Age International
9. Srinivas, M.N. (1966). Social change in modern India. Bombay: Allied.

SEMESTER-VI

C:13-COUNSELING PSYCHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The course is designed to develop entry level counseling psychologists who will be capable of understanding and demonstrating behavior and attitudes in the basic areas of professional counseling.

Learning Objectives:

1. To help students able to understand and integrate current scientific knowledge and theory into counseling practice.
2. To make students learn the history and professional issues related to counseling psychology.
3. To help students integrate and convey information in the core areas of counseling practice.
4. To help students demonstrate professional behavior in their various roles as counseling psychologists.

Expected outcomes: Students will be able to

1. Understand the purpose of counseling and practice counseling ethically following different approaches.
2. Understand the basics of counseling process and use them for counseling students, families, couples, distressed, and handicaps.

UNIT-I Basics of Counseling

- (i) Meaning, scope and purpose of counseling with special reference to India; The counseling process, counseling relationship, counseling interview.
- (ii) Characteristics of a good counselor, Ethics and values in counseling; Education and training of the counselor.

UNIT- II Theories and Techniques of Counseling

- (i) Psychodynamic approach-Freud and Neo Freudians; Humanistic approach-Existential and Client centered.
- (ii) Cognitive approach- Rational-emotive and transaction analysis; Behavioral approach- Behavior modification; Indian contribution- yoga and meditation.

UNIT III Counseling Programs

- (i) Working in a counseling relationship, transference and counter transference, termination of counseling relationship, Factors influencing counseling.
- (ii) Student counseling, Emphases, roles and activities of the school, and college counselor.

UNIT IV Counseling application

- (i) Family and Marriage Counseling, Family life and family cycle, Models and methods of family counseling.
- (ii) Alcohol and drug abuse counseling; Counseling the persons with Suicidal tendencies, and Victims of Harassment and Violence.

PRACTICAL

- (i) **Marital Relationship-** To assess the marital relationship of 2 couples using Lerner's Couple adjustment scale.
- (ii) **Case Reporting:** To complete four case studies of high school students with problem behavior in the appropriate case record proforma.

Recommended Books

1. Burnard Philip. (1995). Counselling Skills Training A sourcebook of Activities. New Delhi: Viva Books Private Limited.
2. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
3. Feltham, C and Horton, I. (2000). Handbook of Counseling and Psychotherapy. London: Sage.
4. Gibson, R.L & Mitchell M.H. (2003). Introduction to counseling and Guidance. 6th edn. Delhi: Pearson Education
5. Gladding, S.T. (2009). Counselling: A comprehensive profession (6th Ed.). New Delhi: Pearson India
6. Mishra, H.C. & Varadwaj, K. (2009). Counseling Psychology: Theories, Issues and Applications, DivyaPrakashini, Samantarapur, Bhubaneswar, Odisha
7. Misra, G. (Ed) (2010). Psychology in India, Volume 3: Clinical and Health Psychology. New Delhi: Pearson India.
8. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
9. Nelson-Jones. (1995). The theory and practice of counseling. 2nd Edn. London: Holt, Rinehart and Winston Ltd
10. Rao, S. (2002). Counselling and Guidance (2nd Ed.). New Delhi: McGraw Hill.

C:14-POSITIVE PSYCHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

Positive psychology is the scientific study of optimal human functioning to help people flourish. This is a foundation course in positive psychology to help students not only to understand the core themes of positive psychology, but also to equip them with the helpful positive interventions in various areas of professional psychology, such as clinical, health, education, organization and community.

Learning Objectives:

1. To help students to understand the rationale behind positive psychology.
2. To guide students to identify and analyze the key conceptual and theoretical frameworks underpinning positive psychology.
3. To encourage students to appreciate the contributions of scholars from a range of disciplines and their influence on developing a positive approach to mental health.

4. To make students understand and apply a strengths-based approach to mental health issues.

Expected outcomes: Students will be able to

1. The goal of positive psychology and the basic behavior patterns that result in positive human growth from the point of view of leading positive psychologists
2. The concepts of flow and happiness and the related theories and models explaining happiness behavior and its consequences.
3. All the precursors to positive psychology from character strength and altruism to resilience.

UNIT-I: Foundations

- (i) Historical roots and goals of positive psychology, Positive emotions, Positive Individual traits, and positive subjective experience.
- (ii) Contribution of Martin Seligman, Albert Bandura, Carol Dweck and Abraham Maslow to positive psychology

UNIT-II: Flow and Happiness

- (i) Components of flow, Conditions and mechanisms of flow, Positive and negative consequences of flow experience.
- (ii) Meaning and nature of happiness, Sources of happiness, Theories of happiness- Set-point theory, Life satisfaction and Affective state theories.

UNIT-III: Precursors to Positive Psychology

- (i) Character strength, Altruism, Hope and Optimism, Positive thinking, Resilience
- (ii) Psychology of well-being: Meaning of well-being, The well-being models, Factors affecting well-being, Promoting well-being among people

UNIT-IV: Ways to Positive Psychology

- (i) Discovering strength, Increasing optimism, Self-direction, Purpose, gratitude, Mindfulness, and Activities and experience
- (ii) Effects of exercise, Yoga, meditation and spiritual intelligence on development of positive psychology; Positive psychology in building relationship

PRACTICAL

- (i) **Happiness:** To measure the happiness of 4 adults using Oxford Happiness questionnaire
- (ii) **Spiritual Intelligence:** To measure the spiritual intelligence of 4 adults using Kings Spiritual Intelligence test.

Recommended Books

1. Carr, A. (2004). Positive Psychology: The science of happiness and human strength. UK: Routledge.
2. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
3. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
4. Peterson, C. (2006). A Primer in Positive Psychology; Oxford University Press
5. Seligman, M.E. (2002). Authentic Happiness: Using the New Positive Psychology to Realize Your Potential for Lasting Fulfillment: Oxford University Press
6. Seligman, M.E. (2012). Flourish: A Visionary New Understanding of Happiness and Well-being. Oxford University Press
7. Snyder, C.R. & Shane, J.L. (2005). Handbook of Positive Psychology. Oxford University Press
8. Snyder, C.R., & Lopez, S.J. (2007). Positive psychology: The scientific and practical explorations of human strengths. Thousand Oaks, CA: Sage.

DSE-3: CONTEMPORARY APPLIED PSYCHOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

Applied psychology is the use of psychological principles and theories to overcome problems in real life situations. Mental health, organizational psychology, counseling psychology, clinical psychology, business management, education, and law are just a few of the areas that have been influenced by the application of psychological principles and findings. Some of the current areas of applied psychology include community psychology, Psychology of the disadvantaged, psychology of economic development, population psychology, gender psychology, and defense psychology. The course is designed to help students understand the application of psychology to these new fields.

Learning Objectives:

...

Expected outcomes: Students will be able to

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UNIT-I: Community Psychology:

- (i) Definition and concept of Community Psychology; Use of small groups in social action, Arousing community consciousness, Effective strategies for social change.
- (ii) **Rehabilitation Psychology:** Primary, secondary, tertiary rehabilitation programs, Rehabilitation of physically, mentally and socially challenged persons including the old persons

UNIT-II:

- (i) **Helping the disadvantaged:** Concept of disadvantaged and deprivation, social, physical, cultural and economic consequences of disadvantaged groups, Educating and motivating the disadvantaged
- (ii) **Psychology and IT:** Psychological consequences of the developments in IT; Role of psychologists in the present scenario of IT

UNIT-III:

- (i) **Psychology in economic development:** Achievement motivation and Economic development; Characteristics of entrepreneurial behavior, Consumer rights and awareness
- (ii) **Population psychology:** Psychological consequences of population explosion and high population density; Psychosocial effects of crowding; motivating for small family norms

UNIT-IV

- (i) **Psychology of Gender:** Issues of discrimination; Glass ceiling effect, Self-fulfilling prophecy, Management of diversity
- (ii) **Defense psychology:** Psychological tests for defense personnel; Promoting positive mental health of defense personnel, Human engineering in defense

PRACTICAL

- (i) To assess the sense of gender equality of 8 college students by using Student Gender equality Questionnaire
- (ii) To assess the attitude and knowledge of 4 women towards family planning using the Family Planning Knowledge Attitude Survey Questionnaire.

Recommended Books

1. Banerjee, D. (1998). Poverty, class and health culture in India, Vol. I, Delhi Prachi Prakashan
2. Dalton, J.H. (2006). Community Psychology: Linking Individuals and Communities: : Oxford University Press
3. Dube, S.C. (1987) Modernization and Development. ND: Sage
4. Fonseca, M. (1998). Family and Marriage in India. Jaipur: Sachin
5. Mishra, G. (1990). Applied Social Psychology in India. ND: Sage
6. Mishra, G. (1999). Psychological perspectives on stress and Health. New Delhi: Concept
7. Mishra, H.C. , Mishra, G.C. & Varadwaj , K. (2014). Fundamentals of Applied Psychology, Divya Prakashani, Bhubaneswar

8. Mishra, H.C. and Misra, S. (2009). Psychology of Deviants, Divya Prakashani, Bhubaneswar
9. Mohanty, A .K. and Mishra, G. (Eds.) (2000). Psychology of Poverty and Disadvantage. New Delhi: Concept
10. Sen, A. & Sen A.K. (Eds.). (1998). Challenges of contemporary Realities: A psychological Perspective. New Delhi: New Age International
11. Srinivas, M.N. (1966). Social change in modern India.Bombay: Allied
12. Swain, S. Applied Psychology

DSE-4: RESEARCH PROJECT

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

Introduction:

The research experience of students is greatly enriched by early exposure to conducting research. There are numerous benefits of undergraduate students who get involved in research. They are better off in understanding published works, determine an area of interest, can discover their passion for research and may start their career as a researcher. Further students will be able develop ability for scientific inquiry and critical thinking, ability in the knowledge base and communication of psychology. This course is included to promote above mentioned abilities among the students.

Learning Objectives:

1. To help students to learn how to develop scientific research designs in the study of psychology.
2. To guide students to understand the previous research in their field of interest and review them to arrive at a research problem
3. To encourage the students to learn ways to describe and measure human behavior.
4. To help students understand the logic of hypothesis testing and application of appropriate statistical analysis.
5. To make students to learn the methods of writing a research report.

Expected outcomes: Students will be able to

1. Independently prepare a research design to carry out a research project
2. Review the related research papers to find out a research problem and relevant hypotheses
3. Understand the administration, scoring and interpretation of the appropriate instrument for measurement of desired behavior
4. Learn the use of statistical techniques for interpretation of data.
5. Learn the APA style of reporting a research project.

UNIT-I: A student is required to carry out a project on an issue of interest to him / her under the guidance and supervision of a teacher. In order to do so s/he must have the knowledge in research methodology and of steps in planning and conducting a research. The supervisors may help the students to go on field study / study tour relevant to their work. Thirty hours of class may be arranged in the routine to help students understand research methodology, and planning, conduction and reporting on the research. An external examiner with the supervisor as the internal examiner will evaluate the research project on the basis of scientific methodology in writing the report, and presentation skill and performance in the viva.

Format

1. **Abstract** 150 words including problem, method and results.
2. **Introduction** Theoretical considerations leading to the logic and rationale for the present research
3. **Review-** Explaining current knowledge including substantive findings and theoretical and methodological contributions to the topic, objectives and hypotheses of the present research
4. **Method** Design, Sample, Measures, Procedure
5. **Results-** Quantitative analysis of group data (Raw data should not be attached in Appendix) Graphical representation of data wherever required. Qualitative analysis wherever done should indicate the method of qualitative analysis.
6. **Discussion**
7. **References (APA Style) & Appendices**
 1. Project should be in Soft binding. It should be typed in Times New Roman 14 letter size with 1.5 spacing on one sides of the paper. Total text should not exceed 50 pages (References & Appendices extra).
 2. Two copies of the project should be submitted to the College.
 3. **Project - American Psychological Association (APA) Publication Manual 2006 to be followed for project writing**

PSYCHOLOGY(PASS)

SEMESTER-I

Paper-I: INTRODUCTORY PSYCHOLOGY

(Credits: 6, Theory: 4, Practical: 2)

Lectures:60 (Theory:40, Practical:20)

Max. Marks: 100 (Theory: 70, Practical: 30)

Introduction:

The course is designed to give the student a basic understanding of the psychology of human behavior. The students will be given exposure to concepts, terminology, principles, and theories that comprise an introductory course in psychology.

Learning Objectives:

1. To help the students to know the sources and processes of development of modern scientific psychology.
2. To help the students to develop a scientific temperament in studying and understanding human behavior.

Expected outcomes: Students will be able to

1. Define the term psychology and demonstrate command of the basic terminology, concepts, and principles of the discipline.
2. Gain knowledge of scientific methodologythe variety of ways in which psychological data are gathered and evaluated / interpreted.
3. Identify and compare the major perspectives in psychology: Recognize how each approach views human thought and behavior.
4. Understand the physiological and biochemical links of human behavior.

UNIT-I: Introducing Psychology

- (i) Concept and definition of psychology, Roots of psychology, Psychology as a scientific discipline.
- (ii) Key Perspectives in Psychology- Behavioral, Cognitive, Humanistic, Psychodynamic, and Socio-cultural.

UNIT- II: Methods in Psychology

- (i) Natural Observation, Survey and Case Study- Nature, advantages and limitations.
- (ii) Experimental and Correlational methods-Nature, advantages and limitations.

UNIT III: Biological Bases of Behavior

- (i) Structure and functions of the neurons, Communication within and between neurons, Chemical regulation of the endocrine glands.
- (ii) Structure and functions of the Central nervous system and Autonomic nervous system.

UNIT-IV: States of Mind

- (i) Nature of consciousness; changes in consciousness- sleep-wake schedules.

(ii) Extended states of Consciousness- Hypnosis, Meditation and Hallucinations.

Practical

1. R.L. by Method of Limits: Students are required to find out the R. L. of volar surface of the right arm of a subject by method of limits.
2. R.L. by Method of Constant Stimuli: Students are required to find out the R. L. of volar surface of the right arm of a subject by method of limits.

Recommended Books:

1. Baron, R. A. (2002). Psychology (5th Edition), New Delhi: Pearson Education.
2. Feldman, R.S. (2004). Understanding Psychology (6th Edition), New Delhi, Tata-McGraw Hill.
3. Gerrig, R.J. & Zimbardo, P.G. (2010). Psychology and Life (19th Ed.). Delhi: Allyn & Bacon.
4. Hilgard & Atkinson- Introduction to Psychology (2003) 14th Edition, Thomson Learning Inc.
5. Morgan, C.T., King, R.A., Weisz, J.R., & Schopler, J. (2008). Introduction to psychology (7th edition) Bombay: Tata-McGraw Hill.
6. Morris, C. G. (1990). Psychology: An Introduction. New Delhi: Prentice Hall.
7. Passer, M.W. & Smith, R.E. (2007). Psychology: The Science of Mind and Behaviour (3rd Ed.). New Delhi: Tata McGraw-Hill
8. Zimbardo, P.G. & Weber, A.L. (1997 Ed.)- Psychology-New York, Harper Collins College Publishers
9. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar.
10. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, Divya Prakashani, Samantarapur, Bhubaneswar.

SEMESTER-II

Paper-II: BASIC PSYCHOLOGICAL PROCESSES

(Credits: 6, Theory: 4, Practical: 2)

Lectures:60 (Theory:40, Practical:20)

Max. Marks: 100 (Theory: 70, Practical: 30)

Introduction:

The course is designed to provide the student a basic understanding of the psychological processes from sensation to thought and communication. The student will be given exposure to the concepts, terminology, principles, and theories relating to each of the mental processes that constitute human

psychology.

Learning Objectives:

1. To help the students to understand the mental processes to begin with sensation and perception up to how it results in thoughts and communication.
2. To help the students gather knowledge about the structural and functional dynamics of each of the mental processes and their interconnectedness.

Expected outcomes: Students will be able to

1. Understand the bases sensory actions and the processes of integration of sensory actions in creating and interpreting perceptual events.
2. Gain knowledge of the important processes and principles of human learning as well as the structural functional attributes of human memory to help conserve the learning outcomes.
3. Understand the structural and functional properties of language and the way it helps thought, communication, problem solving and decision making through development of concepts, ideas, images, and so on.

UNIT-I: Sensation and Perception

- (i) Basics of sensation- Sensory receptors (eye and ear), transduction, sensory thresholds, and sensory adaptation.
- (ii) Nature of perceptual process- Figure and ground, Grouping (Gestalt laws), Perceptual constancies, and illusions, Perception of distance and depth.

UNIT- II: Learning and Memory

- (i) Nature and principles of Classical conditioning, Operant conditioning, and Observational learning.
- (ii) The Atkinson and Shiffrin Model of Memory; Types of Memory- episodic, semantic and procedural; Causes of Forgetting- interference, repression, and amnesia.

UNIT III: Language and Communication

- (i) Properties and structure of language, Linguistic hierarchy, Language acquisition-predisposition, Nature of effective communication.
- (ii) Stages of language development; critical period controversy; speech error and its implications.

UNIT IV: Thinking and Reasoning

- (i) Thinking process; concepts, categories and prototypes, Decision making and factors of influencing decision making.
- (ii) Inductive and deductive reasoning; Problem solving approaches; Steps in problem solving.

Practical

1. Learning Curve: To demonstrate the Learning Curve as a function of Learning trials using Non-sense Syllables.

2. Serial Position Effect: To demonstrate the serial position effect on memory in learning a list of nonsense syllables.

Recommended Books:

1. Baron, R. A. (2002). Psychology (5th Edition), New Delhi, Pearson Education.
2. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar.
3. Feldman, R.S. (2004). Understanding Psychology (6th Edition), New Delhi, Tata Mc. Graw Hill.
4. Gallotti, K.M.: Cognitive Psychology In and Out of the Laboratory. 3rd Ed, Int. Thomson Pub. Co. Bangalore, 2004
5. Gerrig, R.J. & Zimbardo, P.G. (2010). Psychology and Life (19th Ed.). Delhi: Allyn & Bacon.
6. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
7. Morgan, C.T., King, R.A., Weisz, J.R., & Schopler, J. (2008). Introduction to psychology (7th edition) Bombay: Tata-McGraw Hill.
8. Passer, M.W. & Smith, R.E. (2007). Psychology: The Science of Mind and Behavior (3rd Ed.). New Delhi: Tata McGraw-Hill
9. Solso, R.L. (2000). Cognitive Psychology (6th Edition), USA, Allyn Bacon.
10. Zimbardo, P.G. & Weber, A.L. (1997 Ed.)- Psychology- New York, Harper Collins College Publishers

SEMESTER-II

GE-I: INTRODUCTORY PSYCHOLOGY

(Credits: 6, Theory: 4, Practical: 2)

Lectures:60 (Theory:40, Practical:20)

Max. Marks: 100 (Theory: 70, Practical: 30)

Introduction:

The course is designed to give the student a basic understanding of the psychology of human behavior. The students will be given exposure to concepts, terminology, principles, and theories that comprise an introductory course in psychology.

Learning Objectives:

1. To help the students to know the sources and processes of development of modern scientific psychology.
2. To help the students to develop a scientific temperament in studying and understanding human

behavior.

Expected outcomes: Students will be able to

1. Define the term psychology and demonstrate command of the basic terminology, concepts, and principles of the discipline.
2. Gain knowledge of scientific methodologythe variety of ways in which psychological data are gathered and evaluated / interpreted.
3. Identify and compare the major perspectives in psychology: Recognize how each approach views human thought and behavior.
4. Understand the physiological and biochemical links of human behavior.

UNIT-I: Introducing Psychology

- (i) Concept and definition of psychology, Roots of psychology, Psychology as a scientific discipline.
- (ii) Key Perspectives in Psychology- Behavioral, Cognitive, Humanistic, Psychodynamic, and Sociocultural.

UNIT- II: Methods in Psychology

- (i) Natural Observation, Survey and Case Study- Nature, advantages and limitations.
- (ii) Experimental and Correlational methods-Nature, advantages and limitations.

UNIT III: Biological Bases of Behavior

- (i) Structure and functions of the neurons, Communication within and between neurons, Chemical regulation of the endocrine glands.
- (ii) Structure and functions of the Central nervous system and Autonomic nervous system.

UNIT-IV: States of Mind

- (iii) Nature of consciousness; changes in consciousness- sleep-wake schedules.
- (iv) Extended states of Consciousness- Hypnosis, Meditation and Hallucinations.

Practical

1. R.L. by Method of Limits: Students are required to find out the R. L. of volar surface of the right arm of a subject by method of limits.
2. R.L. by Method of Constant Stimuli: Students are required to find out the R. L. of volar surface of the right arm of a subject by method of limits.

Recommended Books:

1. Baron, R. A. (2002). Psychology (5th Edition), New Delhi: Pearson Education.
2. Feldman, R.S. (2004). Understanding Psychology (6th Edition), New Delhi, Tata-McGraw Hill.
3. Gerrig, R.J. & Zimbardo, P.G. (2010). Psychology and Life (19th Ed.). Delhi: Allyn & Bacon.

4. Hilgard & Atkinson- Introduction to Psychology (2003) 14th Edition, Thomson Learning Inc.
5. Morgan, C.T., King, R.A., Weisz, J.R., & Schopler, J. (2008). Introduction to psychology (7th edition) Bombay: Tata-McGraw Hill.
6. Morris, C. G. (1990). Psychology: An Introduction. New Delhi: Prentice Hall.
7. Passer, M.W. & Smith, R.E. (2007). Psychology: The Science of Mind and Behaviour (3rd Ed.). New Delhi: Tata McGraw-Hill
8. Zimbardo, P.G. & Weber, A.L. (1997 Ed.)- Psychology- New York, Harper Collins College Publishers
9. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar.
10. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.

SEMESTER-III

Paper-III: PSYCHOLOGICAL STATISTICS

(Credits: 6, Theory: 4, Practical: 2)

Lectures:60 (Theory:40, Practical:20)

Max. Marks: 100 (Theory: 70, Practical: 30)

Introduction:

The course is designed to equip students with knowledge in the fundamentals of statistics and research methods so that they understand the application of statistics to different research problems in psychology.

Learning Objectives:

1. To help students develop knowledge and understanding of the application of Statistics within Psychology.
2. To help students develop Critical Thinking for application of appropriate statistical analysis in Psychological research.

Expected outcomes: Students will be able to understand

1. The nature psychological variables and how to measure them with appropriate scale.
2. The processes of describing and reporting statistical data.
3. The methods of drawing inferences and conclusions for hypothesis testing by using appropriate statistical analysis.

UNIT-I: Fundamentals of statistics

(i) Meaning and scope of statistics, Nature of variables- Categorical and Continuous, Levels of Measurement- Nominal, Ordinal, Interval, and Ratio.

(ii) Drawing frequency distribution; Graphical representation of grouped data-Polygon, Histogram, Ogive.

UNIT- II: Measures of Statistics

- (i) Measures of Central Tendency- Characteristics of mean, median and mode; Computation of mean, median, and mode.
- (ii) Measures of Variability- Concept of variability, computation of semi-inter quartile range, Standard deviation and variance, Co-efficient of variation.

UNIT III: Sources and Applications

- (i) Concept of Probability; Characteristics of Normal Probability curve, Applications of NPC, Deviation from NPC- Skewness and Kurtosis.
- (ii) Concept of correlation, Product-moment correlation (ungrouped data), Rank order correlation, Chi-square test (Contingency Table).

UNIT -IV: Hypothesis Testing

- (i) Level of significance; Type I and Type II error; Computation of t for independent and dependent samples, The Mann-Whitney U test.
- (ii) Purpose and assumptions of ANOVA; One-way and two-way ANOVA; Kruskal-Wallis H test.

Practical

1. Reporting of Statistical Results: To collect data of 60 (30 boys and 30 girls) High School students about their Annual examination marks in four subjects and to report by descriptive statistical analyses.
2. Computer Awareness: To be familiar with software packages of statistics and their applications.

Recommended Books:

1. Aron, A., Aron, E.N., & Coups, E.J. (2007). Statistics for Psychology. (4thEd.) India: Pearson Education, Prentice Hall.
2. Ferguson, G.A. & Takane, Y. (1989). Statistical Analysis in Psychology & Education, Tata McGraw Hill Publishing Company, New Delhi
3. Garrett, H. E. & Woodworth, R.S. (1985). Psychology in Statistics and Education, Vakils, Feffer & Simons Ltd. Mumbai
4. Mangal, S.K. (2002) Statistics in Psychology and Education. (2ndedt). New Delhi: Prentice Hall of India.
5. Siegal, S. (1994). Nonparametric Statistics. McGraw Hill, New Delhi
6. Singh, A.K. (1986). Tests, Measurements, & Research Methods in Behavioral Sciences, Tata McGraw Hill Publishing Company, New Delhi

7. Walaram, G. Statistics for Behavioral Sciences
8. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
9. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.

SEMESTER-IV

Paper-IV: PSYCHOPATHOLOGY

(Credits: 6, Theory: 4, Practical: 2)

Lectures:60 (Theory:40, Practical:20)

Max. Marks: 100 (Theory: 70, Practical: 30)

Introduction:

Psychopathology refers to the study of mental illness. This course is designed to expose students to the key concepts in psychopathology as well as the major theories associated with the etiology and treatment of psychological disorders and disabilities. Students will be able to understand the distinction between normal and abnormal and the qualities that are used to differentiate what is typical versus atypical through citations of different disorders.

Learning Objectives:

1. To help students define and understand the basic concepts underlying psychopathology and the perspectives which contributed to the development of modern psychopathology.
2. To help students understand the assessment techniques for identifying and classifying maladaptive behavior and mental disorders.
3. To guide students to gain specific knowledge about different types of mental disorders.

Expected outcomes: Students will be able to

1. Understand the differences between normality and abnormality along with the perspectives explaining them.
2. Know the importance and the use of assessment techniques in identifying different forms of maladaptive behavior.
3. Learn the symptoms, causes and treatment of anxiety disorders, mood disorders and schizophrenia.

UNIT-I: Basics of Pathology

- (i) Concept of abnormality; Perspectives of abnormal behavior- Psychodynamic, Behavioral, Cognitive, Humanistic-Existential, and Sociocultural.
- (ii) Classification of maladaptive behavior-DSM-IV; Assessment techniques- Diagnostic tests, Rating scales, History taking interview, Projective tests.

UNIT-II: Anxiety and Mood disorder

- (i) Symptoms, causes and treatment of Generalized anxiety disorder, Phobic disorder, Obsessive-Compulsive disorder.

- (ii) Depressive disorder Symptoms, causes and treatment of Bipolar affective disorder, and Dys-thymia.

UNIT-III: Personality Disorders

- (i) Paranoid, Schizoid, Dissociative, Impulsive.
- (ii) Borderline, Anxious, Avoidance, Dependent personality.

UNIT -IV: Schizophrenia and Therapies

- (i) Characteristics, Major subtypes, Causes and treatment of Schizophrenia.
- (ii) Psychodynamic, and Cognitive Behavior therapy.

Practical

1. Anxiety: Assessment of Anxiety of a subject by Hamilton Anxiety Rating Scale (HARS).
2. Depression: Assessment of Depression Profile of a subject by Becks Depression Inventory (BDI).

Recommended Books:

1. Ahuja N. (2011). A Short Textbook of Psychiatry (7th Ed). New Delhi: Jaypee
2. Barlow D.H. and Durand V.M. (2005). Abnormal Psychology: An Integrated Approach (4th Ed.). Wadsworth: New York.
3. Baron, R.A. (1995 Edition)-Psychology- The Essential Science, Pearson Education Company of India Pvt. Ltd.
4. Carson R.C., Butcher J.N., Mineka, S., & Hooley J.M. (2007). Abnormal Psychology (13th Ed.). ND: Pearson Education.
5. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar.
6. Irwin G. Sarason, Barbara Sarason (2005). Abnormal Psychology. New Delhi: Prentice Hall Publication
7. James C. Coleman (1981). Abnormal Psychology and Modern Life. D.B. Taraporevala with Scott, Foresman and Company, Mumbai
8. Kring, A.M., Johnson, S.L., Davison G.C. & Neale J.M. (2010). Abnormal Psychology (11th Ed.). NY: John Wiley
9. Mohanty, N. (2008). Psychological Disorders: Text and Cases. New Delhi: Neelkamal Publications Pvt. Ltd.
10. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.

SEMESTER-IV

GE-II: PSYCHOPATHOLOGY

(Credits: 6, Theory: 4, Practical: 2)

Lectures:60 (Theory:40, Practical:20)

Max. Marks: 100 (Theory: 70, Practical: 30)

Introduction:

Psychopathology refers to the study of mental illness. This course is designed to expose students to the key concepts in psychopathology as well as the major theories associated with the etiology and treatment of psychological disorders and disabilities. Students will be able to understand the distinction between normal and abnormal and the qualities that are used to differentiate what is typical versus atypical through citations of different disorders.

Learning Objectives:

1. To help students define and understand the basic concepts underlying psychopathology and the perspectives which contributed to the development of modern psychopathology.
2. To help students understand the assessment techniques for identifying and classifying maladaptive behavior and mental disorders.
3. To guide students to gain specific knowledge about different types of mental disorders.

Expected outcomes: Students will be able to

1. Understand the differences between normality and abnormality along with the perspectives explaining them.
2. Know the importance and the use of assessment techniques in identifying different forms of maladaptive behavior.
3. Learn the symptoms, causes and treatment of anxiety disorders, mood disorders and schizophrenia.

UNIT-I: Basics of Pathology

- (i) Concept of abnormality; Perspectives of abnormal behavior- Psychodynamic, Behavioral, Cognitive, Humanistic-Existential, and Sociocultural.
- (ii) Classification of maladaptive behavior-DSM-IV; Assessment techniques- Diagnostic tests, Rating scales, History taking interview, Projective tests.

UNIT-II: Anxiety and Mood disorder

- (i) Symptoms, causes and treatment of Generalized anxiety disorder, Phobic disorder, Obsessive-Compulsive disorder.
- (ii) Depressive disorder Symptoms, causes and treatment of Bipolar affective disorder, and Dysthymia.

UNIT-III: Personality Disorders

- (i) Paranoid, Schizoid, Dissociative, Impulsive.
- (ii) Borderline, Anxious, Avoidance, Dependent personality.

UNIT -IV: Schizophrenia and Therapies

- (i) Characteristics, Major subtypes, Causes and treatment of Schizophrenia.
- (ii) Psychodynamic, and Cognitive Behavior therapy.

Practical

1. Anxiety: Assessment of Anxiety of a subject by Hamilton Anxiety Rating Scale (HARS).
2. Depression: Assessment of Depression Profile of a subject by Becks Depression Inventory (BDI).

Recommended Books:

1. Ahuja N. (2011). A Short Textbook of Psychiatry (7th Ed). New Delhi: Jaypee
2. Barlow D.H. and Durand V.M. (2005). Abnormal Psychology: An Integrated Approach (4th Ed.).Wadsworth: New York.
3. Baron, R.A. (1995 Edition)-Psychology- The Essential Science, Pearson Education Company of India Pvt. Ltd.
4. Carson R.C., Butcher J.N., Mineka, S., & Hooley J.M. (2007). Abnormal Psychology (13th Ed.).ND: Pearson Education.
5. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar.
6. Irwin G. Sarason, Barbara Sarason (2005). Abnormal Psychology. New Delhi: Prentice Hall Publication
7. James C. Coleman (1981). Abnormal Psychology and Modern Life. D.B. Taraporevala with Scott, Foresman and Company, Mumbai
8. Kring,A.M.,Johnson,S.L.,Davison G.C. & Neale J.M. (2010). Abnormal Psychology (11th Ed.).NY: John Wiley
9. Mohanty, N. (2008). Psychological Disorders: Text and Cases. New Delhi: Neelkamal Publications Pvt. Ltd.
10. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.

SEMESTER-V

DSE-I : ORGANIZATIONAL BEHAVIOR

(Credits: 6, Theory: 4, Practical: 2)

Lectures:60 (Theory:40, Practical:20)

Max. Marks: 100 (Theory: 70, Practical: 30)

Introduction:

The course provides an overview of the main fields of organizational and personnel psychology. It focuses on topics such as organizational system; work behavior, attitudes and motivation as related to organizational set up; management of power and politics in the organizations; and finally development and evaluation of human resources for sustainable growth of an organizations.

Learning Objectives:

1. To help students able to understand the structure, functions, and designs of different organizations.
2. To make students understand the processes of group decision making and leadership functions in different organizations.
3. To make students understand the theories of work motivation and related issues of power and politics in the organizational set up.
- 4/. To help students demonstrate professional skills in the evaluation, management, and development of human resources in the organizations.

Expected outcomes: Students will be able to

1. Understand different concepts and dynamics related to organizational system, behavior, and management.
2. Identify steps managers can take to motivate employees in the perspectives of the theories of work motivation.
3. Understand the tricks of power and politics management in the organizations.
4. Understand significance of human resource development, evaluation and management for the interest and benefit of the organization.

UNIT-I: Historical context of organizational behavior

- (i) Contributions of Taylor, Weber and Fayoll; Challenges, Scope and opportunities for OB.
- (ii) OB perspectives-Open system approach, Human relations perspective, Socio-technical approach, OB model responsive to Indian realities.

UNIT-II: Organization System

- (i) Structure and functions of organization, Common organizational designs, Management roles, functions and skills.
- (ii) Group decision making processes in organizations, Organizational leadership and types of leadership in organizations.

UNIT-III: Work, Power and Politics

- (i) Contemporary theories of work motivation- ERG theory, McClellands theory of needs, Cognitive evaluation theory, Goal-setting theory, Reinforcement theory.
- (ii) Defining power in organization, Bases of power, Power tactics, Nature of organizational politics, Impression management, and defensive behavior.

UNIT-IV: Human resource development and Evaluation

- (i) Human Skills and Abilities, Selection Practices for Optimal Use of Human Resources; Training Programs for the Development of Human Resources.
- (ii) Performance Evaluation- Purpose, Methods, Potential Problems and methods to overcome them.

Practical

1. Leadership Style: To measure his basic leadership style of 4 college students by using Greenberg Basic Leadership Style scale.
2. Conflict-Handling: To measure the conflict-handling style of 4 college students by using Rahims scale to identify their conflict handling style.

Recommended Books:

1. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
2. Greenberg, J. & Baron, R.A. (2007). Behaviour in Organizations (9th Ed.). India: Dorling Kindersley.
3. Luthans, F. (2009). Organizational behavior. New Delhi: McGraw Hill.
4. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
5. Pareek, U.(2010). Understanding organizational behaviour. Oxford: Oxford University Press.
6. Robbins, S.P.; Timothy, A.J. & Vohra, N. (2012). Organizational Behavior, 15th Edn. Pearson Education: New Delhi.
7. Schultz, D. and Schultz, S.E. (2004). Psychology and Work Today. Delhi: Pearson Inc.
8. Singh, K. (2010). Organizational Behaviour: Texts & Cases. India: Dorling Kindersley.

SEMESTER-VI

DSE-II : COUNSELING PSYCHOLOGY

(Credits: 6, Theory: 4, Practical: 2)

Lectures:60 (Theory:40, Practical:20)

Max. Marks: 100 (Theory: 70, Practical: 30)

Introduction:

The course is designed to develop entry level counseling psychologists who will be capable of understanding and demonstrating behavior and attitudes in the basic areas of professional counseling.

Learning Objectives:

1. To help students able to understand and integrate current scientific knowledge and theory into counseling practice.
2. To make students learn the history and professional issues related to counseling psychology.
3. To help students integrate and convey information in the core areas of counseling practice.
4. To help students demonstrate professional behavior in their various roles as counseling psychologists.

Expected outcomes: Students will be able to

1. Understand the purpose of counseling and practice counseling ethically following different approaches.
2. Understand the basics of counseling process and use them for counseling students, families, couples, distressed, and handicaps.

UNIT-I: Basics of Counseling

- (i) Meaning, scope and purpose of counseling with special reference to India; The counseling process, counseling relationship, counseling interview.
- (ii) Characteristics of a good counselor, Ethics and values in counseling; Education and training of the counselor.

UNIT-II: Theories and Techniques of Counseling

- (i) Psychodynamic approach-Freud and Neo Freudians; Humanistic approach-Existential and Client centered.
- (ii) Cognitive approach- Rational-emotive and transaction analysis; Behavioral approach- Behavior modification; Indian contribution- yoga and meditation.

UNIT-III: Counseling Programs

- (i) Working in a counseling relationship, transference and counter transference, termination of counseling relationship, Factors influencing counseling.
- (ii) Student counseling, Emphases, roles and activities of the school, and college counselor.

UNIT-IV: Counseling application

- (i) Family and Marriage Counseling, Family life and family cycle, Models and methods of family counseling.
- (ii) Alcohol and drug abuse counseling; Counseling the persons with Suicidal tendencies, and Victims of Harassment and Violence.

Practical

1. Marital Relationship- To assess the marital relationship of 2 couples using Lerner's Couple adjustment scale.

2. Case Reporting: To complete four case studies of high school students with problem behavior in the appropriate case report proforma.

Recommended Books:

1. Burnard Philip. (1995). Counselling Skills Training A sourcebook of Activities. New Delhi: Viva Books Private Limited.
2. Dash, U.N., Dash, A.S., Mishra, H.C., Nanda, G.K. & Jena, N. (2004). Practical Exercises in Psychology: Learning about Yourself and Others. Panchasila, Bhubaneswar
3. Feltham, C and Horton, I. (2000). Handbook of Counseling and Psychotherapy. London: Sage.
4. Gibson, R.L & Mitchell M.H. (2003). Introduction to counseling and Guidance. 6th edn. Delhi: Pearson Education
5. Gladding, S.T. (2009). Counselling: A comprehensive profession (6th Ed.). New Delhi: Pearson India
6. Mishra, H.C. & Varadwaj, K. (2009). Counseling Psychology: Theories, Issues and Applications, DivyaPrakashini, Samantarapur, Bhubaneswar, Odisha
7. Misra, G. (Ed) (2010). Psychology in India, Volume 3: Clinical and Health Psychology. New Delhi: Pearson India.
8. Mohanty, N., Varadwaj, K. & Mishra, H.C. (2014). Explorations of Human Nature and Strength: Practicals in Psychology, DivyaPrakashani, Samantarapur, Bhubaneswar.
9. Nelson-Jones. (1995). The theory and practice of counseling. 2nd Edn. London: Holt, Rinehart and Winston Ltd
10. Rao, S. (2002). Counselling and Guidance (2nd Ed.). New Delhi: McGraw Hill.

STATISTICS (HONOURS)

SEMESTER-I

C:1-DESCRIPTIVE STATISTICS-I & LINEAR ALGEBRA

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Statistical Methods : Definition & scope of Statistics, concepts of Statistical population and sample, quantitative and qualitative data, attributes, variables, scales of measurement- nominal, ordinal, interval and ratio. Presentation : tabular and graphical including histogram and ogives.

UNIT-II:

Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, standard deviation, coefficient of variation, Moments, absolute moments, skewness and kurtosis, Shephard's correction.

UNIT-III:

Permutation & Combination, Binomial Theorem, Logarithmic & Exponential Series, Determinant.

UNIT-IV:

Matrices: types of matrices (orthogonal matrix and idempotent matrix); operation on matrices (including inverse); partitioned matrices; singular and non-singular matrices. Rank of a matrix: row-rank and column-rank; properties of rank; rank of sum and product of matrices.

UNIT-V:

Linear equations: homogeneous and non-homogeneous equations. Solution space: consistency and general solution. Characteristic roots and Characteristic vectors, Properties of Characteristic roots, Cayley Hamilton theorem. Quadratic forms.

PRACTICAL

1. Calculation of different measures of Central tendency, dispersion, skewness and kurtosis.
2. Calculation of 1st Four moments from grouped and ungrouped data.

Recommended Books:

1. Intermediate Algebra by Ghanshyam Samal, Vidyapuri Publication, 2007.
2. A text book of matrices by Shanti Narayan, S. Chand, 1962.
3. Fundamentals of Statistics by S.C Gupta, Himalayan Publishing House, 2014.
4. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2013.

C:2-DESCRIPTIVE STATISTICS-II & CALCULUS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Bivariate Data : Definition, Curve fitting by the method of least squares (linear, quadratic and exponential), fitting of curves reducible to polynomials by log and inverse transformation.

UNIT-II:

Correlation Coefficient: Scatter diagram, Product moment correlation coefficient and its properties (for grouped and ungrouped data), coefficient of determination, correlation ratio, rank correlation, intra class correlation.

UNIT-III:

Regression Analysis: Concept of regression, fitting of regression lines, regression coefficients and their properties.

UNIT-IV:

Function of one variable; limit, continuity and differentiability; successive differentiation; mean value theorem (statement only); maxima and minima.

Function of Several Variables: Partial derivatives, transformations and Jacobians.

UNIT-V:

Integral Calculus : Review of Integration (algebraic, trigonometric, logarithmic and exponential functions) and definite integral, Algebra of integration, differentiation under Integral sign. Differential equations of first order and first degree (variable-separation method).

PRACTICAL

1. Fitting of 1st., 2nd. degree polynomial and exponential curve.
2. Calculation of simple correlation coefficient, regression lines, rank correlation coefficient (for grouped and ungrouped data).

Recommended Books:

1. Differential calculus by Das & Mukherjee, U.N Dhar Publication, Kolkatta, 2010.
2. Integral Calculus by Das & Mukherjee, U.N Dhar, Kolkatta, 2010.
3. Fundamentals of Statistics by S.C Gupta, Himalayan Publishing House, 2014.
4. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2013.
5. Statistical Methods by P.N. Arora, S. Arora & S. Arora, S. Chand, 2014.

SEMESTER-II

C:3-PROBABILITY - I & NUMERICAL ANALYSIS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Random experiment : trials, sample point and samples space, event, operations of events, concept of mutually exclusive and exhaustive events.

Definition of Probability: Classical, relative frequency and axiomatic approach; discrete and continuous probability space, addition law of probability.

UNIT-II:

Multiplication law of probability, conditional probability and independence of events, Bayes theorem and its applications.

UNIT-III:

Difference table. Methods of interpolation: Newtons forward and backward interpolation formulae. Newtons divided difference formula.

UNIT-IV:

Lagranges interpolation formulae, inverse interpolation, central difference formula.

UNIT-V:

Numerical differentiation (Eulers method), Numerical integration: Trapezoidal, Simpsons one-third, three-eighth rules.

PRACTICAL

1. Interpolation with equal intervals, unequal intervals using Lagranges and Newtons formula.
2. Problems on central difference formula.
3. Problems on numerical differentiation and integration.

Recommended Books:

1. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2012.
2. An Outline of Statistical Theory, Vol-I, Gun, Gupta & Dasgupta, 4thEdn., World Press, 2003.
3. Numerical Methods by P.Kandasamy, K. Thilagavathy & K.Gunavathi, S. Chand, 2012.
4. Numerical Methods & Applications by E. Ward Cheney & David R. Kincaid, Cengage Publication, 2010.
5. Numerical Analysis byGoel and Mittal, PragatiPrakashan, ND, 2008.

C:4-PROBABILITY-II & DESCRIPTIVE STATISTICS-III

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Random variables: Definition, properties, probability mass function, probability density function; distribution function, Bivariate random variables, joint, marginal and conditional distributions.

UNIT- II:

Mathematical expectation of a random variable and its properties, Mean and variance of a random variables, probability generating function, moment generating function and cumulant generating function. Conditional expectation and conditional variance.

UNIT-III:

Characteristic function (simple applications), uniqueness theorem, convergence of random variables, convergence in probability, convergence in distribution. Hally-Bray theorem (without proof) and its application.

UNIT-IV:

Multivariate Data: Multiple and Partial correlations (Yules Notation) and plane of regression (three variables only). Properties of residuals, coefficient of multiple and partial correlation and their properties.

UNIT-V:

Analysis of categorical Data : Consistency of categorical data, independence and association of attributes. Yules coefficient, coefficient of colligation.

PRACTICAL

1. Problems on multiple and partial correlation and regression.
2. Problems on theory of attributes (consistency, coefficient of association).

Recommended Books:

1. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2012.
2. Mathematical Statistics by J.N. Kapoor & H.C. Saxena, S. Chand, 2011.
3. An Outline of Statistical Theory, Vol-I, Gun, Gupta & Dasgupta, 4th Edn., World Press, 2003.

SEMESTER-III

C:5-PROBABILITY DISTRIBUTIONS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Discrete probability distributions: Uniform, Bernoulli, Binomial, Poisson, Negative Binomial, Geometric, Hyper geometric and their properties.

UNIT-II:

Continuous probability distributions: Uniform, Normal, Beta, Gamma, Exponential, Cauchy and their properties.

UNIT-III:

Exact sampling distributions: Chi-square, Students t, Fishers t and Snedecors F and relationship between t, F and χ^2 .

UNIT-IV:

Weak law of large numbers: Bernoulli's WLLN, Chebyshev's inequality, Chebyshev's WLLN, Poisson's WLLN and applications.

UNIT-V:

Strong Law of large numbers, Kolmogorov's SLLN (Statement only). Central limit theorem, Lindeberg-Levy theorem and applications.

PRACTICAL

1. Fitting of Binomial, Poisson, Fitting of normal distribution.

Recommended Books:

1. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2013.
2. An Outline of Statistical Theory, Vol-I, Gun, Gupta & Dasgupta, 4thEdn., World Press, 2003.

C:6-SAMPLING DISTRIBUTION & BASICS OF COMPUTER

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Concept of population, sample, parameter, statistic and sampling distribution; standard error, standard error of moments, distribution of sample mean and variance from normal distribution.

UNIT-II:

Tests of significance based on large sample: the normal test of significance (Z-test) for both one-sample and two-sample problems for mean, proportion and standard deviation.

UNIT-III:

Small sample tests: Tests of significance based on exact sampling distributions, i.e. χ^2 , t and F distributions.

UNIT-IV:

Introduction to world of computer, The system unit: Processing & Memory, Storage- Storage Systems: Magnetic and Optical Disks, Input and Output, Key board, Pointing Devices, Scanners, Audio Inputs & Output, Display Devices. Operating Systems: DOS, WINDOWS, LINUX, MAC.

UNIT-V:

Application Software: Concept of Word Processing, Use of MS-Office: MS Word, MS Excel, PowerPoint. Introduction to R, C and SPSS.

PRACTICAL

1. Tests of significance based on Normal distribution , Chi-square, t , F distribution.

Recommended Books:

1. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2013.
2. Statistical Methods:- P.N. Arora, S. Arora & S. Arora, S. Chand, 2014.
3. Statistical methods by S.P. Gupta, Himalayan Publication, Mumbai, 2013.
4. Fundamentals of Computers by Morles & Parker,Cengage publication,2013.
5. Computer Fundamentals and office by Sanjay Saxena and Rajneesh Agrawal, Vikas Publication,2014.

C:7-THEORY OF ESTIMATION

(Credits:6, Theory-4, Practical-2)
Lectures: 60 (Theory:40, Practical:20)
Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Point Estimation: Introduction, Properties of Estimator: unbiasedness, consistency, efficiency and sufficiency.

UNIT-II:

Minimum Variance Unbiased Estimation, Rao-Cramer inequality, Rao-Blackwell theorem and applications.

UNIT-III:

Methods of Estimation: Method of maximum likelihood, properties of MLE. Method of least squares, method of moments, method of minimum variance.

UNIT-IV:

Interval Estimation: Concepts of confidence interval and confidence coefficient, confidence intervals for the parameters of univariate normal distribution.

UNIT-V:

Theory of linear estimation, concept of Gauss Markov linear model (full rank case), Estimation of parameters in linear models.

PRACTICAL

1. Methods of estimations.
2. Estimation of parameters in linear models.

Recommended Books:

1. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2012.
2. An Outline of Statistical theory (Vol-II) Goon, Gupta and Dasgupta, World Press, 2007.
3. Fundamentals of applied Statistics S.C. Gupta and V.K. Kapoor, Sultan Chand, 2013.

SEMESTER-IV

C:8-THEORY OF ESTIMATION

(Credits:6, Theory-4, Practical-2)
Lectures: 60 (Theory:40, Practical:20)
Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Statistical Hypotheses: Simple and composite, statistical tests, critical region, type-I and type-II error, size and power of a test, definition of Most powerful (MP), Uniformly Most Powerful(UMP) and Uniformly Most Powerful Unbiased (UMPU) tests.

UNIT-II:

Neyman-Pearson lemma and its applications in testing of hypothesis based on Binomial, Poisson

and Normal distributions.

UNIT-III:

Tests of composite hypothesis: likelihood ratio test and problems based on LR test.

UNIT-IV:

Non-parametric inference: Introduction, merits and demerits, one-sample sign test, paired-sample sign test. Wilcoxon signed-rank test. Wilcoxon paired sample sign ranked test.

UNIT-V:

Non-parametric inferences: Wald-Wolfowitz runs test, U statistic, Mann-Whitney U-test, Kolmogorov-Smirnov one sample and two sample tests.

PRACTICAL

1. Problems on Sign Test (One sample and paired sample) Run test. Mann whitney U test, Kolmogorov-Smirnov tests.

Recommended Books:

1. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2012.
2. Outline of Statistical theory (Vol-II) Goon, Gupta & Dasgupta, World Press, 2008.
3. Statistical Inference: Testing of Hypothesis by Srivastava & Srivastava, Oscar, 2009.

C:9-SAMPLING THEORY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Population and sample, sampling versus census, steps involved in sample surveys, principles of sample survey, Advantages and disadvantages of sampling, Sampling and non-sampling errors.

UNIT-II:

Types of sampling: Non-probability, Probability & Mixed methods, Simple Random Sampling: SR-SWR & SRSWOR, Drawing of random sample by different methods, estimation of mean and variance.

UNIT-III:

Stratified Random Sampling: Advantages & disadvantages, uses, allocation of sample sizes into various strata: proportional and optimum, estimation of mean, total and variance of the estimate.

UNIT-IV:

Systematic sampling: Advantages and disadvantages, uses, drawing of systematic samples, estimation of mean and variance. systematic sampling versus stratified random sampling, systematic sampling when the population consists of a linear trend.

UNIT-V:

Ratio, product and regression methods of estimation, estimation of mean and variance of the estimate, comparison of efficiencies.

PRACTICAL

1. Problems on SRS, Stratified R.S, systemic sampling.

Recommended Books:

1. Fundamentals of Applied Statistics-S.C. Gupta and V.K. Kapoor, Sultan Chand, 2013.
2. Sampling Techniques W.G. Cochran, Wiley & Sons, 2007.
3. Sampling Theory of Survey with Applications by P.V. Sukhatme, B.V. Sukhatme, S.Sukhatme and C.Asok, ISAS, New Delhi, 1984.

C:10-INDEX NUMBER & LINEAR PROGRAMMING

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Index numbers: Introduction, uses & types. Base year and current year, price relatives and quantity relatives. Problems involved in construction of index number. Unweighted and weighted index number, Laspyers, PaaschesDorbish-Browley,Fishers ideal index number.

UNIT-II:

Criteria of good index number: Unit, Time Reversal, Factor Reversal & Circular tests, cost of living index number, its construction: Aggregate Expenditure & Family Budget method and uses, fixed base and chain base index numbers, base shifting, splicing and deflating.

UNIT-III:

Introduction, definition, scope of Operations Research, phases of Operations Research, models of Operations Research, Elementary idea about Linear programming and its mathematical formulation.

UNIT-IV:

Procedure of solving LPP by graphical method, Definition of Feasible solution, basic feasible solution, Slack and surplus variables, simplex method Big M method.

UNIT-V:

Duality; Primal dual conversion, Dual-simplex method, advantages of duality, game theory concept, two person zero-sum game.

PRACTICAL

1. Computation of index number by Lasperes,PaaschesDrobish-Browley,Fishers Formula.
2. Time reversal Tests consumer price index number.
3. LPP by Graphical method.

Recommended Books:

1. Operations Research by S.Kalavathy, Vikas, 2009.
2. Introduction to Operations Research by Prem Kumar Gupta, D.S. Hira and Aarti Kamboj, S.Chand and Company, 2012.
3. Operations Research by Anand Sharma, Himalayan Publishing House, 2014.
4. Operations Research by P.K Tripathy, Kalyani Publications, 1997.

SEMESTER-V

C:11-STATISTICAL QUALITY CONTROL & OFFICIAL STATISTICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Meaning and uses of Statistical Quality control(SQC), control chart variables, Process and product control, chance and assignable causes of variation, 3- sigma control limits, \bar{X} R and σ charts. Control chart for attributes, p-chart, d-chart, c-chart and their interpretations.

UNIT-II:

Natural tolerance limit and specification limit, acceptance sampling by attributes, AQL, LTPD, AOQL & ASN consumers risk and producers risk, O.C. curve. Idea about single and double sampling plans.

UNIT-III:

Present official Statistical System in India. Methods of collection of official statistics, their reliability and limitations.

UNIT-IV:

Central Statistical organization-CSO & NSSO: their functions and publications. State Statistical Organizations: functions and publications.

Idea about population statistics, Agricultural, Yield and Area statistics.

UNIT-V:

Population census, Introductory ideas about National level surveys viz., NFHS, DLHS, AHS.

PRACTICAL

1. Computation of \bar{X} -Chart, R Chart and σ -charts.
2. Computation of p- Chart.

Recommended Books:

1. Fundamentals of applied Statistics S.C. Gupta and V.K. Kapoor, Sultan Chand, 2013.
2. Fundamentals of Statistics (Vol-II)-Goon, Gupta and Dasgupta, World Press, 2007.
3. Indian Official Statistical System: M.R. Saluja, Publication Society, 2006.

C:12-VITAL STATISTICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Introduction to Vital Statistics, Different Vital events, rates and ratio of vital events. Vital Statistics in the study of population trend, Uses of Vital statistics. Measurement of mortality : Crude

death rate, age-specific death rates, IMR, standardized death rate, Direct and indirect method of standardization and uses.

UNIT-II:

Mortality table or Life table, its uses, columns of life table, assumptions, and construction of life table, Abridged life table (Reed Merell).

UNIT-III:

Measurement of fertility: crude birth rate, general fertility rate, age-specific birth rate, total fertility rate, gross reproduction rate, net reproduction rate.

UNIT-IV:

Population Census: Methods of census, salient features, its uses and problems, registration method, sample surveys, sources of demographic data.

UNIT-V:

Population Estimation and projection, need and uses, methods of population estimation & projection.

PRACTICAL

1. Calculation of different measures of mortality and fertility.
2. Construction of Life table.

Recommended Books:

1. Fundamentals of Applied Statistics, S.C. Gupta & V.K. Kapoor, Sultan Chand, 2012.
2. Indian Official Statistical System: M.R. Saluja, Publication Society, 2006.
3. Statistical System in India: Asthna & Srivastav, S. Chand, 2009.
4. Techniques of Demographic analysis, K.B. Pathak and F.Ram, Himalaya publication.

SEMESTER-VI

C:13-DESIGN OF EXPERIMENTS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Analysis of variance: one way and two way classified data, Design of Experiments: Introduction, Experimental units and errors, uniformity trial. Efficiency of design. Basic principles of a design. Randomization, Replication and local control.

UNIT-II:

Completely Randomised Design, Layout and complete analysis of CRD. Advantages and uses. Randomized Block Design, Layout and complete analysis, Missing plot technique in RBD with analysis. Efficiency of RBD, with respect to CRD . Advantages and uses.

UNIT-III:

Latin square Design, and its analysis Estimation of missing value in LSD and analysis. Comparison

of efficiency with RBD and CRD.

UNIT-IV:

Factorial Experiments: Introduction, advantages & disadvantages, main and interaction effects, Yates method of computing factorial effect totals. Analysis of 2^2 , 2^3 and 2^4 factorial design.

UNIT-V:

Confounding in factorial experiments: Total and partial confounding in 2^3 and 2^4 factorial experiment.

PRACTICAL

1. Analysis of CRD, RBD and LSD.
2. One Missing plot technique in RBD, LSD with analysis.
3. Analysis of 2^2 and 2^3 factorial experiments.
4. Confounding in 2^3 and 2^4 factorial experiment.

Recommended Books:

1. Fundamentals of applied Statistics S.C. Gupta and V.K. Kapoor, Sultan Chand, 2012.
2. Design and Analysis of Experiments by Das and Giri, Wiley Eastern, ND, 200.
3. Fundamentals of Statistics (Vol-II)-Goon, Gupta and Dasgupta, World Press, 2007.

C:14-STATISTICS FOR PUBLIC POLICY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Statistics in Psychology and Education: Scaling procedure.

UNIT-II:

Reliability and validity of test scores. Intelligence test and Intelligence Quotient.

UNIT-III:

Demand analysis: laws of demand and supply, price elasticity of demand and supply, partial and cross elasticity of demand.

UNIT-IV:

Estimating Elasticity: Types of data, required, Leontief and Pigue method, Engels law and Engels curve, Pareto law of income distribution.

UNIT-V:

Concept of national income and social accounting- measurement of national income, circular flow of income in two, three and four-factor economy, different forms of national income accounting.

PRACTICAL

1. Calculation of Reliability and validity scores.
2. Practical based on demand analysis (demand elasticity).

3. Estimation of elasticity.
4. Engels curve.
5. Pareto curve.

Recommended Books:

1. Macroeconomics: Theory and Policy, H.L. Ahuja, S. Chand Publications.
2. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2014.

DISCIPLINE SPECIFIC ELECTIVE (DSE)

For the Discipline Specific Elective (DSE), a student has to choose any three papers (STAT-DSE-501, STAT-DSE-502, STAT-DSE-601) from the following six papers (two papers in Fifth semester and one paper in Sixth Semester) and a project work (STAT-DSE-602) in Sixth Semester.

1. Time Series Analysis.
2. Biostatistics.
3. Population Studies.
4. Actuarial Statistics.
5. Operations Research.
6. Basic Econometrics.

SEMESTER-V

1. TIME SERIES ANALYSIS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Time Series: Introduction to time series data and application in various fields, Components of time series, Methods of measuring secular trend: graphic, semi-average, Moving average method.

UNIT-II:

Estimating trend by Iterated averages and Spencers 15-point and 21-point formula. Measurement of trend by least squares method: by fitting Polynomials of 1st & 2nd Degree, exponential, modified exponential, logistic, Gompertz curve.

UNIT-III:

Measurement of seasonal fluctuations: Simple average, Ratio-to-trend, Ratio-to-moving average & Link relatives method.

UNIT-IV:

Measurement of cyclic component: Harmonic analysis. Measurement of irregular variation (variate difference method), effect of moving averages on cyclical and random components of a time series.

UNIT-V:

Different schemes which account for oscillations in a stationary time series. Auto regressive series of first and second order, Serial correlation and correlogram, lag correlation.

PRACTICAL

- 1.Measurement of Trend and seasonal fluctuations.
2. Problems on Spencers 15- point and 21- point formula.

Recommended Books:

1. Fundamentals of Applied Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2012.
2. Fundamentals of Statistics, Voll-II, Gun, Gupta & Dasgupta, World Press, 2007.

2. BIO-STATISTICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Bioassay: The purpose and structure of biological assay. Types of biological assays, Direct assays, Ratio estimates, asymptotic distributions: Fellers theorem. Regression approach to estimating dose response. Logit and probit approach.

UNIT-II:

Statistical Genetics: Basic terminology of genetics. Frequencies of genes and genotypes. Mendles law, Hardy-Weinberg equilibrium, mating frequencies estimation, allele frequency.

UNIT-III:

Reliability: Introduction, Hazard function, Bath tub failure rate. Exponential distribution as life model, its memory-less property. Reliability function and its estimation. System reliability-series and parallel.

UNIT-IV:

Survival Analysis: Survival function and hazard rates. Types of censoring and likelihood in these cases. Life time distributions-Exponential, Gamma, Weibull, Longnormal.

UNIT-V:

Epidemiology: Introduction to epidemiology, principles of epidemiological investigations, surveillance and disease monitoring in population.

PRACTICAL

1. Estimation of relative potency and its standard error.
2. Fitting exponential growth module to data by linearization method.
3. Fitting logistic growth module.
4. Computation of reliability of series and parallel systems.

Recommended Books:

1. Statistical Techniques in Bioassay By Z. Govindarangilu, Karger Publishers & Panther publishers (2000).
2. A course in Mathematical and Statistical ecology-By Anil Gore and S.A. Paranjape Kulwer, Academic Publishers(2000).
3. Foundations of Epidemiology By Abraham, M. Lilienfeld Oxford University Press.
4. Reliability Engineering By L.S. Srinath, Affiliated East-West Press.

3. POPULATION STUDIES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Measures of Population Change and Distribution: Introduction, rate of population change, doubling time for a population; population distribution: Population density, percentage distribution by rural-urban category, Lorenz curve and Gini concentration ratio.

UNIT-II:

Analysis of Age Distribution: Percent distribution and percent change in distribution, index of relative difference and dissimilarity; Graphic representation of age data: Time series chart and population pyramid, measurement of ageing of population.

UNIT-III:

Quality of Population Data: Introduction, Whipples Index, Myers Blended Index, UN Joint Index.

UNIT-IV:

The Malthusian Theory of Population: The theory, criticisms, applicability, Neo-Malthusian theory. Optimum Theory of Population: Introduction, definition, assumptions, the theory, its superiority over the Malthusian theory its criticisms.

Karl Marx's Theory of surplus population; Introduction, definition, its criticisms.

UNIT-V:

Theory of Demographic Transition: Introduction, explanation, its criticisms.

Nature of information collected in 1971, 1981, 1991 and 2001 census in India.

National Family Health Surveys (NFHS-1 & NFHS-2) and Household Economic Behaviour.

PRACTICAL

1. Measures of population concentration by Gini concentration ratio.
2. Construction of population pyramid.
3. Computation of Whipples index and Myres Blended index.

Recommended Books:

1. Techniques of Demographic Analysis By K.B. Pathak and F.Ram, Himalaya Publishing House, 2013.
2. Basic Demographic Techniques and Application By K. Srinivasan, Sage Publication.
3. Demography By M.L. Thingan, B.K. Bhatta and J.N. Desai, Vrinda Publications(P)Ltd. 2011.

4. ACTUARIAL STATISTICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Utility theory, insurance and utility theory, models for individual claims and their sums, survival

function, curate future life time, force of mortality.

UNIT-II:

Life table and its relation with survival function examples, assumptions of fractional ages, some analytical laws of mortality.

UNIT-III:

Multiple life functions, joint life and last survivor status, insurance and annuity benefits, evaluation for special mortality laws.

UNIT-IV:

Elements of compound interest, life annuities; single payment, continuous life annuities, discrete life annuities.

UNIT-V:

Net premiums: continuous and discrete premiums, true monthly payment premiums, apportionate premiums, commutation functions and accumulation type benefits.

PRACTICAL

1. Computation of values of utility function.
2. Computation of various components of life table.
3. Construction of multiple discernment table.
4. Determination of distribution function, survival function and force of mortality.
5. Computation of discrete and continuous net premiums.

Recommended Books:

1. Analysis of mortality and other Actuarial Statistics By Benjamin, B. and Pollard, J.H. (1980).
2. Actuarial Mathematics By N.L. Bowers, H.U. Gerber, J.C. Hickman, D.A. Jones and C.J. Nesbitt, Society of Actuaries, Ithaca Illious, USA (1986).

5. OPERATIONS RESEARCH

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Solution to Linear Programming Problems by simplex method, Big M-Method, Two-phase simplex method.

UNIT-II:

Duality: Introduction, formulation, determination of dual, Primal to dual and vice-versa.

UNIT-III:

Transportation Problems: Introduction and mathematical formulation definition of important terms initial basic feasible solution by north-west corner rule, least cost method and Vogels approximation method.

UNIT-IV:

Networking: Introduction, basic terms, rules of network construction, numbering the events, forward pass and backward pass computations. Critical Path Method(CPM), Floats & Slacks.

UNIT-V:

Simulation; Types of simulation generation of random numbers by mid-square and congruential-methods, Monte-Carlo simulation.

PRACTICAL

1. Solution of LPP by simplex method, Big-M Method and two-phase method.
2. Finding out dual from primal and vice-versa.
3. Computation of initial basic feasible solution to a transportation problem by north- west corner rule, least cost and Vogels approximation method.

Recommended Books:

1. Operations Research By S.Kalavathy, Vikas Publication, 2013.
2. Operations Research By Pradip Kumar Tripathy, Kalyani Publisher, 2013.
3. Operations Research By Prem Kumar Gupta and D.S. Hira, S. Chand, 2014.

6. BASIC ECONOMETRICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

What is Econometrics? Methodology of econometrics, statement of theory or hypothesis, specification of the mathematical and econometric models of consumption, estimation of the econometric model, hypothesis testing, forecasting or prediction, use of the model for control or policy purpose.

UNIT-II:

The modern interpretation of the term regression, Statistical Vs deterministic relationships, regression Vs causation and correlation, nature and sources of data for econometric analysis, accuracy of data.

UNIT-III:

Two-variable regression analysis: Some basic ideas, a hypothetical example concept of population regression function (PRF), meaning of the term linear, linearity in the variable and parameters, stochastic specification of PRF, significance of the stochastic disturbance, sample regression function.

UNIT-IV:

Two-variable regression model: Problem of estimation method of ordinary least squares. Classical linear regression model: Assumptions, how realistic are these assumptions, precision or standard errors of least-squares estimates: Proportion of least-squares estimators: Gauss-Markov theorem, Coefficient of determination r^2 : A measure of goodness of fit.

PRACTICAL

1. Estimation of the econometric model.
2. Computation of sample regression function.
3. Computation of coefficient of determination r^2 , its interpretation.

Recommended Books:

1. Basic Econometrics By Damodar N. Gujarati, Indian Edition.
2. Econometric Methods By J. Johnston, McGraw Hills International Book company.

SEMESTER-VI

PROJECT

EXTERNAL ASSESSMENT

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

The project work shall be spread over the whole semester. A project may be undertaken by the students with the consultation of the faculties. However, the project report shall be submitted by

each member of the group separately for evaluation. A project report shall clearly state the problem addressed, the methodology adopted, the assumptions and the hypotheses formulated, any previous reference to the study undertaken, statistical analyses performed and the broad conclusion drawn.

INTERNAL ASSESSMENT

The candidate is required to present the synopsis of his/her project work before the teachers of the department.

SEMESTER-I

GE-1: STATISTICAL METHODS-I

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Ideas about types of data, collection, classification and tabulation of data. Frequency distributions: graphic and diagrammatic representation of data.

UNIT-II:

Measures of central tendency: arithmetic mean, geometric mean & harmonic mean their properties & applications. Median & mode & other partition values: quartiles, deciles, percentiles and graphic presentation.

UNIT-III:

Measures of dispersion: range, quartile deviation, mean deviation, standard deviation & variance, coefficient of variation. Moments, skewness and kurtosis.

UNIT-IV:

Bivariate data: scatter diagram, curve fitting by method of least squares(straight line and second degree), product moment correlation coefficient and its properties, coefficient of rank correlation.

UNIT-V:

Concept of regression, fitting of regression lines, regression coefficients, their properties, angle between two regression lines.

PRACTICAL

1. Computation of different measures of central tendency & dispersion.
2. Computation of moments.
3. Curve fitting by least squares method.
4. Computation of correlation Coefficient.
5. Computation of rank correlation.
6. Fitting of Regression lines.

Recommended Books:

1. Fundamentals of Statistics by S.C Gupta, Himalayan Publishing House, 2014.
2. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2013.

SEMESTER-II

GE-2: APPLIED STATISTICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT-I:

Random experiment : trials, sample point and samples space, event, operations of events, concept of mutually exclusive and exhaustive events.

Definition of Probability: Classical, relative frequency and axiomatic approach; discrete and continuous probability space, addition law of probability, Multiplication law of probability.

UNIT-II:

Time Series: Introduction to time series data and application in various fields, Components of time series, Methods of measuring secular trend: graphic, semi-average, Moving average method.

UNIT-III:

Estimating trend by Iterated averages. Measurement of trend by least squares method: by fitting Polynomials of 1st & 2nd Degree, exponential, modified exponential, logistic, Gompertz curve.

UNIT-IV:

Index numbers: Introduction, uses & types. Base year and current year, price relatives and quantity relatives . Problems involved in construction of index number. Unweighted and weighted index number, Laspayers, Paasches Dorbish-Browley, Fishers ideal index number.

UNIT-V:

Criteria of good index number: Unit, Time Reversal, Factor Reversal & Circular tests, cost of living index number, its construction: Aggregate Expenditure & Family Budget method and uses, fixed base and chain base index numbers, base shifting , splicing and deflating.

PRACTICAL

1. Fitting of Binomial & Poisson distribution.
2. Determination of area under Normal Probability curve.

Recommended Books:

1. Fundamentals of Applied Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2012.
2. Fundamentals of Statistics by S.C Gupta, Himalayan Publishing House, 2014.

SKILL ENHANCEMENT COURSE(Four)

(Credit: 02 each)-SEC:1 to SEC:4

SEC-1: COMMUNICATIVE ENGLISH & ENGLISH WRITING

SKILL(Compulsory)

(Credits: Theory-02)

SEMESTER-IV

SEC-2: STATISTICAL TECHNIQUES FOR RESEARCH METHODS

(Credits:6)

Lectures: 60

Max. Marks:100

UNIT-I:

Introduction: Meaning, objection and motivation in research, types of research, research approach, significance of research. Research problems: definition, selection and necessity of research problems.

UNIT-II:

Survey Methodology and Data Collection, inference and error in surveys, the target populations, sampling frames and coverage error, methods of data collection, non-response, questions and answers in surveys.

UNIT-III:

Processing, Data Analysis and Interpretation: Review of various techniques for data analysis covered in core statistics papers, techniques of interpretation, precaution in interpretation.

Recommended Books:

1. Kothari, C.R. (2009): Research Methodology: Methods and Techniques, 2nd Revised Edition reprint, New Age International Publishers.

STATISTICS (PASS)

SEMESTER-I

DSC-ST-A: STATISTICAL METHODS-I

(Credits: 6, Theory: 4, Practical: 2)

Max. Marks: 100 (Theory: 70, Practical: 30)

UNIT-I

Ideas about types of data, collection and classification of data, tabulation of data. Frequency distributions: graphic and diagrammatic representation of data.

UNIT-II

Analysis of Quantitative Data: Concepts of central tendency, dispersion and relative dispersion; moments, skewness and kurtosis and their measures including those based on quartiles and moments.

UNIT-III

Bivariate Data: Scatter diagram, curve fitting by the method of least squares (linear and quadratic), fitting of curves reducible to polynomials by log and inverse transformation.

UNIT-IV

Correlation Coefficient: Product moment correlation coefficient and its properties, coefficient of determination, correlation ratio, rank correlation.

UNIT-V

Regression Analysis: Concept of regression, fitting of regression lines, regression coefficients and their properties.

BOOKS RECOMMENDED:

1. Fundamentals of Statistics by S.C Gupta, Himalayan Publishing House, 2014.
2. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2013.
3. Statistical Methods by P.N. Arora, S. Arora & S. Arora, S. Chand, 2014.

PRACTICAL: DSC-ST-A

1. Computation of mean, median, mode, geometric mean and harmonic mean.
2. Measures of dispersion, moments, skewness & Kurtosis.
3. Fitting of curves by least-squares method.
4. Computation of correlation coefficient, rank correlation coefficient.
5. Fitting of regression lines.

SEMESTER-II

DSC-ST-B: PROBABILITY AND PROBABILITY DISTRIBUTIONS

(Credits: 6, Theory: 4, Practical: 2)

Max. Marks: 100 (Theory: 70, Practical: 30)

UNIT-I

Random experiment: trials, sample point and samples space, events, operations of events, concepts of mutually exclusive and exhaustive events. Definition of Probability : Classical, relative frequency and axiomatic approach; discrete and continuous probability space, addition law of probability.

UNIT-II

Multiplication laws of probability, conditional probability and independence of events, Bayes theorem and its applications.

UNIT-III

Random variables; probability mass function, probability density function; distribution function, joint, marginal and conditional distributions.

UNIT-IV

Mathematical Expectation of a random variable and its properties, moment generating function, cumulant generating function and probability generating function.

UNIT-V

Discrete probability distributions: Uniform, Bernoulli, Binomial, Poisson. Continuous probability distributions: continuous uniform, Normal and Gamma.

PRACTICAL: DSC-ST-B

1. Fitting of binomial distribution.
2. Fitting of poisson distribution.
3. Computation of areas under normal probability curve.

BOOKS RECOMMENDED:

1. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2013.
2. Probability and Statistics by Purna Chandra Biswal, PHI EEE, 2007.

SEMESTER-III

DSC-ST-C: STATISTICAL METHODS-II & SAMPLING

(Credits: 6, Theory: 4, Practical: 2)

Max. Marks: 100 (Theory: 70, Practical: 30)

UNIT-I

Concept of population, sample, parameter, statistic and sampling distribution; standard error Tests of significance based on large samples (Z-test).

UNIT-II

Concepts of χ^2 , t and F distributions and tests of significance based on χ^2 , t and F distributions.

UNIT-III Analysis of categorical Data: Consistency of categorical data, independence and association of attributes.

UNIT-IV

Population and sample, sampling versus census, steps involved in sample surveys, principles of sample survey, random sampling versus non-random sampling, sampling and non-sampling errors.

UNIT-V

Simple Random Sampling: Drawing of random sample by different methods, SRSWR & SRSWOR, estimation of mean and variance. Stratified Random Sampling: Advantages & disadvantages, uses, estimation of mean and Variance only.

PRACTICAL: DSC-ST-C

1. Tests of significance based on large samples (Z-test).
2. Tests based on χ^2 , t and F distributions.
3. Associations of attributes.
4. Estimation of mean and variance in SRS and stratified sampling.

BOOKS RECOMMENDED:

1. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2013.
2. Statistical methods by S.P. Gupta, Himalayan Publication, Mumbai, 2013.
3. Fundamentals of Applied Statistics by S.C. Gupta and V.K. Kapoor.

SEMESTER-III

DSC-ST-D:DESIGN AND ANALYSIS OF EXPERIMENT, OPERATIONS RESEARCH

(Credits: 6, Theory: 4, Practical: 2)

Max. Marks: 100 (Theory: 70, Practical: 30)

UNIT-I

Analysis of Variance: Introduction, one-way & two-way classifications (with one observation per cell) with fixed effect model and their analysis.

UNIT-II

Basic principles of experimental design: replication, randomization and local control Completely Randomized Design, Randomized Block Design.

UNIT-III

Introduction, definition, scope of Operations Research, Linear programming problems formulation, procedure of solving LPP by graphical method.

UNIT-IV

Definition of feasible solution, basic feasible solution, slack, surplus & artificial variables, simplex method, its algorithm & solution.

UNIT-V

Scheduling by PERT and CPM: Phases of project management, Difference between PERT and CPM, network construction, Computation of different times: EST, LST, Slack and Float time, Critical path.

PRACTICAL: DSC-ST-D

1. Analysis of variance in case of one-way and two-way(one observation per cell) classified data.
2. Completely randomized design, randomized block design, estimation of one missing value in RBD.
3. Solution of LPP by graphical method & simplex method.
4. Computation of trend values by graphic, semi-averages moving averages and least-squares method.

BOOKS RECOMMENDED:

1. Fundamentals of Applied Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand.
2. Operations Research by R.K. Gupta, Krishna Prakashan.

DISCIPLINE SPECIFIC ELECTIVE

For DSE-(ST-A) and DSE-(ST-B), one has to choose any two (one for each semester) from the following three papers:

1. Time Series Analysis
2. Statistical Quality Control
3. Vital Statistics

DSE-ST: Time Series Analysis

Credits: 6, Theory: 4, Practical: 2)

Max. Marks: 100 (Theory: 70, Practical: 30)

UNIT-I

Time Series: Introduction to time series data and application in various fields, Components of time

series, Mathematical Models, Methods of measuring secular trend: graphic, semi-average, Moving average method.

UNIT-II

Measurement of trend by least squares method: by fitting Polynomials of 1st & 2nd Degree, exponential, modified exponential, logistic, Gompertz curve.

UNIT-III

Measurement of seasonal fluctuations: Simple average, Ratio-to-trend, Ratio-to-moving average & Link relatives method.

UNIT-IV

Measurement of cyclic component: Harmonic analysis. Measurement of irregular variation (variate difference method), effect of moving averages on cyclical and random components of a time series.

UNIT-V

Different schemes which account for oscillations in a stationary time series. Auto regressive series of first and second order, Serial correlation and correlogram.

PRACTICAL

1. Measurement of Trend and seasonal fluctuations.
2. Problems on Spencers 15-point and 21-point formula.

BOOKS RECOMMENDED:

1. Fundamentals of Applied Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2012.
2. Fundamentals of Statistics, Voll-II, Gun, Gupta & Dasgupta, World Press, 2007.

DSE-ST: Statistical Quality Control

Credits: 6, Theory: 4, Practical: 2)

Max. Marks: 100 (Theory: 70, Practical: 30)

UNIT-I

Types of quality measure, rational sub-groups and the techniques of control charts, 3-sigma control limits and probability limits, Control charts for variables (Mean, S.D. and Range).

UNIT-II

Control charts for attributes, two types of control charts, Natural tolerance limits and specification limits, Modified control limits.

UNIT-III

Process control and Product control, advantages of process control, Sampling inspection by at-

tributes: single sampling Plans.

UNIT-IV

Double sampling plans, Five different characteristic curves and their importance, sequential sampling inspection plans, comparison of three types of plans.

UNIT-V

Acceptance Sampling: comments on Dodge and Romigs schemes. Sampling inspection by variables: underlying principle, variables inspection with known standard deviation and variables inspection with unknown standard deviation.

PRACTICAL

1. Measurement of secular trend: Fitting of different types of curves by least square method.
2. Measurement of seasonal fluctuations.
3. Serial correlation and Correlogram.
4. Control charts for variables and attributes.
5. OC, ASN, ATI, LTPD, AOQL curves.

BOOKS RECOMMENDED:

1. Fundamentals of Applied Statistics by S.C. Gupta & V.K. Kapoor, Sultan Chand, 2012.
2. Fundamentals of Statistics, Voll-II, Gun, Gupta & Dasgupta, World Press, 2007.

DSE-ST: Vital Statistics

Credits: 6, Theory: 4, Practical: 2)

Max. Marks: 100 (Theory: 70, Practical: 30)

UNIT-I

Introduction to Vital Statistics, Different Vital events, rates and ratio of vital events. Vital Statistics in the study of population trend, Uses of Vital statistics.

UNIT-II

Population Census: Methods of census, salient features, its uses and problems, registration method, sample surveys, sources of demographic data.

UNIT-III

Measurement of mortality: Crude death rate, age-specific death rates, IMR, standardized death rate, Direct and indirect method of standardisation and uses.

UNIT-IV

Mortality table or Life table, its uses, columns of life table, assumptions, and construction of life table, Abridged life table (Reed Merell).

UNIT-V

Measurement of fertility: crude birth rate, general fertility rate, age-specific birth rate, total fertility rate, gross reproduction rate, net reproduction rate.

PRACTICAL

1. Calculation of different measures of mortality and fertility.
2. Construction of Life table.

BOOKS RECOMMENDED:

1. Fundamentals of Applied Statistics, S.C. Gupta & V.K. Kapoor, Sultan Chand, 2012.
2. Indian Official Statistical System: M.R. Saluja, Publication Society, 2006.
3. Statistical System in India: Asthna & Srivastav, S. Chand, 2009.

ZOOLOGY(HONOURS)

SEMESTER-I

C:1-DIVERSITY AND EVOLUTION OF NON-CHORDATA (PROTISTA TO PSEUDOCOELOMATES)

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Kingdom Protista

General characteristics and classification up to classes; Life cycle, pathogenicity and prophylaxis of Plasmodium vivax, Trypanosoma gambiense and Entamoeba histolytica; Locomotion and reproduction in Protista.

UNIT-II: Phylum Porifera and Ctenophora

General characteristics and classification up to classes; Canal system in sponges; General characteristics and evolutionary significance; Evolution of Parazoa and Metazoa.

UNIT-III: Phylum Cnidaria

General characteristics and classification up to classes; Metagenesis in Obelia; Polymorphism in Cnidaria; Corals and coral reefs.

UNIT-IV: Phylum Platyhelminthes

General characteristics and classification up to classes; Life cycle, pathogenicity and prophylaxis of Fasciola hepatica and Taenia solium; Parasitic adaptations.

UNIT-V: Phylum Nematelminthes

General characteristics and classification up to classes; Life cycle, pathogenicity and prophylaxis of Ascaris lumbricoides and Wuchereria Bancrofti; Parasitic adaptations.

Note: Classification to be followed from “ Barnes RD (1982) Invertebrate Zoology; 5th Edition.”

PRACTICAL

Kingdom Protista

1. Morphology of Paramecium, Binary fission and Conjugation in Paramecium.
2. Life stages of Plasmodium vivax, Trypanosma gambiense and Entamoeba histolytica (Slides/Microphotographs).
3. Examination of pond water for protists.

Phylum Porifera

4. Study of Sycon (including T.S. and L.S.), Hyalonema, and Euplectella.
5. Temporary mounts of spicules, gemmules and sponging fibres.

Phylum Cnidaria

6. Study of Obelia, Physalia, Millepora, Aurelia, Ephyra larva, Tubipora, Corallium, Alcyonium, Gorgonia and Metridium (including T.S. and L.S.).

Phylum Ctenophora

7. Any one specimen/slide.

Phylum Platyhelminthes

8. Study of adult *Fasciola hepatica*, *Taenia solium* and their life stages (Slides/microphotographs).

Phylum Nematelminthes

9. Study of adult *Ascaris lumbricoides*, *Wuchereria bancrofti* and their life stages (Slides/microphotographs).

Note: Classification to be followed from “ Barnes RD (1982) Invertebrate Zoology; 5th Edition.”

Recommended Books:

1. Arora MP (2006) Non-Chordata-I. 1st edition. Himalaya Publishing House, New Delhi.
2. Arora MP (2008) Non-Chordata-II. 1st edition. Himalaya Publishing House, New Delhi.
3. Barnes RD (1982) Invertebrate Zoology. 6th Edition. Holt Saunders International Edition.
4. Barnes RSK, Calow P, Olive PJW, Golding DW & Spicer JI (2002) The Invertebrates: A New Synthesis. 3rd Edition. Blackwell Science, USA.
5. Barrington EJW (1979) Invertebrate Structure and Functions. 2nd Edition. ELBS and Nelson.
6. Boradale LA and Potts EA (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
7. Jordan EL and Verma PS (1963) Invertebrate Zoology. Revised Edition. S. Chand, New Delhi.
8. Mohanty PK (2000) Illustrated Dictionary of Biology. Kalyani Publishers, Ludhiana.

C:2-PERSPECTIVES IN ECOLOGY AND BIOSTATISTICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Introduction to Ecology and Ecosystem

Relevance of studying ecology; History of ecology; Laws of limiting factors; Detailed study of temperature and light as physical factors; Types of ecosystem; Food chain, Detritus and grazing food chains; Food web; Energy flow through the ecosystem; Ecological pyramids.

UNIT-II: Population

Unitary and modular populations; Unique and group attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion; Exponential and logistic growth, equation and patterns, *r* and *K* strategies, Population regulation-density-dependent and independent factors; Population interactions, Gauses Principle with laboratory and field examples; Lotka-Volterra equation for competition and Predation, functional and numerical responses.

UNIT-III: Community

Community characteristics: dominance, diversity, species richness, abundance, stratification; Ecotone and edge effect; Ecosystem development (succession) with example and Theories pertaining to climax community; Nutrient and biogeochemical cycle, Nitrogen cycle and Sulphur cycle.

UNIT-IV: Conservation of Biodiversity

Types of biodiversity, its significance, loss of biodiversity; Conservation strategies (in situ and ex situ); Endangered species concept; Role of ZSI, WWF, IUCN; Wildlife (Protection) Act, 1972.

UNIT-V: Biostatistics

Concept, definition and scope of biostatistics, biological data, sampling techniques, measures of central tendency (mean, median and mode), measures of dispersion, hypothesis and testing of hypothesis

(chi square test, t test and Z test), correlation and regression analysis; Data analysis using EXCEL programme.

PRACTICAL

1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided.
2. Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon-Weiner diversity index for the same community.
3. Study of an aquatic ecosystem: fauna and flora Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winklers method), Chemical Oxygen Demand and free CO₂.
4. Report on a visit to National Park/Biodiversity Park/Wildlife sanctuary.
5. Determination of mean, median, mode and standard deviation of biological data.

Recommended Books

1. Colinvaux PA (1993) Ecology. II Edition. John Wiley and Sons, Inc., USA.
2. Dash MC (1993) Fundamentals of Ecology. McGraw Hill Book Company, New Delhi.
3. Joshi N and Joshi PC (2012) Ecology and Environment. 1st Edition. Himalaya Publishing House, New Delhi.
4. Odum EP (2008) Fundamentals of Ecology. Indian Edition. Brooks/Cole.
5. Ricklefs, R.E., (2000). Ecology. 5th Edition. Chiron Press.
6. Robert Leo Smith Ecology and field biology Harper and Row.
7. Singh JS, Gupta SR and Singh SP (2014) Ecology, Environmental Science and Conservation. S. Chand, New Delhi.
8. Chainy, GBN, Mishra G and Mohanty PK. Basic Biostatistics, Kalyani Publisher.

C:3-DIVERSITY AND EVOLUTION OF NON-CHORDATA (COELOMATE NONCHORDATES)

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Phylum Annelida

General characteristics and classification up to classes; Evolution of Coelom; Metamerism and Excretion in Annelida.

UNIT-II: Phylum Arthropoda

General characteristics and classification up to classes; Vision in Arthropoda; Respiration in Arthropoda; Moulting in insects, Metamorphosis in insects; Social life in insects (bees and termites) and Larval forms in Crustacea.

UNIT-III: Phylum Onychophora

General characteristics and evolutionary significance and affinities of Peripatus.

UNIT-IV: Phylum Mollusca

General characteristics and classification up to classes; Respiration in Mollusca; Torsion and detorsion in Gastropoda; Pearl formation in bivalves and Evolutionary significance of trochophore larva.

UNIT-V: Phylum Echinodermata

General characteristics and classification up to classes; Water-vascular system in Asteroidea; Larval forms in Echinodermata and Evolutionary significance (Affinities with Chordates).

Note: Classification to be followed from “ Barnes, R.D. (1982). Invertebrate Zoology, 5th Edition, Holt Saunders International Edition.”

PRACTICAL

Phylum Annelida

1. Study of Aphrodite, Nereis, Sabella, Terebella, Serpula, Chaetopterus, Pheretima and Hirudinaria.
2. T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm.
3. T.S. through crop of leech.

Phylum Arthropoda

4. Study of Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, termite, louse, honeybee, silk moth, wasp and dragon fly. **Phylum Onychophora**
5. Any one specimen/slide.

Phylum Mollusca

6. Study of Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Mytilus, Loligo, Sepia, Octopus and Nautilus and Cypraea (cowrie).

Phylum Echinodermata

7. Study of echinoderm larvae.
8. Study of Pentaceros, Asterias, Ophiura, Clypeaster, Echinus, Echinocardium, Cucumaria and Antedon.

Note: Classification to be followed from “ Barnes, R.D. (1982). Invertebrate Zoology, 5th Edition, Holt Saunders International Edition.”

Recommended books

1. Arora MP (2006) Non-Chordata-I. 1st edition. Himalaya Publishing House, New Delhi.
2. Arora MP (2008) Non-Chordata-II. 1st edition. Himalaya Publishing House, New Delhi.
3. Barnes RD (1982) Invertebrate Zoology. 6th Edition. Holt Saunders International Edition.
4. Barnes RSK, Calow P, Olive PJW, Golding DW & Spicer JI (2002) The Invertebrates: A New Synthesis. 3rd Edition. Blackwell Science, USA.
5. Barrington EJW (1979) Invertebrate Structure and Functions. 2nd Edition. ELBS and Nelson.
6. Boradale LA and Potts EA (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
7. Jordan EL and Verma PS (1963) Invertebrate Zoology. Revised Edition. S. Chand, New Delhi.
8. Mohanty PK (2000) Illustrated Dictionary of Biology. Kalyani Publishers, Ludhiana.

C:4-PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Digestive System

Structural organization, histology and functions of gastrointestinal tract and its associated glands; Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Role of gastrointestinal hormones on the secretion and control of enzymes of gastrointestinal tract.

UNIT-II: Respiratory System

Histology of trachea and lung; Mechanism of respiration, Pulmonary ventilation; Respiratory volume and capacity; Transport of oxygen in the blood; Oxygen- hemoglobin and myoglobin, dissociation curve and the factors influencing it; Carbon monoxide poisoning; Carbon dioxide transport in the blood; buffering action of blood and haemoglobin and Control of respiration.

UNIT-III: Excretory System

Structure of kidney and its histological details; Renal blood supply; Mechanism of urine formation and its regulation and Regulation of acid-base balance.

UNIT-IV: Blood

Components of blood and their functions; Structure and functions of haemoglobin; Haemopoiesis; Haemostasis, Coagulation of blood and Disorders of blood.

UNIT-V: Heart

Structure of heart; Coronary circulation; Structure of conducting and working of myocardial fibers; Origin and conduction of cardiac impulses functions of AV node; Cardiac cycle; Cardiac output and its regulation-Frank-Starling Law of the heart; Nervous and chemical regulation of heart rate; Blood pressure and its regulation and Electrocardiogram.

PRACTICAL

1. Enumeration of red blood cells using haemocytometer.
2. Estimation of haemoglobin using Sahli's haemoglobinometer.
3. Preparation of haemin and haemochromogen crystals.
4. Recording of blood pressure using a Sphygmomanometer.
5. Examination of sections of mammalian oesophagus, stomach, duodenum, ileum, rectum liver, trachea, lung and kidney.

Recommended Books

1. Arey LB (1974) Human Histology. 4th Edition. W.B. Saunders, USA.
2. Chatterjee CC (2008) Human Physiology. Vol. I and II. Medical Allied Agency, Kolkata.
3. Guyton AC and Hall JE (2006) Textbook of Medical Physiology. 9th Edition. W.B. Saunders Company, Philadelphia.
4. Tortora GJ and Derrickson B (2012) Principles of Anatomy & Physiology. 13th Edition John Wiley and sons, USA.
5. Victor PE (2008) diFiore Atlas of Histology with Functional Correlations. 12th Edition, Lippincott W. & Wilkins, USA.

C:5-DIVERSITY AND DISTRIBUTION OF CHORDATA

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Protochordata and Origin of Chordates

General characters of Hemichordata, Urochordata and Cephalochordata; Study of larval forms in protochordates; Retrogressive metamorphosis in Urochordata; Dipleurula concept and the Echinoderm theory of origin of chordates.

UNIT-II: Introduction to Vertebrata and Agnatha

Advanced features of vertebrates over Protochordata; General characters and classification of cyclostomes up to class; Structural peculiarities and affinities of Petromyzon and Myxine.

UNIT-III: Pisces and Amphibia

General characters of Chondrichthyes and Osteichthyes and classification up to order; Migration; Osmoregulation and Parental care in fishes; Scales in fishes; Origin of Tetrapoda (Evolution of terrestrial ectotherms); General characters and classification up to order and Parental care in Amphibians.

UNIT-IV: Reptilia and Aves

General characters and classification up to order; Skull in Reptilia; Affinities of Sphenodon; Poison apparatus and Biting mechanism in snakes; General characters and classification up to order; Principles and aerodynamics of flight, Flight adaptations; Archaeopteryx- a connecting link and Migration in birds.

UNIT-V: Mammals and Zoogeography

General characters and classification up to order; Affinities of Prototheria and Metatheria; Dentition in mammals; Adaptive radiation with reference to locomotory appendages; Zoogeographical realms; Theories pertaining to distribution of animals and Distribution of vertebrates in different realms.

PRACTICAL

Protochordata

1. Balanoglossus, Herdmania, Branchiostoma and Colonial Urochordata.
2. Sections of Balanoglossus through proboscis and branchiogenital regions.
3. Sections of Amphioxus through pharyngeal, intestinal and caudal regions.
4. Permanent slide of spicules of Herdmania.

Agnatha

5. Petromyzon and Myxine.

Fishes

6. Sphyrna, Pristis, Trygon, Torpedo, Chimaera, Notopterus, Mystus, Heteropneustes, Hippocampus, Exocoetus, Echeneis, Anguilla, Tetradon, Diodon, Anabas and Flat fish.

Amphibia

7. Ichthyophis/Ureotyphlus, Necturus, Duttaphrynus, Polypedates, Hyla, Alytes and Salamandra.

Reptiles

8. Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Draco, Ophiosaurus, Bungarus, Vipera, Naja, Hydrophis, Zamenis and Crocodylus.
9. Key for Identification of poisonous and non-poisonous snakes.

Aves

10. Study of six common birds from different orders.
11. Types of beaks and claws.
12. Types of feathers.

Mammalia

13. Sorex, Bat (Insectivorous and Frugivorous), Funambulus, Loris, Herpestes and Hemiechenis.

Recommended Books

1. Agarwal VK (2011) Zoology for degree students. S. Chand, New Delhi.
2. Arora MP (2006) Chordata-1. 1st Edition. Himalaya Publishing House, New Delhi.
3. Hall BK and Hallgrímsson B (2008) Strickberger's Evolution. 4th Edition. Jones and Bartlett Publishers Inc., USA.
4. Jordan EL and Verma PS (1963) Chordate Zoology. Revised Edition. S. Chand, New Delhi.
5. Young JZ (2004) The Life of Vertebrates. 3rd Edition. Oxford University Press, USA.

C:6-PHYSIOLOGY CONTROLLING AND COORDINATING SYSTEM

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Tissues and Glands, Bone and cartilage

Structure, location, function and classification of Epithelial tissue, Connective tissue, Muscular tissue, Nervous tissue; Types of glands and their functions; Structure and types of bones and cartilages; Ossification, bone growth and resorption.

UNIT-II: Nervous System

Structure of neuron, resting membrane potential; Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; types of synapsis, Synaptic transmission; Neuromuscular junction; Reflex action and its types, Reflex arc and Physiology of hearing and vision.

UNIT-III: Muscle

Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor Unit, summation and tetanus.

UNIT-IV: Reproductive System

Histology of male and female reproductive systems; Puberty; Physiology of reproduction of male and female; Methods of contraception (depicted through flow chart).

UNIT-V: Endocrine System

Functional Histology of endocrine glands - pineal, pituitary, thyroid, parathyroid, thymus, pancreas, adrenals; Hormones secreted by them and their mechanism of action; Gonadal hormones; Classification of hormones; Regulation of their secretion; Mode of hormone action; Signal transduction pathways utilized by steroidal and non-steroidal hormones; Hypothalamus (neuroendocrine gland), principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system and Placental hormones.

PRACTICAL

1. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex).
2. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells.
3. Examination of sections of mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid.

Recommended Books

1. Arey LB (1974) Human Histology. 4th Edition. W.B. Saunders, USA.

2. Chatterjee CC (2008) Human Physiology. Vol. I and II. Medical Allied Agency, Kolkata.
3. Guyton AC and Hall JE (2006) Textbook of Medical Physiology. 9th Edition. W.B. Saunders Company, Philadelphia.
4. Tortora GJ and Derrickson B (2012) Principles of Anatomy & Physiology. 13th Edition John Wiley and sons, USA.
5. Victor PE (2008) diFiores Atlas of Histology with Functional Correlations. 12th Edition, Lippincott W. and Wilkins, USA.

C:7-COMPARATIVE ANATOMY OF VERTEBRATES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Integumentary System and Skeletal System

Structure, functions and derivatives of integument; Axial and appendicular skeletons; Jaw suspensorium in vertebrates.

UNIT-II: Digestive and Respiratory System

Alimentary canal and associated glands; Skin, gills, lungs and air sacs and Accessory respiratory organs in fishes.

UNIT-III: Circulatory System

General plan of circulation; Evolution of heart and aortic arches.

UNIT-IV: Urinogenital System

Succession of kidney; Evolution of urinogenital ducts and Types of mammalian uteri.

UNIT-V: Nervous System and Sense Organs

Comparative account of brain; Autonomic nervous system; Spinal Nerves; Spinal cord; Cranial nerves in Mammals; Classification of receptors; visual receptors, chemoreceptors and mechanoreceptors.

PRACTICAL

1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs.
2. Disarticulated skeleton of Frog, Varanus, Fowl and Rabbit.
3. Carapace and plastron of turtle or tortoise.
4. Mammalian skulls (One herbivorous and one carnivorous animal).

Recommended Books

1. Hilderbrand M and Gaslow GE. Analysis of Vertebrate Structure. John Wiley and Sons., USA.
2. Kardong KV (2005) Vertebrates Comparative Anatomy, Function and Evolution. 4th Edition. McGraw-Hill Higher Education, New York.
3. Kent GC and Carr RK (2000) Comparative Anatomy of the Vertebrates. 9th Edition. The McGraw-Hill Companies, New York.
4. Weichert CK and William Presch (1970) Elements of Chordate Anatomy. Tata McGraw Hill, New York.

C:8-BIOCHEMISTRY OF METABOLIC PROCESSES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Biomolecules

Structures and properties of important mono-, di- and polysaccharides; Fatty acids, triglycerides and steroids; and amino acids and proteins.

UNIT-II: Carbohydrate Metabolism

Glycolysis; Citric acid cycle; pentose phosphate pathway; Gluconeogenesis; Shuttle systems (Malate-aspartate shuttle, Glycerol 3-phosphate shuttle); Glycogenolysis; Glycogenesis.

UNIT-III: Lipid Metabolism

β -oxidation of saturated fatty acids with even and odd number of carbon atoms; Biosynthesis of palmitic acid and Ketogenesis and its regulation.

UNIT-IV: Protein Metabolism

Catabolism of amino acids: Transamination, Deamination; Urea cycle; Fate of C-skeleton of Glucogenic and Ketogenic amino acids.

UNIT-V: Enzymes and Oxidative Phosphorylation

Kinetics and Mechanism of action of enzymes; Inhibition of enzyme action; Allosteric enzymes; Oxidative phosphorylation in mitochondria; Respiratory chain, ATP synthase, Inhibitors and Uncouplers.

PRACTICAL

1. Identification of unknown carbohydrates in given solutions (Starch, Sucrose, Lactose, Galactose, Glucose, Fructose).
2. Colour tests of functional groups in protein solutions.
3. Action of salivary amylase under optimum conditions.
4. Effect of pH on the action of salivary amylase.
5. Effect of temperature on the action of salivary amylase.
6. Estimation of total protein in given solutions by Lowrys method.

Recommended Books

1. Berg JM, Tymoczko JL and Stryer L (2007) Biochemistry. 6th Edition, W.H. Freeman and Co., New York.
2. Cox MM and Nelson DL (2008) Lehninger Principles of Biochemistry. 5th Edition. W.H. Freeman and Co., New York.
3. Devesena T (2014) Enzymology. 2nd Edition. Oxford University Press, UK.
4. Hames BD and Hooper NM (2000) Instant Notes in Biochemistry. 2nd Edition. BIOS Scientific Publishers Ltd., U.K.
5. Murray RK, Bender DA, Botham KM, Kennelly PJ, Rodwell VW and Well PA (2009) Harpers Illustrated Biochemistry. 28th Edition. International Edition. The McGraw-Hill Companies Inc., New York.

C:9-CELL BIOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Cells and Plasma Membrane

Prokaryotic and Eukaryotic cells; Mycoplasma; Virus, Viroids, Virions and Prions; Various models

of plasma membrane; Transport across membranes; Cell junctions: Occluding junctions (Tight junctions), Anchoring junctions (desmosomes), Communicating junctions (gap junctions) and Plasmodesmata.

UNIT-II: Endomembrane System, Mitochondria and Peroxisomes

The Endoplasmic Reticulum; Golgi apparatus; Mechanism of vesicular transport; Lysosomes; Structure and function of mitochondria: Chemi-osmotic hypothesis; Semiautonomous nature of mitochondria; Endosymbiotic hypothesis and Peroxisomes.

UNIT-III: Cytoskeleton and Nucleus

Structure and functions of intermediate filament, microtubules and microfilaments; Ultra structure of nucleus; Nuclear envelope: Structure of nuclear pore complex; Chromosomal DNA and its packaging; Structure and function of Nucleolus.

UNIT-IV: Cell Cycle and Cell Signaling

Cell cycle, Regulation of cell cycle; Signaling molecules and their receptors.

UNIT-V: Apoptosis and Cancer

Extrinsic (Death Receptor) Pathway and Intrinsic (Mitochondrial) Pathway; Growth and development of tumors and Metastasis.

PRACTICAL

1. Gram's staining technique for visualization of prokaryotic cells.
2. Study various stages of mitosis from permanent slides.
3. Study various stages of meiosis from permanent slides.
4. Study the presence of Barr body in human female blood cells/cheek cells. (Preparation of permanent slides).
5. Cytochemical demonstration (Preparation of permanent slides).
 - (i) DNA by Feulgen reaction.
 - (ii) Mucopolysaccharides by PAS reaction.
 - (iii) Proteins by Mercurobromophenol blue.
 - (iv) DNA and RNA by Methyl Green Pyronin.

(In practical examination, 05 marks should be of permanent slide submission; one mark each for DNA, PAS, Proteins, MGP and Barr body slide.)

Recommended Books

1. Becker WM, Kleinsmith LJ, Hardin J and Bertoni G P (2009) The World of the Cell. 7th Edition. Pearson Benjamin Cummings Publishing, San Francisco.
2. Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James (2008) Molecular Biology of the Cell. 5th Edition. Garland publishing Inc., New York.
3. Cooper GM and Hausman RE (2009) The Cell: A Molecular Approach. 5th Edition. ASM Press, Washington D.C.
4. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology. 8th Edition. Lippincott Williams and Wilkins, Philadelphia.
5. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley and Sons. Inc., USA.

(Credits:6, Theory-4, Practical-2)
Lectures: 60 (Theory:40, Practical:20)
Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Mendelian Genetics and its Extension

Principles of inheritance; Incomplete dominance and co-dominance; Multiple alleles, Lethal alleles; Epistasis; Pleiotropy; Sex-linked inheritance.

UNIT-II: Linkage, Crossing Over and Chromosomal Mapping

Linkage and crossing over; Cytological basis of crossing over; Molecular mechanisms of crossing over; Recombination frequency as a measure of linkage intensity; Two factor and three factor crosses; Interference and coincidence and Somatic cell hybridization.

UNIT-III: Mutations

Gene mutations; Chromosomal mutations: Deletion, duplication, inversion, translocation; Aneuploidy and polyploidy; Induced versus spontaneous mutations; Backward and forward mutations; Suppressor mutations; Molecular basis of mutations in relation to UV light and chemical mutagens; Detection of mutations: CLB method, attached X method and DNA repair mechanisms.

UNIT-IV: Sex Determination and Quantitative Genetics

Chromosomal mechanisms of sex determination; Sex-linked, sex-influenced and sex limited characters; Polygenic inheritance and Transgressive variation.

UNIT-V: Extra-chromosomal Inheritance

Criteria for extra-chromosomal inheritance; Antibiotic resistance in Chlamydomonas; Mitochondrial mutations and Maternal effects.

PRACICAL

1. To study the Mendelian laws and gene interactions and their verification by Chi square analyses using seeds/beads/Drosophila.
2. Identification of various mutants of Drosophila.
3. To calculate allelic frequencies by Hardy-Weinberg Law.
4. Linkage maps based on data from crosses of Drosophila.
5. Study of human karyotype (normal and abnormal).
6. Pedigree analysis of some human inherited traits.
7. Preparation of polytene chromosomes from larva of Chironomous/Drosophila.
8. To study mutagenicity in Salmonella/E. coli by Ames test.

Recommended Books

1. Gardner EJ, Simmons MJ, Snustad DP (2008) Principles of Genetics. 8th Edition. Wiley India.
2. Griffiths AJF, Wessler SR, Lewontin RC and Carroll SB. Introduction to Genetic Analysis. 9th Edition. W. H. Freeman and Co., NewYork.
3. Klug WS, Cummings MR, Spencer CA and Palladino MA (2012) Concepts of Genetics. 10th Edition. Pearson Education, Inc., USA.
4. Russell PJ (2009) Genetics- A Molecular Approach. 3rd Edition. Benjamin Cummings, USA.
5. Snustad DP and Simmons MJ (2012) Principles of Genetics. 6th Edition. John Wiley and Sons Inc., USA.
6. Verma PS and AgarwalVK (2010) Genetics. 9th Edition. S. Chand, New Delhi.

C:11-DEVELOPMENTAL BIOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Introduction

History and basic concepts: Epigenesis, preformation, Mosaic and regulative development; Discovery of induction; Cell-Cell interaction; Pattern formation; Differentiation and growth; Differential gene expression; Cytoplasmic determinants and asymmetric cell division.

UNIT-II: Early Embryonic Development

Gametogenesis (Spermatogenesis, Oogenesis); Types of eggs; Egg membranes; Fertilization: Changes in gametes, monospermy and polyspermy; Planes and patterns of cleavage; Early development of frog and chick up to gastrulation; Fate maps; Embryonic induction and organizers.

UNIT-III: Late Embryonic Development

Fate of germ layers; Extra-embryonic membranes in birds; Implantation of embryo in humans and Placenta (Structure, types and functions of placenta).

UNIT-IV: Post Embryonic Development

Metamorphosis: Changes, hormonal regulations in amphibians; Regeneration: Modes of regeneration (epimorphosis, morphallaxis and compensatory regeneration); Ageing: Concepts and models.

UNIT-V: Implications of Developmental Biology

Teratogenesis: Teratogenic agents and their effects on embryonic development; *in vitro* Fertilization; Stem cell culture and Amniocentesis.

PRACTICAL

1. Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages).
2. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages).
3. Study of developmental stages (above mentioned) by raising chick embryo in the laboratory.
4. Study of the developmental stages and life cycle of *Drosophila* from stock culture.
5. Study of different types of placenta.
6. Project report on *Drosophila* culture/chick embryo development.

Recommended Books

1. Balinsky BI and Fabian BC (1981) An Introduction to Embryology. 5th Edition. International Thompson Computer Press.
2. Gilbert SF (2010) Developmental Biology. 9th Edition. Sinauer Associates, Inc., USA.
3. Kalthoff (2008) Analysis of Biological Development. 2nd Edition. McGraw-Hill, New York.
4. Wolpert L, Beddington R, Jessell T, Lawrence P, Meyerowitz E and Smith J (2002) Principles of Development. 1st Edition, Oxford University Press, New York.

C:12-MOLECULAR BIOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Nucleic Acids and DNA Replication

Salient features of DNA double helix; Watson and Crick model of DNA; DNA denaturation and renaturation; DNA topology - linking number and DNA topoisomerases; Cot curves; Structure of RNA, tRNA and DNA and RNA associated proteins; DNA Replication in prokaryotes and eukaryotes; Mechanism of DNA replication; Role of proteins and enzymes in replication; Licensing factors; Semiconservative, bidirectional and semi-discontinuous replication; RNA priming; Replication of circular and linear ds-DNA and replication of telomeres.

UNIT-II: Transcription

RNA polymerase and transcription Unit; Mechanism of transcription in prokaryotes and Eukaryotes; Synthesis of rRNA and mRNA; Transcription factors and regulation of transcription.

UNIT-III: Translation

Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Process of protein synthesis in prokaryotes: Ribosome structure and assembly in prokaryotes, fidelity of protein synthesis, aminoacyl tRNA synthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation.

UNIT-IV: Post Transcriptional Modifications and Processing of Eukaryotic RNA

Structure of globin mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing.

UNIT-V: Gene Regulation and Regulatory RNAs

Transcription regulation in prokaryotes: Principles of transcriptional regulation with examples from lac operon and trp operon; Transcription regulation in eukaryotes: Activators, repressors, enhancers, silencers elements; Gene silencing, Genetic imprinting; Ribo-switches, RNA interference, miRNA and siRNA.

PRACTICAL

1. Study of DNA replication using Photographs or slides and special cases, e.g., Polyteny using permanent slides of polytene chromosomes.
2. Preparation of liquid culture medium (LB) and raise culture of *E. coli*.
3. Estimation of the growth kinetics of *E. coli* by turbidity method.
4. Preparation of solid culture medium (LB) and growth of *E. coli* by spreading and streaking.
5. Demonstration of antibiotic sensitivity/resistance of *E. coli* to antibiotic pressure and interpretation of results.
6. Quantitative estimation of salmon sperm/calf thymus DNA using colorimeter (Diphenylamine reagent) or spectrophotometer (A₂₆₀ measurement).
7. Quantitative estimation of RNA using Orcinol reaction.

Recommended Books

1. Becker WM, Kleinsmith LJ, Hardin J and Bertoni GP (2009) The World of the Cell. 7th Edition. Pearson Benjamin Cummings Publishing, San Francisco.
2. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter (2008) Molecular Biology of the Cell, 4th Edition. Garland publishing Inc., New York.
3. Cooper GM and Hausman RE (2007) The Cell: A Molecular Approach. 4th Edition, ASM Press, USA.
4. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology. 8th Edition; Lippincott Williams and Wilkins, Philadelphia.
5. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments. 6th Edition; John Wiley and Sons. Inc., USA.

C:13-IMMUNOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Immune System and Immunity

Historical perspective of Immunology, Early theories of Immunology, Haematopoiesis, Cells and organs of the Immune system; Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral), Passive: Artificial and natural Immunity, Active: Artificial and natural Immunity and Immune dysfunctions.

UNIT-II: Antigens

Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T -Cell epitopes.

UNIT-III: Immunoglobulins

Structure and functions of different classes of immunoglobulins, Antigen-antibody interactions, Immunoassays, Polyclonal sera, Monoclonal antibodies and Hybridoma technology.

UNIT-IV: Major Histocompatibility Complex and Complement System

Structure and functions of endogenous and exogenous pathway of antigen presentation; Components and pathways of complement activation.

UNIT-V: Cytokines, Hypersensitivity and Vaccines

Properties and functions of cytokines; Cytokine-based therapies; Gell and Coombs classification and Brief description of various types of hypersensitivities; Types of vaccines: Recombinant vaccines and DNA vaccines.

PARCTICAL

1. Demonstration of lymphoid organs.
2. Ouchterlony's double immuno-diffusion method.
3. Determination of ABO blood group.
4. Preparation of single cell suspension of splenocytes from chick spleen, cell counting and viability test.
5. ELISA/ dot Elisa (using kit).
6. Principles, experimental set up and applications of immuno-electrophoresis, RIA, F.

Recommended Books

1. Abbas KA and Lichtman HA (2003) Cellular and Molecular Immunology. 5th Edition. Saunders Publication, Philadelphia.
2. David M, Jonathan B, David RB and Ivan R (2006) Immunology. 7th Edition. Elsevier Publication, USA .
3. Kindt TJ, Goldsby RA, Osborne BA and Kuby J (2006) Immunology. 6th Edition. W.H. Freeman and Company, New York.

C:14-EVOLUTIONARY BIOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: History of Life, theories of Evolution and Extinction

Chemogeny, Biogeny, RNA World, Major Events in History of Life; Lamarckism; Darwinism; Neo-Darwinism; Background of extinction, Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail) and Role of extinction in evolution.

UNIT-II: Evidences of Evolution

Fossils and its types; Dating of fossils, Phylogeny of horse and human; Molecular evidences (Globin gene families as an example) and Molecular clock concept.

UNIT-III: Processes of Evolutionary Change

Organic variations; Isolating mechanisms; Natural selection (Industrial melanism, Pesticide/Antibiotic resistance); Types of natural selection (Directional, Stabilizing, Disruptive), Sexual Selection and Artificial selection.

UNIT-IV: Principles of population genetics

Concept of gene pool, Gene frequencies equilibrium frequency (Hardy-Weinberg equilibrium), Shift in gene frequency without selection Genetic drift, Mutation pressure and Gene flow and Shifts in gene frequencies with selection.

UNIT-V: Species Concept and Evolution above species level

Biological concept of species (Advantages and Limitations); Sibling species, Polymorphic species, Polytypic species, Ring species; Modes of speciation (Allopatric, Sympatric); Macro-evolutionary Principles (Darwins Finches); Convergence, Divergence and Parallelism.

PRACTICAL

1. Study of fossil evidences from plaster cast models and pictures.
2. Study of homology and analogy from suitable specimens/ pictures.
3. Demonstration of changing allele frequencies with and without selection.
4. Construction of cladogram based on morphological characteristics.
5. Construction of phylogenetic tree with bioinformatics tools (Clustal X and Phylip).
6. Interpretation of phylogenetic trees.

Recommended Books

1. Barton NH, Briggs DEG, Eisen JA, Goldstein DB and Patel NH (2007) Evolution. Cold Spring Harbour Laboratory Press.
2. Campbell NA and Reece JB (2011) Biology. 9th Edition. Pearson Education Inc., New York.
3. Douglas JF (1997) Evolutionary Biology. Sinauer Associates, USA.
4. Hall BK and Hallgrímsson B (2008) Evolution. 4th Edition. Jones and Bartlett Publishers, USA.
5. Pevsner J (2009) Bioinformatics and Functional Genomics. 2nd Edition. Wiley-Blackwell, USA.
6. Ridley M (2004) Evolution. 3rd Edition. Blackwell Publishing, USA.

DISCIPLINE SPECIFIC ELECTIVE

DSE:1-ANIMAL BEHAVIOUR

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Introduction and Mechanisms of Behaviour

Origin and history of Ethology; Brief profiles of Karl von Frisch, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen; Proximate and ultimate behavior; Objective of behaviour, Behaviour as a basis of evolution; Behaviour as a discipline of science; Innate behaviour, Instinct, Stimulus filtering, Sign stimuli and Code breakers.

UNIT-II: Patterns of Behaviour

Reflexes: Types of reflexes, reflex path, characteristics of reflexes (latency, after discharge, summation, fatigue, inhibition) and its comparison with complex behavior.

Orientation: Primary and secondary orientation; kinesis-orthokinesis, klinokinesis; taxistropotaxis and klinotaxis and menotaxis (light compass orientation) and mnemotaxis.

Learning: Associative learning, classical and operant conditioning, Habituation and Imprinting.

UNIT-III: Social Behaviour

Insects society; Honey bee: Society organization, polyethism, foraging, round dance, waggle dance, Experiments to prove distance and direction component of dance, learning ability in honey bee, formation of new hive/queen; Reciprocal altruism, Hamiltons rule and inclusive fitness with suitable examples.

UNIT-IV: Sexual Behaviour

Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Infanticide, Consequences of mate choice for female fitness, Sexual conflict for male versus female parental care and Courtship behaviour in three spine stickleback.

UNIT-V: Biological Clocks

Circadian rhythm, Tidal rhythm, Lunar rhythm, Advantages of biological clocks, Jet lag and Entrainment.

PRACTICAL

1. To study different types of animal behaviour such as habituation, social life, courtship behaviour in insects, and parental care from short videos/movies and prepare a short report.
2. To study nests and nesting habits of the birds and social insects.
3. To study the behavioural responses of wood lice to dry condition.
4. To study behavioural responses of wood lice in response to humid condition.
5. To study geotaxis behaviour in earthworm.
6. To study the phototaxis behaviour in insect larvae.
7. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report.

Recommended Books

1. David McF. Animal Behaviour. Pitman Publishing Limited, London, UK.
2. John A (2001) Animal Behaviour. 7th Edition. Sinauer Associate Inc., USA.
3. Manning A and Dawkins MS. An Introduction to Animal Behaviour. Cambridge University Press, USA.
4. Paul WS and John A (2013) Exploring Animal Behaviour. 6th Edition. Sinauer Associate Inc., Massachusetts, USA.

DSE:2-ECONOMIC ZOOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Bee-keeping and Bee Economy (Apiculture)

Varieties of honey bees and Bee pasturage; Setting up an apiary: Langstroths/Newton's hive, bee veil, brood and storage chambers, iron frames and comb sheets, drone excluder, rearing equipments, handling of bees, artificial diet; Diseases of honey bee, American and European Foulbrood, and their management; Honey extraction techniques; Physicochemical analysis of honey; Other beneficial products from bee; Visit to an apiculture institute and honey processing Units.

UNIT-II: Silk and Silk Production (Sericulture)

Different types of silk and silkworms in India; Rearing of Bombyx mori, Rearing racks and trays, disinfectants, rearing appliances, black boxing, Chawki rearing, bed cleaning, mountages, harvesting of cocoons; Silkworm diseases: Pebrine, Flacherie, Grasserie, Muscardine and Aspergillosis, and their management; Silkworm pests and parasites: Uzi fly, Dermestid beetles and their management; Silk reeling techniques and Quality assessment of silk fibre.

UNIT-III: Aquaculture I

Brood stock management; Induced breeding of fish; Management of hatchery of fish; Management of nursery, rearing and stocking ponds; Preparation and maintenance of fish aquarium; Preparation of compound diets for fish; Role of water quality in aquaculture; Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish; Fishery by-products.

UNIT-IV: Aquaculture II

Prawn farming; Culture of crab; Pearl culture and Culture of air breathing fishes.

UNIT-V: Dairy and Poultry Farming

Introduction; Indigenous and exotic breeds; Rearing, housing, feed and rationing; Commercial importance of dairy and poultry farming; Varietal improvement techniques; Diseases and their management; Dairy or poultry farm management and business plan; Visit to any dairy farm or Poultry farm.

* Submission of report on anyone field visits mentioned above.

PRACTICAL

1. Study of different types of bees (Queens, Drones and Worker bees).
2. Study of different types of silk moths.
3. Study of different types of pearls.
4. Study of different types of fish diseases.
5. Identification of different types of scales in fishes.

6. Study of different types of fins.
7. Study of different modified structures of fishes (Saw of sawfish, Hammer of hammer head fish, tail of sharks etc.)
8. Identification of various types of natural silks.

Recommended Books

1. Dhyan Singh Bisht, Apiculture, ICAR Publication.
2. Dunham RA (2004) Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications, U.K.
3. Hafez ESE (1962) Reproduction in Farm Animals. Lea and Fabiger Publishers.
4. Knobil E and Neill JD (2006) The Physiology of Reproduction. Vol. 2. Elsevier Publishers, USA.
5. Prost PJ (1962) Apiculture. Oxford and IBH, New Delhi.
6. Singh S. Beekeeping in India, Indian council of Agricultural Research, New Delhi.
7. Srivastava CBL (1999) Fishery Science and Indian Fisheries. Kitab Mahal publications, India.

DSE:3-MICROBIOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I:

History of Microbiology; Microbial World Characterization, Classification and identification of microbes.

UNIT-II:

Prokaryotes: General morphology and classification of bacteria, their characters and economic importance; Gram-positive and Gram-negative bacteria.

UNIT-III:

Eukaryotes: General morphology of Protista and Fungi classification and economic importance.

UNIT-IV:

Viruses: structure, genome, replication cycle; Epidemiology of infectious diseases with reference of human hosts Bacterial (Tuberculosis), Viral (Hepatitis), Protozoan (Amoebiasis) and Fungal (any one) disease.

UNIT-V:

Microbe interactions-Immune Responses-Antibiotics and other chemotherapeutic agents; Applied microbiology in the fields of food, agriculture, industry and environment.

PRATICAL

1. Cleaning of glasswares, sterilisation principle and methods - moist heat - dry heat and filtration methods.
2. Media preparation: Liquid media, Solid media, Agar slants, Agar plates. Basal, enriched, selective media preparation - quality control of media, growth supporting properties, sterility check of media.
3. Pure culture techniques: Streak plate, pour plate and decimal dilution.
4. Cultural characteristics of microorganisms: Growth on different media, growth characteristics and description and demonstration of pigment production.
5. Staining techniques: Smear preparation, simple staining, Grams staining, Acidfast staining and

staining for meta chromatic granules.

6. Morphology of microorganisms.

7. Antibiotic sensitivity testing: Disc diffusion test - Quality control with standard strains.

8. Physiology characteristics: IMViC test, H₂S, Oxidase, catalase, urease test, Carbohydrate fermentation, Maintenance of pure culture, Paraffin method, Stab culture and maintenance of mold culture.

Recommended Books

1. Ahsan J and Sinha SP (2010) A Hand book on Economic Zoology. S Chand, NewDelhi.

2. Arora DR and Arora B (2001) Medical Parasitology.2nd Edition.CBS Publications and Distributers.

3. Atwal AS (1993) Agricultural Pests of India and South East Asia. Kalyani Publishers, Ludhiana.

4. Dubey RC and Maheshwari DK (2013) A Textbook of Microbiology. S. Chand, New Delhi.

5. Dunham RA (2004) Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications.

6. Pelczar MJ, Chan ECS and Krieg NR (1993) Microbiology.5th Edition, Tata McGraw Hill Publishing Co.Ltd.

7. Pradhan, S (1983) Insect Pests of Crops. National Book Trust of India, New Delhi.

8. Shukla, G.S. and Upadhya, V.B. (2013) Economic Zoology. 5th Edition, Rastogi Publications, Meerut.

DSE:4-PROJECT WORK

(Credits:6, Max. Marks:100)

SKILL ENHANCEMENT COURSES(SEC)

SEC:1-COMMUNICATIVE ENGLISH & ENGLISH WRITING SKILL

(Compulsory)

(Credits: 02) Theory: 20 Classes (1hr duration)

SEC:2-PUBLIC HEALTH AND HYGIENE

(Credits:2)

Lectures:30, Max. Marks:50

UNIT-I:

Scope of Public health and Hygiene; nutrition and health; classification of foods; Nutritional deficiencies; Vitamin deficiencies.

UNIT-II:

Pollution: water pollution, air pollution, soil pollution, noise pollution, thermal pollution and radioactive pollution.

UNIT-III:

Environment and Health hazards; Environmental degradation and health hazards due to pollutants.

UNIT-IV:

Communicable diseases and their control measures such as Measles, Polio, Chikungunya, Rabies, Plague, Leprosy and AIDS.

UNIT-V:

Non-Communicable diseases and their preventive measures such as Hypertension, Coronary Heart diseases, Stroke, Diabetes, Obesity and Mental ill-health.

Recommended Books

1. Arora DR and Arora B (2001) Medical Parasitology.2nd Edition.CBS Publications and Distributers.
2. Dubey RC and Maheshwari DK (2013) A text book of Microbiology. S. Chand, New Delhi.
3. Pelczar MJ, Chan ECS and Krieg NR (1993) Microbiology.5th Edition. Tata McGraw Hill Publishing Co. Ltd.

GENERIC ELECTIVE PAPERS(GE)

Credits: 06 each)

GE-1: ANIMAL DIVERSITY (NON-CHORDATE), PHYSIOLOGY AND ENDOCRINOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

General characteristics and classification up to classes and study of types mentioned

UNIT-I:

Protozoa: Paramecium with reference to structure and reproduction.

Porifera: Structure of Sycon and Canal system in sponges.

Cnidaria: Structure, reproduction and life cycle of Aurelia.

UNIT-II:

Platyhelminthes: Structure, reproduction and life cycle of Fasciola.

Nemathelminthes: Structure, reproduction and life cycle of Ascaris.

Annelida: Structure, digestion and excretion of Hirudinaria.

UNIT-III:

Arthropoda: External morphology, digestive and excretory system of Paleamon.

Mollusca: Morphology and respiration of Pila.

Echinodermata: Morphology and water vascular system of Asterias.

UNIT-IV: Mammalian Physiology

Digestion, Respiration, Transport of respiratory gases, Structure of heart and cardiac cycle, Composition and clotting of blood, Blood group, Structure of neuron and transmission of nerve impulse, Structure of skeletal muscle and muscle contraction.

UNIT-V: Endocrinology

Structure and function of Pituitary, Thyroid and Gonads.

Note: Classification to be followed from “ Barnes RD (1982) Invertebrate Zoology. 5th Edition.”

PRACTICAL

Experiment (Physiology) Estimation of haemoglobin concentration in man, Estimation of casein in milk, Estimation of lipid in any given sample.

Endocrinology slides as mentioned in syllabus Museum Specimens and slides Slides: Morphology of Paramecium, Binary fission and Conjugation in Paramecium. Section through Sycon, Spicules and Gemmules of sponge, Ephyra larva.

Museum specimens: Spongilla, Sycon, Gorgonia, Physallia, Porpita, Penatulla, Nereis, Aphrodite, Sacculina, Eupagurus, Chiton, Aplysia, Octopus, Starfish, sea-Urchin, sea Cucumber.

Recommended Books

1. Arora MP (2006) Non-Chordata-I. 1st edition. Himalaya Publishing House, New Delhi.
2. Arora MP (2008) Non-Chordata-II. 1st edition. Himalaya Publishing House, New Delhi.

3. Barnes RD (1982) Invertebrate Zoology. 6th Edition. Holt Saunders International Edition.
4. Barnes RSK, Calow P, Olive PJW, Golding DW & Spicer JI (2002) The Invertebrates: A New Synthesis. 3rd Edition. Blackwell Science, USA.
5. Barrington EJW (1979) Invertebrate Structure and Functions. 2nd Edition. ELBS and Nelson.
6. Boradale LA and Potts EA (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
7. Jordan EL and Verma PS (1963) Invertebrate Zoology. Revised Edition. S. Chand, New Delhi.
8. A text book of medical Physiology. Guyton and Hall.
9. Human physiology. Chatterjee.
10. Principle of Anatomy and Physiology. Tortora and Derrickson.
11. A book of Physiology and Functional Histology, A K berry.
12. Mohanty PK (2000) Illustrated Dictionary of Biology. Kalyani Publishers, Ludhiana.

GE-2: ANIMAL DIVERSITY (PROTOCHORDATA, CHORDATA), DEVELOPMENTAL BIOLOGY AND IMMUNOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Protochordata and Origin of Chordates

General characters of Hemichordata, Urochordata and Cephalochordata; Structure, Digestive system, Respiratory and reproduction in Balanoglossus, Herdmania and Amphioxus.

UNIT-II: Pisces and Amphibia

General characters of Chondrichthyes and Osteichthyes and classification up to order; Digestive and reproductive system in Scoliodon General characters and classification of amphibian up to order, Circulatory and Nervous system (Brain and Cranial nerves).

UNIT-III: Reptilia, Aves and Mammals

Urinogenital system of Calotes; Respiratory system of Pigeon and Flight adaptation in Birds; Digestive and Nervous System (Brain and Cranial nerves) of rabbit.

UNIT-IV: Developmental Biology

Gametogenesis, structure of gametes, Mechanism of fertilization, Types of Cleavage, Development of Amphioxus and frog up to formation of three germ layers.

UNIT-V: Immunology

Innate and acquired immunity, Antigens, structure and function of immunoglobulins, Antigen- Antibody interaction, Vaccines.

PRACTICAL

Immunology: Blood Grouping

Museum specimens: Balanoglossus, Herdmania, Amphioxus, Exocoetus, Hippocampus, Anabas, Ambystoma, Axolotl larva, Polypedates, Ichthyophis, Draco, Chelone, Trionyx, Hemidactylus, Varanus, Chamaeleon, Sea snake, Cobra, Viper, Krait, Pigeon, Crow, Bat, Rat.

Slides: Sections through Balanoglossus and Amphioxus; Tissue sections through Liver, Pancreas; Embryological slides of frog.

Bones: Amphibia and mammals.

Recommended Books

1. Agarwal VK (2011) Zoology for degree students. S. Chand, NewDelhi.
2. Arora MP (2006) Chordata-1. 1st Edition. Himalaya Publishing House, New Delhi.
3. Hall BK and Hallgrimsson B (2008) Strickbergers Evolution. 4th Edition. Jones and Bartlett Publishers Inc., USA.
4. Jordan EL and Verma PS (1963) Chordate Zoology. Revised Edition.S. Chand, New Delhi.
5. Young JZ (2004) The Life of Vertebrates. 3rd Edition. Oxford University Press, USA.
6. Kindt TJ, Goldsby RA, Osborne BA, Immunology.
7. Gilbert SF, Developmental Biology.

GE-3: FOOD, NUTRITION AND HEALTH

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I:

Food; Diet; Nutrient; Vitamins; Disorders due to deficiency of vitamins; Synthetic foods and drinks.

UNIT-II:

Functions of food; Components of food; Nutrients (Macro and micronutrients): their biochemical role and dietary sources; Food groups and the concept of a balanced diet; Causes of food spoilage; Food adulteration; Nutrition through the life cycle- Physiological considerations, nutrient needs and dietary pattern for various groupsadults, pregnant and nursing mothers, infants, preschool and school children, adolescents and elderly.

UNIT-III:

Nutritional Biochemistry Carbohydrates, Lipids, Proteins - Definition, Classification, Structure and properties Significance of acid value, iodine value and saponification value of lipids; Essential and Non-essential amino acids; Enzymes- Definition, Classification, Properties; Coenzymes Vitamins- Fat-soluble and Water-soluble vitamins; their Structure and properties Minerals- Iron, calcium, phosphorus, iodine, selenium and zinc and their properties.

UNIT-IV:

Introduction to health- Definition and concept of health; Major nutritional deficiency Diseases: Protein Energy Malnutrition; Life style related diseases- hypertension, diabetes mellitus, and obesity- their causes and prevention through dietary or lifestyle modifications. Social health problems- smoking, alcoholism, drug dependence and Acquired Immuno Deficiency Syndrome (AIDS); Common ailments- cold, cough, fevers, diarrhoea, constipation: their causes and dietary treatment.

UNIT-V:

Food hygiene, Potable water- sources and methods of purification, Food and Water Borne Infections.

PRACTICAL

1. To detect adulteration in a) Ghee b) Sugars c) Tea leaves and d) Turmeric.
2. To determine absorbed oil content in fried foods.
3. Estimation of lactose in milk.
4. Ascorbic acid estimation in food by titrimetry.
5. Estimation of calcium in foods by titrimetry.

6. Preparation of temporary mounts of various stored grain pests.
7. Project- Undertake computer aided diet analysis and nutrition counselling for different age groups.
OR Identify nutrient rich sources of foods, their seasonal availability and price; study of Nutrition labelling on selected foods.

Recommended Books

1. Bamji MS, Rao NP and Reddy V (2009) Text Book of Human Nutrition. Oxford & IBH Publishing Co. Pvt Ltd.
2. Jain P et al. (2007) Poshan vaswasthya ke mool siddhant (Hindi). 1st Ed. Academic Pratibha.
3. Lakra P and Singh MD (2008) Text book of Nutrition and Health. 1st Edition. Academic Excellence.
4. Manay MS, Shadaksharaswamy (1998) Food-Facts and Principles. New Age International (P) Ltd.
5. Mohanty PK (2000) Illustrated Dictionary of Biology. Kalyani Publishers, Ludhiana.
6. Mudambi SR and Rajagopal MV (2007) Fundamentals of Foods, Nutrition and Diet Therapy. 5th Edition. New Age International Publishers.
7. Srilakshmi B (2002) Nutrition Science. New Age International (P) Ltd.
8. Srilakshmi B (2007) Food Science. 4th Edition. New Age International (P) Ltd.
9. Swaminathan M (1986) Handbook of Foods and Nutrition. 5th Edition. BAPPCO.
10. Wardlaw GM, Hampl JS (2007) Perspectives in Nutrition. 7th Edition. McGraw Hill.

GE-4: BIOTECHNOLOGY: MICROBES TO ANIMALS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Introduction

Concept and scope of Biotechnology; Importance of biotechnology and Application of biotechnology.

UNIT-II: Techniques in Gene Manipulation

Restriction and modifying enzymes, Cloning vectors and Expression vectors, Transformation techniques, Identification of recombinants, Construction and screening of DNA libraries; Molecular analysis of DNA, RNA and proteins (i.e., Southern, Northern and Western blotting), DNA sequencing (Sangers method and automation), Polymerase Chain Reaction, Microarrays, DNA fingerprinting and RAPD.

UNIT-III: Microbes in Biotechnology

Growth kinetics of microbes, Applications of microbes in industry (Concept of primary and secondary metabolites, Fermentation/Bioreactors, Downstream processing), Bioremediation and Biosensing.

UNIT-IV: Transgenic Animal

Production of transgenic animals: Retroviral method, DNA microinjection method, embryonic stem cell method, nuclear transplantation; Applications of transgenic animals; Knockout mice; Transgenic livestock and Transgenic fish.

UNIT-V: Biotechnology and Human Welfare

Animal cell technology: Concept of expressing cloned genes in mammalian cells, Recombinant DNA in health (Recombinant insulin and human growth hormone), Production of recombinant vaccines, Gene therapy: in vitro, in-vivo and ex-vivo. Ethical issues concerning: Transgenesis, Bio safety and

Intellectual Property Rights.

PRACTICAL

1. Isolation of genomic DNA from E. coli and analyze it using agarose gel electrophoresis.
2. Isolation of plasmid DNA (pUC 18/19) and analyse it using agarose gel electrophoresis.
3. Transformation of E. coli (pUC 18/19) and calculation of transformation efficiency.
4. Restriction digestion of lambda (λ) DNA using EcoR1 and Hind III.
5. DNA ligation (lambda DNA EcoR1/Hind III digested).
6. Construction of restriction digestion maps from data provided.
7. Study of Southern blot hybridization and PCR; Analysis of DNA fingerprinting (Dry Lab).
8. Project on Animal Cell Culture.

Recommended Books

1. Beauchamp TI and Childress JF (2008) Principles of Biomedical Ethics. 6th Edition. Oxford University Press, USA.
2. Brown TA (1998) Molecular Biology Labfax II: Gene Cloning and DNA Analysis. 2nd Edition. Academic Press, USA.
3. Glick BR and Pasternak JJ and Patten CL (2009) Molecular Biotechnology- Principles and Applications of Recombinant DNA. 4th Edition. ASM press, Washington, USA.
4. Griffiths AJF, Miller JH, Suzuki DT, Lewontin RC and Gelbart WM (2009) An Introduction to Genetic Analysis. 9th Edition. W.H. Freeman and Co., USA.
5. Snustad DP and Simmons MJ (2009) Principles of Genetics. 5th Edition, John Wiley and Sons Inc., USA.
6. Watson JD, Myers RM, Caudy A and Witkowski JK (2007) Recombinant DNA- Genes and Genomes- A Short Course. 3rd Edition, Freeman and Co., USA.

ZOOLOGY(PASS)

SEMESTER-I

C:1-DIVERSITY AND EVOLUTION OF NON-CHORDATA (PROTISTA TO PSEUDOCOELOMATES)

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Kingdom Protista

General characteristics and classification up to classes; Life cycle, pathogenicity and prophylaxis of Plasmodium vivax, Trypanosoma gambiense and Entamoeba histolytica; Locomotion and reproduction in Protista.

UNIT-II: Phylum Porifera

General characteristics and classification up to classes; Canal system in sponges.

UNIT-III: Phylum Cnidaria

General characteristics and classification up to classes; Metagenesis in Obelia; Polymorphism in Cnidaria; Corals and coral reefs.

UNIT-IV: Phylum Platyhelminthes

General characteristics and classification up to classes; Life cycle, pathogenicity and prophylaxis of Fasciola hepatica and Taenia solium; Parasitic adaptations.

UNIT-V: Phylum Nematelminthes

General characteristics and classification up to classes; Life cycle, pathogenicity and prophylaxis of Ascaris lumbricoides and Wuchereria Bancrofti; Parasitic adaptations.

Note: Classification to be followed from “ Barnes RD (1982) Invertebrate Zoology. 5th Edition.”

PRACTICAL

Kingdom Protista

1. Morphology of Paramecium, Binary fission and Conjugation in Paramecium.
2. Life stages of Plasmodium vivax, Trypanosoma gambiense and Entamoeba histolytica (Slides/Microphotographs).
3. Examination of pond water for protists.

Phylum Porifera

4. Study of Sycon (including T.S. and L.S.), Hyalonema, and Euplectella.
5. Temporary mounts of spicules, gemmules and sponging fibres.

Phylum Cnidaria

6. Study of Obelia, Physalia, Millepora, Aurelia, Ephyra larva, Tubipora, Corallium, Alcyonium, Gorgonia and Metridium (including T.S. and L.S.).

Phylum Ctenophora

7. Any one specimen/slide. **Phylum Platyhelminthes**

8. Study of adult Fasciola hepatica and Acanthamoeba, Taenia solium and their life stages (Slides/ microphotographs).

Phylum Nematelminthes

9. Study of adult Ascaris lumbricoides, Wuchereria bancrofti and their life stages (Slides/ microphotographs).

Note: Classification to be followed from “ Barnes RD (1982) Invertebrate Zoology. 5th Edition.”

Recommended Books

1. Arora MP (2006) Non-Chordata-I. 1st edition. Himalaya Publishing House, New Delhi.
2. Arora MP (2008) Non-Chordata-II. 1st edition. Himalaya Publishing House, New Delhi.
3. Barnes RD (1982) Invertebrate Zoology. 6th Edition. Holt Saunders International Edition.
4. Barnes RSK, Calow P, Olive PJW, Golding DW & Spicer JI (2002) The Invertebrates: A New Synthesis. 3rd Edition. Blackwell Science, USA.
5. Boradale LA and Potts EA (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
6. Jordan EL and Verma PS (1963) Invertebrate Zoology. Revised Edition. S. Chand, New Delhi.
7. Mohanty PK (2000) Illustrated Dictionary of Biology. Kalyani Publishers, Ludhiana.

C:2-PERSPECTIVES IN ECOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Introduction to Ecology

History of ecology; Autecology and synecology; Levels of organization; Laws of limiting factors; Detailed study of temperature and light as physical factors.

UNIT-II: Population

Unitary and modular populations; Unique and group attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion; Exponential and logistic growth, equation and patterns, r and K strategies, Population regulation - density-dependent and independent factors.

UNIT-III: Community

Community characteristics: dominance, diversity, species richness, abundance, stratification; Ecotone and edge effect; Ecosystem development (succession) with example.

UNIT-IV: Ecosystem

Types of ecosystem; Food chain, Detritus and grazing food chains, Linear and Y-shaped food chains; Food web; Energy flow through the ecosystem; Ecological pyramids and Ecological efficiencies; Nutrient and biogeochemical cycle, Nitrogen cycle.

UNIT-V: Conservation of Biodiversity

Types of biodiversity, its significance, loss of biodiversity; Conservation strategies (in situ and ex situ) and wildlife (Protection) act, 1972.

PRACTICAL

1. Study of life tables and plotting of survivorship curves of different types from the hypotheti-

cal/real data provided.

2. Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon-Weiner diversity index for the same community.
3. Study of an aquatic ecosystem: fauna and flora Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content(Winklers method), Chemical Oxygen Demand and free CO₂.
4. Report on a visit to National Park/Biodiversity Park/Wildlife sanctuary.

Recommended Books

1. Colvin PA (1993) Ecology. II Edition. John Wiley and Sons, Inc., USA.
2. Dash MC (1993) Fundamentals of Ecology. McGraw Hill Book Company, New Delhi.
3. Joshi N and Joshi PC (2012) Ecology and Environment. 1st Edition. Himalaya Publishing House, New Delhi.
4. Odum EP (2008) Fundamentals of Ecology. Indian Edition. Brooks/Cole.
5. Singh JS, Gupta SR and Singh SP (2014) Ecology, Environmental Science and Conservation. S. Chand, New Delhi.

C:3-DIVERSITY AND EVOLUTION OF NON-CHORDATA (COELOMATE NONCHORDATES)

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Phylum Annelida

General characteristics and classification up to classes; Metamerism and Excretion in Annelida.

UNIT-II: Phylum Arthropoda

General characteristics and classification up to classes; Vision in Arthropoda; Respiration in Arthropoda; Moulting in insects, Metamorphosis in insects; Social life in insects (bees and termites) and Larval forms in Crustacea.

UNIT-III: Phylum Onychophora

General characteristics, evolutionary significance and affinities of Peripatus.

UNIT-IV: Phylum Mollusca

General characteristics and classification up to classes; Respiration in Mollusca; Torsion and detorsion in Gastropoda; Pearl formation in bivalves.

UNIT-V: Phylum Echinodermata General characteristics and classification up to classes; Water-vascular system in Asteroidea; Larval forms in Echinodermata.

Note: Classification to be followed from " Barnes, R.D. (1982). Invertebrate Zoology, 5th Edition, Holt Saunders International Edition."

PRACTICAL

Phylum Annelida

1. Study of Aphrodite, Nereis, Heteronereis, Sabella, Terebella, Serpula, Chaetopterus, Pheretima and Hirudinaria.
2. T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm.
3. T.S. through crop of leech.

Phylum Arthropoda

4. Study of Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, termite, louse, honeybee, silk moth, wasp and dragon fly.

Phylum Onychophora

5. Any one specimen/slide.

Phylum Mollusca

6. Study of Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Mytilus, Loligo, Sepia, Octopus and Nautilus and Cyprea (cowrie).

Phylum Echinodermata

7. Study of echinoderm larvae.

8. Study of Pentaceros, Asterias, Ophiura, Clypeaster, Echinus, Echinocardium, Cucumaria and Antedon.

Note: Classification to be followed from “ Barnes, R.D. (1982). Invertebrate Zoology, 5th Edition, Holt Saunders International Edition.”

Recommended Book

1. Arora MP (2006) Non-Chordata-I. 1st edition. Himalaya Publishing House, New Delhi.
2. Arora MP (2008) Non-Chordata-II. 1st edition. Himalaya Publishing House, New Delhi.
3. Barnes RD (1982) Invertebrate Zoology. 6th Edition. Holt Saunders International Edition.
4. Barnes RSK, Calow P, Olive PJW, Golding DW & Spicer JI (2002) The Invertebrates: A New Synthesis. 3rd Edition. Blackwell Science, USA.
5. Barrington EJW (1979) Invertebrate Structure and Functions. 2nd Edition. ELBS and Nelson.
6. Boradale LA and Potts EA (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
7. Jordan EL and Verma PS (1963) Invertebrate Zoology. Revised Edition. S. Chand, New Delhi.

C:4-PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Digestive System

Structural organization, histology and functions of gastrointestinal tract and its associated glands; Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Role of gastrointestinal hormones on the secretion and control of enzymes of gastrointestinal tract.

UNIT-II: Respiratory System

Histology of trachea and lung; Mechanism of respiration, Pulmonary ventilation; Respiratory volume and capacity; Transport of oxygen in the blood; Oxygen- hemoglobin and myoglobin, dissociation curve and the factors influencing it; Carbon dioxide transport in the blood and Control of respiration.

UNIT-III: Excretory System

Structure of kidney and its histological details; Renal blood supply; Mechanism of urine formation and its regulation and Regulation of acid-base balance.

UNIT-IV: Blood

Components of blood and their functions; Structure and functions of haemoglobin; Haemopoiesis;

Haemostasis and Coagulation of blood.

UNIT-V: Heart

Structure of heart; Coronary circulation; Structure of conducting and working of myocardial fibers; Origin and conduction of cardiac impulses functions of AV node; Cardiac cycle; Cardiac output and its regulation-Frank-Starling Law of the heart; Nervous and chemical regulation of heart rate; Blood pressure and its regulation.

PRACTICAL

1. Enumeration of red blood cells using haemocytometer.
2. Estimation of haemoglobin using Sahli's haemoglobinometer.
3. Preparation of haemin and haemochromogen crystals.
4. Recording of blood pressure using a Sphygmomanometer.
5. Examination of sections of mammalian oesophagus, stomach, duodenum, ileum, rectum liver, trachea, lung and kidney.

Recommended Books

1. Arey LB (1974) Human Histology. 4th Edition. W.B. Saunders, USA.
2. Chatterjee CC (2008) Human Physiology. Vol. I and II. Medical Allied Agency, Kolkata.
3. Guyton AC and Hall JE (2006) Textbook of Medical Physiology. 9th Edition. W.B. Saunders Company, Philadelphia.
4. Tortora GJ and Derrickson B (2012) Principles of Anatomy & Physiology. 13th Edition John Wiley and sons, USA.
5. Victor PE (2008) diFiore's Atlas of Histology with Functional Correlations. 12th Edition, Lippincott W. & Wilkins, USA.

C:5-DIVERSITY AND DISTRIBUTION OF CHORDATA

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Protochordata and Origin of Chordates

General characters of Hemichordata, Urochordata and Cephalochordata; Study of larval forms in protochordates; Retrogressive metamorphosis in Urochordata.

UNIT-II: Introduction to Vertebrata and Agnatha

Advanced features of vertebrates over Protochordata; General characters and classification of cyclostomes up to class.

UNIT-III: Pisces and Amphibia

General characters of Chondrichthyes and Osteichthyes and classification up to order; Migration; Osmoregulation and Parental care in fishes; Scales in fishes; General characters and classification up to order and Parental care in Amphibia.

UNIT-IV: Reptilia and Aves

General characters and classification up to order; Skull in Reptilia; Affinities of Sphenodon; Poison apparatus and Biting mechanism in snakes; General characters and classification up to order; Flight adaptations; Archaeopteryx- a connecting link and Migration in birds.

UNIT-V: Mammals and Zoogeography

General characters and classification up to order; Affinities of Prototheria and Metatheria; Dentition in mammals; Zoogeographical realms and Distribution of vertebrates in different realms.

PRACTICAL

Protochordata

1. Balanoglossus, Herdmania, Branchiostoma and Colonial Urochordata.
2. Sections of Balanoglossus through proboscis and branchiogenital regions.
3. Sections of Amphioxus through pharyngeal, intestinal and caudal regions.
4. Permanent slide of spicules of Herdmania.

Agnatha

5. Petromyzon and Myxine.

Fishes

6. Sphyrna, Pristis, Trygon, Torpedo, Chimaera, Notopterus, Mystus, Heteropneustes, Hippocampus, Exocoetus, Echineis, Anguilla, Tetraodon, Diodon, Anabas and Flat fish.

Amphibia

7. Ichthyophis/Ureotyphlus, Necturus, Duttaphrynus, Polypedates, Hyla, Alytes and Salamandra.

Reptiles

8. Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Draco, Ophiosaurus, Bungarus, Vipera, Naja, Hydrophis, Zamenis and Crocodylus.
9. Key for Identification of poisonous and non-poisonous snakes.

Aves

10. Study of six common birds from different orders.
11. Types of beaks and claws.
12. Types of feathers.

Mammalia

13. Sorex, Bat (Insectivorous and Frugivorous), Funambulus, Loris, Herpestes and Hemiechenis.

Recommended Books

1. Agarwal VK (2011) Zoology for degree students. S. Chand, New Delhi.
2. Arora MP (2006) Chordata-1. 1st Edition. Himalaya Publishing House, New Delhi.
3. Hall BK and Hallgrimsson B (2008) Strickbergers Evolution. 4th Edition. Jones and Bartlett Publishers Inc., USA.
4. Jordan EL and Verma PS (1963) Chordate Zoology. Revised Edition. S. Chand, New Delhi.
5. Young JZ (2004) The Life of Vertebrates. 3rd Edition. Oxford University Press, New York.

C:6-PHYSIOLOGY CONTROLLING AND COORDINATING SYSTEM

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Tissues and Glands, Bone and cartilage

Structure, location, function and classification of Epithelial tissue, Connective tissue, Muscular tissue, Nervous tissue; Types of glands and their functions; Structure and types of bones and cartilages.

UNIT-II: Nervous System

Structure of neuron, resting membrane potential; Origin of action potential and its propagation

across the myelinated and unmyelinated nerve fibers; types of synapsis, Synaptic transmission; Neuromuscular junction; Reflex action and its types and Reflex arc.

UNIT-III: Muscle

Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor Unit, summation and tetanus.

UNIT-IV: Reproductive System

Histology of male and female reproductive systems; Puberty; Physiology of reproduction of male and female.

UNIT-V: Endocrine System

Functional Histology of endocrine glands - pineal, pituitary, thyroid, parathyroid, thymus, pancreas, adrenals; Hormones secreted by them and their mechanism of action; Gonadal hormones; Classification of hormones; Regulation of their secretion; Mode of hormone action; Signal transduction pathways utilized by steroidal and non-steroidal hormones.

PRACTICAL

1. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex).
2. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells.
3. Examination of sections of mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid.

Recommended Books

1. Arey LB (1974) Human Histology. 4th Edition. W.B. Saunders, USA.
2. Chatterjee CC (2008) Human Physiology. Vol. I and II. Medical Allied Agency, Kolkata.
3. Guyton AC and Hall JE (2006) Textbook of Medical Physiology. 9th Edition. W.B. Saunders Company, Philadelphia.
4. Tortora GJ and Derrickson B (2012) Principles of Anatomy & Physiology. 13th Edition John Wiley and sons, USA.
5. Victor PE (2008) diFiores Atlas of Histology with Functional Correlations. 12th Edition, Lippincott W. and Wilkins, USA.

C:7-COMPARATIVE ANATOMY OF VERTEBRATES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Integumentary System and Skeletal System

Structure, functions and derivatives of integument; Axial and appendicular skeletons; Jaw suspensorium in vertebrates.

UNIT-II: Digestive and Respiratory System

Alimentary canal and associated glands; Skin, gills, lungs and air sacs and Accessory respiratory organs in fishes.

UNIT-III: Circulatory System

General plan of circulation; Evolution of heart and aortic arches.

UNIT-IV: Urinogenital System

Succession of kidney and Evolution of urinogenital ducts.

UNIT-V: Nervous System and Sense Organs

Comparative account of brain; Autonomic nervous system; Spinal Nerves; Spinal cord; Cranial nerves in Mammals.

PRACTICAL

1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs.
2. Disarticulated skeleton of Frog, Varanus, Fowl and Rabbit.
3. Carapace and plastron of turtle or tortoise.
4. Mammalian skulls (One herbivorous and one carnivorous animal).

Recommended Books

1. Hilderbr and M and Gaslow GE. Analysis of Vertebrate Structure. John Wiley and Sons., USA.
2. Kardong KV (2005) Vertebrates Comparative Anatomy, Function and Evolution. 4th Edition. McGraw-Hill Higher Education, New York.
3. Kent GC and Carr RK (2000) Comparative Anatomy of the Vertebrates. 9th Edition. The McGraw-Hill Companies, New York.
4. Weichert CK and William Presch (1970) Elements of Chordate Anatomy. Tata McGraw Hill, New York.

C:8-BIOCHEMISTRY OF METABOLIC PROCESSES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Biomolecules

Structures and properties of important mono-, di- and polysaccharides; Fatty acids, triglycerides and steroids; and amino acids and proteins.

UNIT-II: Carbohydrate Metabolism

Glycolysis; Citric acid cycle; pentose phosphate pathway; Gluconeogenesis; Shuttle systems (Malate-aspartate shuttle, Glycerol 3-phosphate shuttle); Glycogenolysis; Glycogenesis.

UNIT-III: Lipid Metabolism

beta oxidation of saturated fatty acids with even and odd number of carbon atoms; Biosynthesis of palmitic acid and Ketogenesis and its regulation.

UNIT-IV: Protein Metabolism

Catabolism of amino acids: Transamination, Deamination; Urea cycle; Fate of C-skeleton of Glucogenic and Ketogenic amino acids.

UNIT-V: Enzymes

Kinetics and Mechanism of action of enzymes; Inhibition of enzyme action.

PRACTICAL

1. Identification of unknown carbohydrates in given solutions (Starch, Sucrose, Lactose, Galactose, Glucose, Fructose).
2. Colour tests of functional groups in protein solutions.
3. Action of salivary amylase under optimum conditions.

4. Effect of pH on the action of salivary amylase.
5. Effect of temperature on the action of salivary amylase.
6. Estimation of total protein in given solutions by Lowrys method.

Recommended Books

1. Berg JM, Tymoczko JL and Stryer L (2007) Biochemistry. 6th Edition, W.H. Freeman and Co., New York.
2. Cox MM and Nelson DL (2008) Lehninger Principles of Biochemistry. 5th Edition. W.H. Freeman and Co., New York.
3. Devesena T (2014) Enzymology. 2nd Edition. Oxford University Press, New York.
4. Hames BD and Hooper NM (2000) Instant Notes in Biochemistry. 2nd Edition. BIOS Scientific Publishers Ltd., U.K.
5. Murray RK, Bender DA, Botham KM, Kennelly PJ, Rodwell VW and Well PA (2009) Harpers Illustrated Biochemistry. 28th Edition. International Edition. The McGraw-Hill Companies Inc., New York.

C:9-CELL BIOLOGY AND GENETICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Cell and Plasma Membrane

Prokaryotic and Eukaryotic cells; Various models of plasma membrane; Transport across membranes (Diffusion, Active transport, Passive transport, Uniport, Symport and Antiport); Cell junctions.

UNIT-II: Endomembrane System, Mitochondria and Peroxisomes

The Endoplasmic Reticulum; Golgi apparatus; Mechanism of vesicular transport; Lysosomes; Structure and function of mitochondria: Chemi-osmotic hypothesis; Semiautonomous nature of mitochondria; Endosymbiotic hypothesis; Peroxisomes.

UNIT-III: Cytoskeleton, Nucleus and Cell Cycle

Microtubules, microfilaments and their functional dynamics; Ultra structure of nucleus; Nuclear Envelope-Structure of nuclear pore complex; Chromosomal DNA and its packaging; Structure and function of Nucleolus; Cell cycle.

UNIT-IV: Mendelian Genetics, Linkage, Crossing Over and Chromosomal Mapping

Principles of inheritance; Incomplete dominance and co-dominance; Multiple alleles, Lethalalleles; Epistasis; Pleiotropy; Sex-linked inheritance; Linkage and crossing over; Cytological basis of crossing over; Molecular mechanisms of crossing over; Recombination frequency as a measure of linkage intensity; Two factor and three factor crosses; Interference and coincidence; Somatic cell hybridization.

UNIT-V: Determination of Sex and Mutations

Chromosomal mechanisms of sex determination; Sex-linked, sex-influenced and sex limited characters; Gene mutations; Chromosomal mutations: Deletion, duplication, inversion, translocation; Aneuploidy and polyploidy; Induced versus spontaneous mutations; Backward and forward mutations; Suppressor mutations; Molecular basis of mutations in relation to UV light and chemical mutagens; DNA repair mechanisms.

PRACTICAL

1. Grams staining technique for visualization of prokaryotic cells.
2. Study various stages of mitosis from permanent slides.
3. Study various stages of meiosis from permanent slides.
4. Study the presence of Barr body in human female blood cells/cheek cells. (Preparation of permanent slides).
5. To study the Mendelian laws and gene interactions and their verification by Chi-square analyses using seeds/beads/Drosophila.
6. Identification of various mutants of Drosophila.

(In practical examination, 05 marks should be of permanent slide submission; one mark each for DNA, PAS, Proteins, MGP and Barr body slide.)

Recommended Books

1. Becker WM, Kleinsmith LJ, Hardin J and Bertoni G P (2009) The World of the Cell. 7th Edition. Pearson Benjamin Cummings Publishing, San Francisco.
2. Bruce Albert, Bray Dennis, Lewis Julian, Raff Martin, Roberts Keith and Watson James (2008) Molecular Biology of the Cell, 5th Edition, Garland publishing Inc., New York and London.
3. Cooper GM and Hausman RE (2009) The Cell: A Molecular Approach. 5th Edition. ASM Press and Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology. 8th Edition. Lippincott Williams and Wilkins, Philadelphia.
5. Gardner EJ, Simmons MJ, Snustad DP (2008) Principles of Genetics. 8th Edition. Wiley India.
6. Griffiths AJF, Wessler SR, Lewontin RC and Carroll SB. Introduction to Genetic Analysis. 9th Edition. W. H. Freeman and Co., New York.
7. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley and Sons. Inc., USA.
8. Klug WS, Cummings MR, Spencer CA (2012) Concepts of Genetics. 10th Edition. Benjamin Cummings, USA.
9. Russell, P. J. (2009). Genetics- A Molecular Approach. 3rd Edition. Benjamin Cummings.
10. Snustad DP, Simmons MJ (2009) Principles of Genetics. 5th Edition. John Wiley and Sons Inc., USA.
11. Verma, P.S. and Agarwal, V.K. (2010) Genetics, 9th Edition, S. Chand, New Delhi.

C:10-EVOLUTIONARY BIOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: History of Life, theories of Evolution and Extinction

Chemogeny, Biogeny, RNA World; Lamarckism; Darwinism; Neo-Darwinism; Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail) and Role of extinction in evolution.

UNIT-II: Evidences of Evolution

Fossils and its types; Dating of fossils, Phylogeny of horse and human.

UNIT-III: Processes of Evolutionary Change

Organic variations; Isolating mechanisms; Natural selection (Industrial melanism, Pesticide/Antibiotic resistance); Types of natural selection (Directional, Stabilizing, Disruptive), Sexual Selection and Artificial selection.

UNIT-IV: Principles of population genetics

Concept of gene pool, Gene frequencies equilibrium frequency (Hardy-Weinberg equilibrium), Shift in gene frequency without selection Genetic drift, Mutation pressure and Gene flow.

UNIT-V: Species Concept and Evolution above species level

Biological concept of species; Sibling species, Polymorphic species, Polytypic species, Ring species; Modes of speciation (Allopatric, Sympatric); Convergence, Divergence and Parallelism.

PRACTICAL

1. Study of fossil evidences from plaster cast models and pictures.
2. Study of homology and analogy from suitable specimens/ pictures.
3. Demonstration of changing allele frequencies with and without selection.
4. Construction of cladogram based on morphological characteristics.
5. Construction of phylogenetic tree with bioinformatics tools (Clustal X and Phylip).
6. Interpretation of phylogenetic trees.

Recommended Books

1. Barton NH, Briggs DEG, Eisen JA, Goldstein DB and Patel NH (2007) Evolution. Cold Spring Harbour Laboratory Press.
2. Campbell NA and Reece JB (2011) Biology. 9th Edition. Pearson Education Inc., New York.
3. Douglas JF (1997) Evolutionary Biology. Sinauer Associates, USA.
4. Hall BK and Hallgrimsson B (2008) Evolution. 4th Edition. Jones and Bartlett Publishers.
5. Pevsner J (2009) Bioinformatics and Functional Genomics. 2nd Edition. Wiley-Blackwell, USA.
6. Ridley M (2004) Evolution. 3rd Edition. Blackwell Publishing, USA.

C:11-DEVELOPMENTAL BIOLOGY AND IMMUNOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Introduction

Mosaic and regulative development; Discovery of induction; Cell-Cell interaction; Pattern formation; Differentiation and growth; Differential gene expression; Cytoplasmic determinants and asymmetric cell division; Reliability of development: Redundancy and negative feed-back.

UNIT-II: Early Embryonic Development

Gametogenesis (Spermatogenesis, Oogenesis); Types of eggs; Egg membranes; Fertilization: Changes in gametes, monospermy and polyspermy; Planes and patterns of cleavage; Early development of frog and chick up to gastrulation; Fate maps; Embryonic induction and organizers.

UNIT-III: Embryonic Development

Fate of germ layers; Extra-embryonic membranes in birds; Implantation of embryo in humans; Placenta (Structure, types and functions of placenta); Metamorphosis: Changes, hormonal regulations in amphibians; Regeneration: Modes of regeneration(epimorphosis, morphallaxis and compensatory regeneration); Ageing: Concepts and models.

UNIT-IV: Immune System and Immunity

Cells and organs of the Immune system; Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral), Passive: Artificial and natural Immunity, Active: Artificial and natural Immunity and Immune dysfunctions.

UNIT-V: Antigens, Antibodies and Vaccines

Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T-Cell epitopes; Structure and functions of different classes of immunoglobulins, Antigen-antibody interactions, Immunoassays, Polyclonal sera, Monoclonal antibodies, Hybridoma technology and Vaccine.

PRACTICAL

1. Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages).
2. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages).
3. Study of developmental stages (above mentioned) by raising chick embryo in the laboratory.
4. Study of the developmental stages and life cycle of *Drosophila* from stock culture.
5. Demonstration of lymphoid organs.
6. ABO blood group determination.

Recommended Books

1. Abbas KA and Lichtman HA (2003) Cellular and Molecular Immunology. 5th Edition. Saunders Publication, Philadelphia.
2. Balinsky BI and Fabian BC (1981) An Introduction to Embryology. 5th Edition. International Thompson Computer Press.
3. David M, Jonathan B, David RB and Ivan R (2006) Immunology. 7th Edition. Elsevier Publication, USA.
4. Gilbert SF (2010) Developmental Biology. 9th Edition. Sinauer Associates, Inc., USA.
5. Kalthoff (2008) Analysis of Biological Development. 2nd Edition. McGraw-Hill, New York.
6. Kindt TJ, Goldsby RA, Osborne BA and Kuby J (2006) Immunology. 6th Edition. W.H. Freeman and Company, New York.
7. Wolpert L, Beddington R, Jessell T, Lawrence P, Meyerowitz E and Smith J (2002) Principles of Development. 1st Edition, Oxford University Press, New York.

C:12-MOLECULAR BIOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Nucleic Acids and DNA Replication

Salient features of DNA double helix; DNA denaturation and renaturation; DNA topology - linking number and DNA topo-isomerases; Structure of RNA, tRNA and DNA and RNA associated proteins; DNA Replication in prokaryotes and eukaryotes; Role of proteins and enzymes in replication; Licensing factors; Semi-conservative, bidirectional and semi-discontinuous replication; RNA priming;

Replication of circular and linear ds-DNA.

UNIT-II: Transcription

RNA polymerase and transcription Unit; Mechanism of transcription in prokaryotes and Eukaryotes; Synthesis of rRNA and mRNA; Transcription factors and regulation of transcription.

UNIT-III: Translation

Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Process of protein synthesis in prokaryotes: Ribosome structure and assembly in prokaryotes; Proteins involved in initiation, elongation and termination of polypeptide chain; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation.

UNIT-IV: Post Transcriptional Modifications and Processing of Eukaryotic RNA

Structure of globin mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing.

UNIT-V: Gene Regulation and Regulatory RNAs

Principles of transcriptional regulation with examples from lac operon and trp operon; Transcription regulation in eukaryotes: Activators, repressors, enhancers, silencers elements; Gene silencing, Genetic imprinting; Ribo-switches, RNA interference, miRNA and siRNA.

PRACTICAL

1. Study of DNA replication using Photographs or slides and special cases, e.g., Polyteny using permanent slides of polytene chromosomes.
2. Preparation of liquid culture medium (LB) and raise culture of *E. coli*.
3. Estimation of the growth kinetics of *E. coli* by turbidity method.
4. Preparation of solid culture medium (LB) and growth of *E. coli* by spreading and streaking.
5. Demonstration of antibiotic sensitivity/resistance of *E. coli* to antibiotic pressure and interpretation of results.
6. Quantitative estimation of salmon sperm/calf thymus DNA using colorimeter (Diphenylamine reagent) or spectrophotometer (A260 measurement).
7. Quantitative estimation of RNA using Orcinol reaction.

Recommended Books

1. Becker WM, Kleinsmith LJ, Hardin J and Bertoni GP (2009) The World of the Cell. 7th Edition. Pearson Benjamin Cummings Publishing, San Francisco.
2. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter. Molecular Biology of the Cell, 4th Edition. Garland publishing Inc., New York.
3. Cooper GM and Hausman RE (2007) The Cell: A Molecular Approach. 4th Edition, ASM Press, USA.
4. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology. 8th Edition, Lippincott Williams and Wilkins, Philadelphia.
5. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley and Sons. Inc., USA.

DSE1A: ANIMAL BEHAVIOUR

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Introduction and Mechanisms of Behaviour

Origin and history of Ethology; Brief profiles of Karl von Frisch, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen; Proximate and ultimate behavior; Objective of behaviour, Behaviour as a basis of evolution; Behaviour as a discipline of science; Innate behaviour, Instinct, Stimulus filtering, Sign stimuli and Code breakers.

UNIT-II: Patterns of Behaviour

Reflexes: Types of reflexes, reflex path, characteristics of reflexes (latency, after discharge, summation, fatigue, inhibition) and its comparison with complex behavior.

Orientation: Primary and secondary orientation; kinesis-orthokinesis, klinokinesis; taxistropotaxis and klinotaxis and menotaxis (light compass orientation) and mnemotaxis.

Learning: Associative learning, classical and operant conditioning, Habituation and Imprinting.

UNIT-III: Social Behaviour

Insects society; Honey bee: Society organization, polyethism, foraging, round dance, waggle dance, Experiments to prove distance and direction component of dance, learning ability in honey bee, formation of new hive/queen; Reciprocal altruism, Hamiltons rule and inclusive fitness with suitable examples.

UNIT-IV: Sexual Behaviour

Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Infanticide, Consequences of mate choice for female fitness, Sexual conflict for male versus female parental care and Courtship behaviour in three spine stickleback.

UNIT-V: Biological Clocks

Circadian rhythm, Tidal rhythm, Lunar rhythm, Advantages of biological clocks, Jet lag and Entrainment.

PRACTICAL

1. To study different types of animal behaviour such as habituation, social life, courtship behaviour in insects, and parental care from short videos/movies and prepare a short report.
2. To study nests and nesting habits of the birds and social insects.
3. To study the behavioural responses of wood lice to dry condition.
4. To study behavioural responses of wood lice in response to humid condition.
5. To study geotaxis behaviour in earthworm.
6. To study the phototaxis behaviour in insect larvae.
7. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report.

Recommended Books

1. David McF. Animal Behaviour. Pitman Publishing Limited, London, UK.
2. John A (2001) Animal Behaviour. 7th Edition. Sinauer Associate Inc., USA.
3. Manning A and Dawkins MS. An Introduction to Animal Behaviour. Cambridge University Press, UK.
4. Paul WS and John A. Exploring Animal Behaviour. Sinauer Associate Inc., Massachusetts, USA.

DSE-2A: ECONOMIC ZOOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)
Max. Marks:100(Theory:70, Practical:30)

UNIT I: Bee-keeping and Bee Economy (Apiculture)

Varieties of honey bees and Bee pasturage; Setting up an apiary: Langstroths/Newtons hive, bee veil, brood and storage chambers, iron frames and comb sheets, drone excluder, rearing equipments, handling of bees, artificial diet; Diseases of honey bee, American and European Foulbrood, and their management; Honey extraction techniques; Physicochemical analysis of honey; Other beneficial products from bee; Visit to an apiculture institute and honey processing Units.

UNIT I: Silk and Silk Production (Sericulture)

Different types of silk and silkworms in India; Rearing of Bombyx mori, Rearing racks and trays, disinfectants, rearing appliances, black boxing, Chawki rearing, bed cleaning, mountages, harvesting of cocoons; Silkworm diseases: Pebrine, Flacherie, Grasserie, Muscardine and Aspergillosis, and their management; Silkworm pests and parasites: Uzi fly, Dermestid beetles, and their management; Silk reeling techniques and Quality assessment of silk fibre.

UNIT III: Aquaculture I

Brood stock management; Induced breeding of fish; Management of hatchery offish; Management of nursery, rearing and stocking ponds; Preparation and maintenance of fish aquarium; Preparation of compound diets for fish; Role of water quality in aquaculture; Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish; Fishery by-products.

UNIT IV: Aquaculture II

Prawn farming; Culture of crab; Pearl culture and Culture of air breathing fishes.

UNIT V: Dairy and Poultry Farming

Introduction; Indigenous and exotic breeds; Rearing, housing, feed and rationing; Commercial importance of dairy and poultry farming; Varietal improvement techniques; Diseases and their management; Dairy or poultry farm management and business plan; Visit to any dairy farm or Poultry farm.

PRACTICAL

1. Study of different types of bees (Queens, Drones and Worker bees).
2. Study of different types of silk moths.
3. Study of different types of pearls.
4. Study of different types of fish diseases.
5. Identification of different types of scales in fishes.
6. Study of different types of fins.
7. Study of different modified structures of fishes (Saw of sawfish, Hammer of hammer head fish, tail of sharks etc.)
8. Identification of various types of natural silks.

Recommended Books:

1. Dhyani Singh Bisht, Apiculture, ICAR Publication.
2. Dunham RA (2004) Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications, U.K.

3. Hafez ESE (1962) Reproduction in Farm Animals. Lea and Fabiger Publishers.
4. Knobil E and Neill JD (2006) The Physiology of Reproduction. Vol. 2. Elsevier Publishers, USA.
5. Prost PJ (1962) Apiculture. Oxford and IBH, New Delhi.
6. Singh S. Beekeeping in India, Indian council of Agricultural Research, New Delhi.
7. Srivastava CBL (1999) Fishery Science and Indian Fisheries. KitabMahal publications, India.

DSE-3A: WILDLIFE CONSERVATION AND MANAGEMENT

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT I:

Wildlife: Values of wildlife, positive and negative; Our conservation ethics; Importance Of conservation; Causes of depletion and World conservation strategies.

UNIT II:

Habitat analysis; Evaluation and management of wildlife; Physical parameters: Topography, Geology, Soil and water; Biological Parameters: food, cover, forage, browse and cover estimation; Standard evaluation procedures: remote sensing and GIS; Management of habitats; Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction and Preservation of general genetic diversity.

UNIT III:

Population estimation: Population density, Natality, Birth rate, Mortality, fertility Schedules and sex ratio computation; Faecal analysis of ungulates and carnivores: Faecal samples, slide preparation; Hair identification; Pug marks and census method.

UNIT IV:

National Organizations involved in wildlife conservation; Wild life Legislation: Wildlife Protection Act, 1972, its amendments and implementation; Management planning of Wildlife in protected areas; Estimation of carrying capacity; Eco tourism / wildlife tourism in forests; Concept of climax persistence; Ecology of perturbation.

UNIT V:

Management of excess population & translocation; Bio- telemetry; Care of injured and diseased animal; Quarantine and Common diseases of wild animal; Protected areas National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation: Tiger reserves in India and Management challenges in Tiger reserve.

PRACTICAL

1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna.
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses).
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers etc.

4. Demonstration of different field techniques for flora and fauna.
5. PCQ, Ten tree method, Circular, Square & rectangular plots, Parkers 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.
6. Trail/transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences).

Recommended Books:

1. Singh JS, Gupta SR and Singh SP (2014) Ecology, Environmental Science and Conservation. S. Chand, New Delhi.
2. Jugale K P . Wildlife in India. Daya publishing House, Delhi

DSE-1B: MICROBIOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT I:

History of Microbiology; Microbial World: Characterization, Classification and identification of microbes.

UNIT II:

Prokaryotes: General morphology and classification of bacteria, their characters and economic importance; Gram-positive and Gram-negative bacteria.

UNIT III:

Eukaryotes: General morphology of Protista and Fungi; classification and economic importance.

UNIT IV:

Viruses: structure, genome, replication cycle; Epidemiology of infectious diseases with reference to Human Hosts: Bacterial (Tuberculosis), Viral (Hepatitis), Protozoan (Amoebiasis) and Fungal (any one) disease.

UNIT V:

Microbe interactions; Immune Responses; Antibiotics and other chemotherapeutic agents; Applied microbiology in the fields of food, agriculture, industry and environment.

PRACTICAL

1. Cleaning of glass wares, sterilization principle and methods - moist heat - dry heat and filtration methods.
2. Media preparation: Liquid media, Solid media, Agar slants, Agar plates. Basal, enriched, selective media preparation - quality control of media, growth supporting properties, sterility check of media.
3. Pure culture techniques: Streak plate, pour plate and decimal dilution.
4. Cultural characteristics of microorganisms: Growth on different media, growth characteristics and description and demonstration of pigment production.
5. Staining techniques: Smear preparation, simple staining, Grams staining, Acid fast staining and staining for metachromatic granules.
6. Morphology of microorganisms.

7. Antibiotic sensitivity testing: Disc diffusion test - Quality control with standard strains.
8. Physiology characteristics: IMViC test, H₂S, Oxidase, catalase, urease test, Carbohydrate fermentation, Maintenance of pure culture, Paraffin method, Stab culture and maintenance of mold culture.

Recommended Books:

1. Arora DR and Arora B (2001) Medical Parasitology. 2nd Edition. CBS Publications and Distributors.
2. Dubey RC and Maheshwari DK (2013) A text book of Microbiology, S. Chand Publishing, New Delhi.
3. Pelczar MJ, Chan ECS and Krieg NR (1993) Microbiology. 5th Edition, Tata McGraw Hill Publishing Co. Ltd., New York.

DSE: AGRO-CHEMICALS AND PEST MANAGEMENT

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT I: Fundamentals of Pest Management

Pest: Definition, pest resurgence, secondary pest outbreak, Economic injury level, Economic threshold; Types of pests according to damage (sub economic, occasional, perennial).

UNIT II: Insects of Importance

General morphological features of different groups of insects; Study of biting and chewing, and piercing and sucking type of mouth parts.

UNIT III: Pest Management

Integrated Pest Management: Cultural, biological, chemical, genetic control; Agrochemicals: Pesticides, brief history, nomenclature, mode of action of insecticides, tools and techniques for pesticide application, environmental issues; Measurement of insecticide toxicity by estimation of LD₅₀ value of any one insect pest.

UNIT IV: Study of Pest in Laboratory and Field

Visit to agricultural field to study biology, damage and management practices of pests of agricultural crops (*Papilio demoleus*, *Helicoverpa armigera*, *Leptocorisa acuta*, *Leucinodes orbonalis*, *Epilachna vigintioctopunctata*).

UNIT V: Rearing of Pests

Rearing of any two important pests; one each from stored grain and agricultural crop in the laboratory and study their different stages.

PRACTICAL

1. Trips IARI fields, CWC, FCI, Stored grain institutes (any two).
2. Biological Agents; (Pathogens NPV); Parasites (*Trichogramma*); Predators (*Gambusia* fish, lady bird beetle etc.) [Collection, preservations & Slide preparation].
3. Field Specimen Infested plant/plant parts.
4. Determination of LD₅₀ or LC₅₀ of insecticides based on the data provided.
5. Instruments used in IPM.

6. Bio efficacy of EPN.
7. Dry Lab exercise for SIT efficacy.

Recommended Books:

1. Atwal, A.S. (1993) Agricultural pest of India and South East Asia. Kalyani Pub., New Delhi.
2. Dennis, S. Hill. (2005) Agricultural Insect pests of the tropics and their management, Cambridge University press, UK.
3. Pedigo L. P. (2002). Entomology and Pest Management, Prentice Hall Publication.
4. Pradhan, S. (1969). Insect Pests of Crops. National Book Trust, India Book House.
5. Robert F. Norris, Edward P. Caswell-Chen and Marcos Kogan, Concepts of Integrated Pest Management, Prentice Hall of India.

SEC-1: PUBLIC HEALTH AND HYGIENE

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT I:

Scope of Public health and Hygiene; nutrition and health; classification of foods; Nutritional deficiencies; Vitamin deficiencies.

UNIT II:

Pollution: water pollution, air pollution, soil pollution, noise pollution, thermal pollution and radioactive pollution.

UNIT III:

Environment and Health hazards; Environmental degradation; health hazards due to pollutants.

UNIT IV:

Communicable diseases and their control measures such as Measles, Polio, Chikungunya, Rabies, Plague, Leprosy and AIDS.

UNIT V:

Non-Communicable diseases and their preventive measures such as Hypertension, Coronary Heart diseases, Stroke, Diabetes, Obesity and Mental ill-health.

Recommended Books:

1. Arora DR and Arora B (2001) Medical Parasitology.2nd Edition.CBS Publications and Distributers.
2. Dubey RC and Maheshwari DK (2013) A text book of Microbiology. S. Chand, New Delhi.
3. Pelczar MJ, Chan ECS and Krieg NR (1993) Microbiology.5th Edition. Tata McGraw Hill Publishing Co. Ltd., New York.

SEC-2: AQUARIUM FISH KEEPING

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100(Theory:70, Practical:30)

UNIT I:

The potential scope of Aquarium Fish Industry as a Cottage Industry; Exotic and Endemic species of Aquarium Fishes.

UNIT II:

Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish.

UNIT III:

Food and feeding of Aquarium fishes; Use of live fish feed organisms; Preparation and composition of formulated fish feeds.

UNIT IV:

Live fish transport; Fish handling, packing and forwarding techniques; General Aquarium maintenance; budget for setting up an Aquarium Fish Farm as a Cottage Industry.

UNIT V:

Health Education in India; WHO Programmes; Government and Voluntary Organizations and their health services; Precautions, First Aid and awareness on Sporadic diseases.

Recommended Books:

1. Dunham RA (2004) Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications, U.K.
2. Srivastava CBL (1999) Fishery Science and Indian Fisheries. Kitab Mahal publications, India.

SEC-3: POULTRY FARMING

(Credits:2, Lectures: 30, Max. Marks: 50)

UNIT-I:

External morphology of variety of Fowls such as Plymouth Rock, Light Sussex, Minorca, Rhode Island, Red and White Leghorn.

UNIT-II:

Classification of Fowls based on their use : Meat type such as Broilers, Egg type such as White Leghorn and Commercial layers, Dual purpose varieties, Game and Ornamental purpose varieties.

UNIT-III:

Feeding Poultry Management of Egg Layers Management of Broilers in large scale farms.

UNIT-IV:

Poultry diseases Viral, Bacterial, Fungal, Protozoan and Parasitic Lice etc., Prevention and precautions during vaccination.

UNIT-V:

Management of a modern Poultry Farms Progressive plans to promote Poultry as a Self-Employment venture.

Recommended Books

1. Hand book of poultry farming and feed formulation EIRI Board (2008).
2. Chauhan H.V.S. Poultry diseases Diagnosis and Treatment New Age (2007)

SEC-4: APICULTURE

(Credits:2, Lectures: 30, Max. Marks: 50)

UNIT-I:

History Biology and classification of honey bee species of honey bees Social organization of honey bee colony.

UNIT-II:

Bee hive; Flora for apiculture; Selection of bees for apiculture, Method of bee Keeping and Indigenous method of Extraction of honey.

UNIT-III:

Modern method of apiculture; Appliances for modern method; Diseases of Honey bee and control measures.

UNIT-IV:

Products of bee keeping : Honey, Bee wax and Bee Yeman; Honey : Production, Chemical composition and Economic importance of Honey bee wax.

UNIT-V:

Bee enemies; Bee keeping industry; Recent efforts; Modern method in employing honey bees for cross pollination in horticultural gardens.

Recommended Books

1. Dhyan Singh Bisht, Apiculture, ICAR Publication.
2. Prost PJ (1962) Apiculture. Oxford and IBH, New Delhi.
3. Singh S. Beekeeping in India, Indian council of Agricultural Research, New Delhi.