Government of West Bengal
GOVERNMENT GENERAL DEGREE COLLEGE, KHARAGPUR-II
Vill - Ambigeria, P.O. - Madpur, Dist. – Paschim Medinipur, PIN – 721149
E-mail Id.principalggdckgp2@gmail.com

Key Indicator-1.3: Curriculum Enrichment
Metric No.-1.3.1: Institution integrates cross-cutting issues relevant to Professional Ethics, Gender, Human Values, Environment & Sustainability in transacting the Curriculum

The Table showing the list of Courses in the Curriculum which addresses Professional Ethics, Gender, Human Values, Environment & Sustainability

Sl. No.	Course Name	Course Code	Programme Name	Offered to	Particular Unit/Topic	Has Relevance to
1.	Paper I	-	B.Sc. Honours in Botany (3-Tier System)	1st Year	Entire paper	Environment

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2.	Paper III	-	B.Sc. Honours in Botany (3-Tier System)	2nd Year	Ecology, Economic Botany, Ethnobotany, Phytogeography	Environment, Sustainability
3.	Paper- IV	-	B.Sc. Honours in Botany (3-Tier System)	2nd Year	Plant Physiology, Applied Microbiology & Immunology	Environment
4.	Paper- VI	-	B.Sc. Honours in Botany (3-Tier System)	3rd Year	Biotechnology	Environment, Sustainability
5.	Paper-I	-	B.Sc. General (Botany General) (3-Tier System)	1st Year	Microbiology, Economic Botany	Environment
6.	Paper-II	-	B.Sc. General (Botany General) (3-Tier System)	2nd Year	Ecology, Ethnobotany	Environment
7.	Part IV	-	B.Sc. General (Botany General) (3-Tier System)	3rd Year	Medicinal Plants, Biofertilizer, Biodiversity	Environment, Sustainability
8.	Paper-Phycology & Microbiology	CC-1	B.Sc. Honours in Botany (CBCS)	1st Semester	Microbiology	Environment
9.	Paper-Mycology & Phytopathology	CC-3	B.Sc. Honours in Botany (CBCS)	2nd Semester	Symbiotic Association, Applied Mycology, Phytopathology	Environment
10.	Paper- Economic	CC-6	B.Sc. Honours in	3rd	Entire Paper	Environment,

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	Botany		Botany (CBCS)	Semester		Sustainability
11.	Paper- Plant Ecology & Phytogeography	CC-9	B.Sc. Honours in Botany (CBCS)	4th Semester	Entire Paper	Environment, Sustainability
12.	Paper-Plant Biotechnology	CC-14	B.Sc. Honours in Botany (CBCS	6th Semester	Entire Paper	Environment, Sustainability
13.	Paper-Natural Resource Management	DSE-1	B.Sc. Honours in Botany (CBCS)	5th Semester	Entire Paper	Environment, Sustainability
14.	Paper-Plant Breeding	DSE-2	B.Sc. Honours in Botany (CBCS	5th Semester	Entire Paper	Environment, Sustainability
15.	Paper- Industrial & Environmental Microbiology	DSE-3T	B.Sc. Honours in Botany (CBCS	6th Semester	Entire Paper	Environment, Sustainability
16.	Paper-Bioinformatics	DSE-3T	B.Sc. Honours in Botany (CBCS	6th Semester	Applications of Bioinformatics	Environment
17.	Paper-Biofertilizers	SEC-1	B.Sc. Honours in Botany (CBCS	3rd Semester	Entire Paper	Environment, Sustainability
18.	Paper- Floriculture	SEC-1	B.Sc. Honours in Botany (CBCS	3rd Semester	Entire Paper	Environment

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19.	Paper-Mushroom Culture Technology	SEC-2	B.Sc. Honours in Botany (CBCS	4th Semester	Entire Paper	Environment, Sustainability
20.	Paper-Biodiversity (Microbes, Algae, Fungi, Archegoniate	GE-1	B.Sc. Honours (Botany GE) (Interdisciplinary for other department) (CBCS)	1st Semester	Entire Paper	Environment
21.	Paper-Plant Ecology & Taxonomy	GE-1	B.Sc. Honours (Botany GE) (Interdisciplinary for other department)(CBCS)	2nd Semester	Entire Paper	Environment
22.	Paper-Economic Botany & Plant Biotechnology	GE-3	B.Sc. Honours (Botany GE) (Interdisciplinary for other department)(CBCS)	3rd Semester	Entire Paper	Environment, Sustainability
23.	Paper-Biodiversity (Microbes, Algae, Fungi, Archegoniate	DSC-1A (CC-1)	B.Sc. General (Botany General) (CBCS)	1st Semester	Entire Paper	Environment
24.	Plant Ecology & Taxonomy	DSC-1B (CC-1)	B.Sc. General (Botany General) (CBCS)	2nd Semester	Entire Paper	Environment
25.	Paper-Economic	DSE-1	B.Sc. General (Botany	5th	Entire Paper	Environment

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	Botany & Plant Biotechnology		General) (CBCS)	Semester		
26.	Paper- Bioinformatics	DSE-1	B.Sc. General (Botany General) (CBCS)	5th Semester	Applications of Bioinformatics	Environment
27.	Paper- Genetics & Plant Breeding	DSE-2	B.Sc. General (Botany General) (CBCS)	6th Semester	Plant Breeding, Crop Improvement	Environment, Sustainability
28.	Paper- Biofertilizers	SEC-1	B.Sc. General (Botany General) (CBCS)	3rd Semester	Entire Paper	Environment, Sustainability
29.	Paper- Nursery & Gardening	SEC-1	B.Sc. General (Botany General) (CBCS)	3rd Semester	Entire Paper	Environment, Sustainability
30.	Paper- Herbal Technology	SEC-2	B.Sc. General (Botany General) (CBCS)	4th Semester	Entire Paper	Environment, Sustainability
31.	Paper-Mushroom Culture Technology	SEC-2	B.Sc. General (Botany General) (CBCS)	4th Semester	Entire Paper	Environment, Sustainability
32.	Paper- Floriculture	SEC-3	B.Sc. General (Botany General) (CBCS)	5th Semester	Entire Paper	Environment
33.	Paper- Medicinal Botany	SEC-4	B.Sc. General (Botany General) (CBCS)	6th Semester	Entire Paper	Environment

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34.	Paper-Plant Diversity & Human Welfare	SEC-4	B.Sc. General (Botany General) (CBCS)	6th Semester	Entire Paper	Environment, Sustainability, Human Values
35.	Paper- Intellectual Property Rights	SEC-4	B.Sc. General (Botany General) (CBCS)	6th Semester	Entire Paper	Environment, Sustainability, Professional Ethics, Human Values
36.	Paper- II	-	B.Sc. Honours in Zoology (3-Tier System)	1st Year	Bio-systematics, Adaptation, Evolution	Environment
37.	Paper- III	-	B.Sc. Honours in Zoology (3-Tier System)	2nd Year	Entire Paper	Environment, Sustainability, Human Values
38.	Paper- IV	-	B.Sc. Honours in Zoology (3-Tier System)	2nd Year	Microbiology, Bioinformatics	Environment
39.	Paper- VI	-	B.Sc. Honours in Zoology (3-Tier System)	3rd Year	Biotechnology	Environment, Sustainability, Human Values, Professional Ethics
40.	Paper-I	-	B.Sc. General (Zoology General) (3-Tier System)	1st Year	Taxonomy, Evolution, Adaptation & Distribution, Ecology, Ethology, Wildlife	Environment, Sustainability, Professional Ethics, Human Values

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41.	Paper-Ecology	CC-2	B.Sc. Honours in Zoology (CBCS)	1st Semester	Entire	Environment
42.	Paper-Aquarium Fish Keeping	SEC-1	B.Sc. Honours in Zoology (CBCS)	3rd Semester	Entire	Environment
43.	Paper- Aquatic Biology	GE-3	B.Sc. Honours (Zoology GE) (Interdisciplinary for other department) (CBCS)	3rd Semester	Entire	Environment
44.	Paper- Environment & Public Health	GE-4	B.Sc. Honours (Zoology GE) (Interdisciplinary for other department) (CBCS)	4th Semester	Entire	Environment, Sustainability
45.	Paper- Animal Behaviour & Chronobiology	DSE-1	B.Sc. Honours in Zoology (CBCS)	5th Semester	Unit-1, unit-2, Unit-3	Environment
46.	Paper-Fish & Fisheries	DSE-1	B.Sc. Honours in Zoology (CBCS)	5th Semester	Entire	Environment, Sustainability
47.	Paper- Animal Biotechnology	DSE-2	B.Sc. Honours in Zoology (CBCS)	5th Semester	Unit-3, Unit-4	Environment

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48.	Paper- Microbiology	DSE-2	B.Sc. Honours in Zoology (CBCS)	5th Semester	Unit-1, Unit-4, Unit-6, Unit-9	Environment
49.	Paper- Evolutionary Biology	CC-14	B.Sc. Honours in Zoology (CBCS)	6th Semester	Unit-1, Unit-2, Unit-3, Unit-4	Environment
50.	Paper- Wildlife conservation & Management	DSE-4	B.Sc. Honours in Zoology (CBCS)	6th Semester	Entire	Environment, Human Values
51.	Paper- Genetics & Evolutionary Biology	DSC-1D	B.Sc. General (Zoology General) (CBCS)	4th Semester	Unit-6 to Unit-12	Environment
52.	Paper- Applied Zoology	DSE-1	B.Sc. General (Zoology General) (CBCS)	5th Semester	Entire	Environment, Sustainability
53.	Paper- Aquatic Biology	DSE-1	B.Sc. General (Zoology General) (CBCS)	5th Semester	Entire	Environment, Sustainability
54.	Paper- Animal Biotechnology	DSE-2	B.Sc. General (Zoology General) (CBCS)	6th Semester	Unit-3, Unit-4	Environment
55.	Paper-Aquarium Fish Keeping	SEC-1	B.Sc. General (Zoology General) (CBCS)	4th Semester	Entire	Environment
56.	Paper- II	-	B.Sc. Honours in	1st Year	Industrial Chemistry	Environment,

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			Chemistry (3-Tier System)			Sustainability
57.	Paper-VI	-	B.Sc. General (Chemistry General) (3-Tier System)	3rd Year	Instrumental Analysis	Environment, Sustainability
58.	Paper-Analytical Methods in Chemistry	DSE-1	B.Sc. General (Chemistry General) (CBCS)	5th Semester	Entire	Environment, Sustainability
59.	Paper- Green Chemistry	DSE-2	B.Sc. General (Chemistry General) (CBCS)	6th Semester	Entire	Environment, Sustainability, Human Values
60.	Paper- Industrial Chemicals & Environment	DSE-2	B.Sc. General (Chemistry General) (CBCS)	6th Semester	Entire	Environment, Sustainability, Human Values
61.	Paper- Intellectual Property Rights	SEC-2	B.Sc. General (Chemistry General) (CBCS)	4th Semester	Entire	Professional Ethics, Human Values
62.	Paper- Pesticide Chemistry	SEC-4	B.Sc. General (Chemistry General) (CBCS)	6th Semester	Entire	Environment
63.	Paper- Fuel Chemistry	SEC-4	B.Sc. General (Chemistry General) (CBCS)	6th Semester	Coal, Industry	Environment
64.	Paper-III	-	B.Sc. Honours in Physiology (3-Tier System)	Part II	Environmental Physiology	Environment, Sustainability, Human Values

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65.	Paper- IV A	-	B.Sc. General (Physiology General) (3-Tier System)	Part III	Environmental Physiology	Environment, Sustainability, Human Values
66.	Paper- Environmental Studies	-	B.A./B.Sc. Honours & General (3-Tier System)	Part -III	Entire	Environment, Sustainability, Professional Ethics, Human Values
67.	Paper- Environmental Studies	AECC-ENVS	B.A./B.Sc. Honours & General (CBCS)	2nd Semester	Entire	Environment, Sustainability, Professional Ethics, Human Values
68.	Paper- III	-	B.A. Honours in Philosophy (3-Tier System)	Part II	Group B- Unit II	Human Values, Professional Ethics
69.	Paper- VI	-	B.A. Honours in Philosophy (3-Tier System)	Part III	Entire	Professional Ethics, Human Values, Environment
70.	Paper-I	-	B.A. General (Philosophy General) (3-Tier System)	Part I	Indian Philosophy	Professional Ethics, Human Values
71.	Paper- II	-	B.A. General (Philosophy General) (3-Tier System)	Part II	Theoretical & Applied Ethics	Professional Ethics, Human Values
72.	Paper-Indian	CC-1	B.A. Honours in	1st	Entire	Professional Ethics,

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	Philosophy		Philosophy (CBCS)	Semester		Human Values
73.	Paper- Social & Political Philosophy	CC-6	B.A. Honours in Philosophy (CBCS)	3rd Semester	Entire	Human Values
74.	Paper- Philosophy of Religion	CC-7	B.A. Honours in Philosophy (CBCS)	3rd Semester	Entire	Human Values
75.	Paper- Ethics(Indian)	CC-12	B.A. Honours in Philosophy (CBCS)	5th Semester	Entire	Professional Ethics, Human Values
76.	Paper- Ethics (Western)	CC-14	B.A. Honours in Philosophy (CBCS)	6th Semester	Entire	Professional Ethics, Human Values
77.	Paper- Ethics (Applied Ethics)	DSE-2	B.A. Honours in Philosophy (CBCS)	5th Semester	Entire	Professional Ethics, Human Values
78.	Paper- Swami Vivekananda	DSE-4	B.A. Honours in Philosophy (CBCS)	6th Semester	Entire	Professional Ethics, Human Values
79.	Paper- Rabindranath Tagore	DSE-4	B.A. Honours in Philosophy (CBCS)	6th Semester	Entire	Professional Ethics, Human Values
80.	Paper- Sri Aurobindo	DSE-4	B.A. Honours in Philosophy (CBCS)	6th Semester	Entire	Professional Ethics, Human Values

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81.	Paper- M.K. Gandhi	DSE-4	B.A. Honours in Philosophy (CBCS)	6th Semester	Entire	Professional Ethics, Human Values
82.	Paper- Philosophy of Human Rights	SEC-1	B.A. Honours in Philosophy (CBCS)	3rd Semester	Entire	Human Values
83.	Paper- Value Education	SEC-2	B.A. Honours in Philosophy (CBCS)	4th Semester	Entire	Human Values
84.	Paper- Man & Environment	SEC-2	B.A. Honours in Philosophy (CBCS)	4th Semester	Entire	Environment, Human Values, Gender
85.	Paper- Ethics: Indian & Western	GE-1	B.A. Honours (Philosophy GE) (Interdisciplinary for other department) (CBCS)	1st Semester	Entire	Professional Ethics
86.	Paper- Environment Ethics	GE-4	B.A. Honours (Philosophy GE) (Interdisciplinary for other department) (CBCS)	4th Semester	Entire	Environment, Professional Ethics, Human Values
87.	Paper- Termination of Life & Ethics	GE-4	B.A. Honours (Philosophy GE) (Interdisciplinary for other department)	4th Semester	Entire	Professional Ethics, Human Values

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	Ethics & Philosophy of Religion		(Philosophy General) (CBCS)	Semester		Human Values
97.	Paper-Philosophy of Religion	GE-1	B.A. General (Philosophy General) (CBCS)	5th Semester	Entire	Human Values
98.	Paper-III	-	B.A. Honours in Philosophy (3-Tier System)	2nd Year	Unit II	Gender
99.	Paper-VI	-	B.A. Honours in Philosophy (3-Tier System)	3rd Year	Unit I	Gender
100.	Paper-Feminism	DSE-2	B.A. General (Philosophy General) (CBCS)	6th Semester	Entire	Gender
101.	Paper-Women's Writing	CC-12	B.A. Honours in English (CBCS)	5th Semester	Entire	Gender
102.	Paper-Contemporary India: Women & Empowerment	GE-3	B.A. Honours (English GE) (Interdisciplinary for other department) (CBCS)	3rd Semester	Entire	Gender, Environment
103.	Paper-Gender & Human Rights	GE-4	B.A. Honours (English GE) (Interdisciplinary for other department) (CBCS)	4th Semester	Entire	Gender, Human Values

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104.	Paper- Environment & Literature	GE-4	B.A. Honours (English GE) (Interdisciplinary for other department) (CBCS)	4th Semester	Entire	Gender, Environment
105.	Paper- Contemporary India: Women & Empowerment	DSC-1C	B.A. General (English General) (CBCS)	3rd Semester	Entire	Gender
106.	Paper- Gender & Human Rights	GE-1	B.A. General (English General) (CBCS)	5th Semester	Entire	Gender, Human Values
107.	Paper- Environment & Literature	GE-2	B.A. General (English General) (CBCS)	6th Semester	Entire	Gender, Environment
108.	Paper-II Government & Politics in India	-	B.A. Honours in Political Sciences (3-Tier System)	1st Year	Entire	Human Values, Environment, Gender
109.	Paper- V International Relations	-	B.A. Honours in Political Sciences (3-Tier System)	2nd Year	Unit-5	Human Values, Environment
110.	Paper- VI Society, State & Politics	-	B.A. Honours in Political Sciences (3-Tier System)	2nd Year	Group A	Gender, Human Values
111.	Paper-VII Public Administration		B.A. Honours in Political Sciences (3-Tier System)	3rd Year	Entire	Professional Ethics, Human Values

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112.	Paper-VIII Colonialism & Nationalism in India	-	B.A. Honours in Political Sciences (3-Tier System)	3rd year	Group B	Gender, Human Values
113.	Paper- I Political Theory	-	B.A. General (Political Science General) (3-Tier System)	1st Year	Entire	Human Values
114.	Paper- III Indian Government	-	B.A. General (Political science General) (3-Tier System)	2nd year	Unit-1,2, 3,4,13	Human Values
115.	Paper-IV Contemporary India: Political & Administrative Issues	-	B.A. General (Political science General) (3-Tier System)	3rd Year	Entire	Professional Ethics, Human Values, Environment & Sustainability
116.	Paper- Understanding Political Theory	CC-1	B.A. Honours in Political Science (CBCS)	1st Semester	Unit-4	Gender
117.	Paper- Political Theory -Concepts & Debates	CC-3	B.A. Honours in Political Science (CBCS)	2nd Semester	Entire	Human Values
118.	Paper-Political Process in India	CC-4	B.A. Honours in Political Science (CBCS)	2nd Semester	Unit-6	Gender
119.	Paper- Women, Power & Politics	DSE-3	B.A. Honours in Political Science	6th Semeste	Entire	Gender

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			(CBCS)	r		
120.	Paper- Human Rights in a Comparative Perspective	DSE-4	B.A. Honours in Political Science (CBCS)	6th Semester	Entire	Gender, Human Values
121.	Paper- Democratic Awareness with Legal Literacy	SEC-1	B.A. Honours in Political Science (CBCS)	3rd Semester	Entire	Professional Ethics, human Values,Gender

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VIDYASAGAR UNIVERSITY

BOTANY

(Honours)

Under Graduate Syllabus

(3 Tier Examination Pattern)

w.e.f. 2014-2015

REVISED

Vidyasagar University

Midnapore 721 102

West Bengal

Vidyasagar University

Botany

B.Sc. (Honours)

Part-I

Paper – I (Theoretical)	F.M..: 100 (90 + 10)*
Paper – II (Theoretical)	F.M..: 100 (90 + 10)*

Part – II

Paper – III (Theoretical)	F.M. : 100 (90 + 10)*
Paper – IV (Theoretical)	F.M. : 100 (90 + 10)*
Paper – V (Practical)	F.M. : 100

Part – III

Paper – VI (Theoretical)	F.M. : 100 (90 + 10)*
Paper – VII (Practical)	F.M. : 100
Paper – VIII (Practical)	F.M. : 100

* External Assessment (University level) – 90 marks
Internal Assessment (College level) – 10 marks.

Paper wise Distribution of Subject Contents

PART – I

PAPER – I (Theory)

Section – I

Microbiology

Section – II

Phycology

Section – III

Mycology and Plant Pathology

Section – IV

Morphology

PAPER – II (Theory)

Section – I

Bryology and Pteridology

Section – II

Gymnosperm, Paleobotany

Section III

Palynology, Embryology

PART – II

Paper- III (Theory)

Section – I

Taxonomy of Angiosperms

Section – II

Ecology, Economic Botany, Ethnobotany, Floriculture

Section – III

Pharmacognosy, Phytogeography

Paper IV (Theory)

Section I

Plant Physiology, Biochemistry

Section II

Applied Botany

Section III

Anatomy

PAPER – V (Practical)

Microbiology (10)

Algae (10)

Fungi (10)

Pathology (5)

Bryophyte (10)

Pteridophyte (10)

Morphology (12)

Submission of specimen (5)

Identification of slides (6)

Practical Note Book (7)

Tour report (3)

Slide submission (2)

Viva 10

PART III

Paper VI (Theory)

Section I

Cell Biology and Molecular Biology

Section II

Genetics

Section III

Biotechnology and Bioinformatics

Section IV
Plant Breeding and Biometry

Paper- VII (Practical)
Taxonomy (18)
Pharmacognosy (7)
Anatomy (20)
Ecology (10)
Identification (15)
Submission (6)
Lab Note Book (10)
Field report (4)
Viva voce (10)

Paper VIII (Practical)
Plant Physiology (20)
Biochemistry (10)
Biometry (8)
Cytology (15)
Plant Breeding (6)
Dissertation (15)
Identification of cytological slides (6)
Laboratory Note Book (10)
Viva voce (10)

Detailed Syllabus

Part I

Paper I (Theory)

Section – I
Microbiology
Section – II
Phycology
Section – III
Mycology and Plant Pathology
Section – IV
Morphology

Section – I
MICROBIOLOGY:

Origin of life, History, Definition and Distribution of microorganisms, Scope and importance of their study, Classification of microorganisms - Idea about prokaryotic and eukaryotic microorganisms including five and three kingdom concepts.

i) Virus: Nature of viruses, Types (Plant, Animal and Bacteriophage), Structure of T4 and TMV, Lytic and Lysogenic cycle with reference to T4 and Lambda phage. Interferon, Structure of AIDS causing virus-HIV.

ii) Bacteria: Systematic position, Characters need for identification, Types (on the basis of cell shape), Ultrastructure (Flagella, Pilli, Endospore, Capsule and Slime Layer, Cell Wall of Gram Positive and Gram Negative Bacteria), Cell membrane (structure and function in brief), Concept of genome and plasmid, Special organelles (Mesosome, Magenetosome) and reserve materials, Bacterial growth-definition, growth curve, Generation time, Cultural condition - physical (temperature, pH), Nutritional requirements, Recombination-transformation *(Streptococcus pneumonae),* transduction (generalised), conjugation (F and Hfr mediated), Idea of soil

microorganisms, Role of microbes in biogeochemical cycle (Nitrogen cycle). Actinomycetes, Archaebacteria, Myxomycetes (Diagnostic features only).

Section – II

ALGAE:

A general account: Habit and habitat, thallus organization, mode of reproduction, origin and evolution of sex in algae. Criteria of classification, Classification of algae Lee (1989) with class characters. Life cycle patterns in algae.

Cyanophyta - Salient features and chromatic adaptation, Bacterial features of Cyanophyta, Ultrastructure of cell including heterocyst and its role in nitrogen fixation.

Types - *Anabaena.*

Chlorophyta - Salient features.

Types - *Chlamydomonas, Oedogonium, Chara.*

Bacillariophyta - Salient features, vegetative structure, reproduction of centric and pinnate diatoms.

Xanthophyta - Salient features.

Type - *Vaucheria.*

Phaeophyta - Salient features

Types - *Ectocarpus, Laminaria*

Rhodophyta - Salient features

Type - *Polysiphonia*

LICHEN:

Definition & types, Reproduction, Economic and Ecological importance.

Section – III

FUNGI:

General Characters - Habit and habitat. Hyphal forms, Nutrition, Reproduction, Classification (Ainsworth-1973) upto subdivisions with characters and examples. Evolution of sex in fungi. Life Histories – Phycomycotina, Types - *Synchytrium, Rhizopus;* Ascomycotina, Types - *Penicillium, Ascobolus, Claviceps;* Basidiomycotina
Types - *Agaricus, Polyporus;* Deuteromycotina - A general account Types - *Alternaria.*

PLANT PATHOLOGY:

Classification of plant diseases. Terms and definitions: Causal complex, primary and secondary inocula, disease cycle, pathogenecity, susceptibility, resistance and immunity, sign and symptom, necrosis, hyperplasia and hypoplasia, disease syndrome, Koch's postulates, quarantine.

Host - parasite interaction: mechanism of infection, role of enzymes and toxins in pathogenesis, defence mechanism, with special emphasis on phytoalexins.

Physical, chemical and Biological Control of plant diseases.

Knowledge of the following diseases: symptoms, causal organism, etiology of pathogen, disease cycle & control measure of (i) Late Blight of potato, (ii) Tungro Virus disease of rice, (iii) Black stem rust of wheat, (iv) Tikka disease of ground nut, (v) Blight of betel.

Section - IV

MORPHOLOGY

a. **Inflorescence:** Types and evolution.
b. **Flowers:** Types, corolla aestivation, cohesion and adhesion of stamens, different types of ovule, placentation - types and evolution, floral formula and floral diagram.

c. **Pollination:** Types and contrivances.
d. **Fruits:** Types and dispersal.

PAPER – II (Theory)

Section – I
Bryology and Pteridology
Section – II
Gymnosperm, Paleobotany,
Section – III
Palynology and Embryology

Section - I

BRYOLOGY

1. Classification of Bryophytes (Proskauer, 1957) upto class characters. Mistchler, 1994- outline only.
2. Origin of Bryophytes with reference to different theories.
3. Life history (including Gametophytic structure, Reproduction, Development and structure of sporophyte, Spore dispersal) of *Riccia, Marehantia, Anthoceros, Sphagnum* and *Funaria.*
4. Phylogenetic relationship and evolutionary tendencies in Bryophytes (among the studied genera).
5. Ecological and economic importance of Bryophytes with reference to soil erosion, pollution monitoring and control, geo-botanical prospecting, animal feed, horticulture and antibiotics.

PTERIODOLOGY

1. Origin and Classification of Pteridophytes (Sporne, 1975) with class characters and example, Telome concept.
2. Life history (including Sporophytic nature, Reproduction and structure of gametophyte) of *Psilotum, Lycopodium, Selaginella, Equisetum, Marsilea.* Characteristic features and geographic

distribution and evolutionary significance of *Rhynia, Lepidodendron, Lepidoearpon, Calamities.*

3. Progymnosperm- diagonostic features and significance.
4. Heterospory and attainment of seed habit in Pteridophytes.
5. Economic importance (food, medicine and agriculture) of Pteridophytes.

Section - II

GYMNOSPERM

1. Classification of Gymnosperm (Stewart and Rothwel, 1993) with class characters and example.
2. Establishment of heterospory and seed habit.
3. General characters of the order and structural features of *Cycadofilicales (Lygenopteris), Glossopteridales (Glossopteris)* and *Benettitales (Williamsonia sewardiana)*.
4. Life history of *Cycas, Pinus, Ginkgo* and *Gnetum.*
5. Economic importance of Gymnosperms with reference to wood, resin, essential oil and drugs..

PALAEOBOTANY

1. Definition, process of fossilisation, fossil types- trace fossil, chemical fossil, Petrifaction and Compression.
2. Index fossil. Radio Carbon dating. Nomenclature, Economical and ecological importance.
3. Geological time scale and major events of plant life through geological time, Dominant plant groups through ages.

Section III

PALYNOLOGY

1. Definition of Palynology, different branches of Palynology, importance of study.

2. Spores, Pollen morphology with special reference to polarity, size, shape, symmetry, aperture and sculpture. NPC classification.

EMBRYOLOGY

1. Development of male and female gametophyte of Angiosperms.
2. Development and structure of endosperm - nuclear, hellobial and cellular types.
3. Development of a typical dicot embryo and Monocot embryo.

Part II

Paper- III (Theory)

Section – I

Taxonomy of Angiosperms

Section – II

Ecology, Economic Botany, Ethnobotany, Floriculture

Section – III

Pharmacognosy, Phytogeography

Section - I

TAXONOMY OF ANGIOSPERMS

a) Taxonomy and Systematics, aims and objectives, phases of Taxonomy.

b) The concept of primitive and advanced characters, Monophyly and Polyphyly, Parallelism and Convergence, ideas about Alpha & Beta taxonomy, units of classification and taxonomic keys (indented and bracketed).

c) Botanical Nomenclature:
Elementary Knowledge of ICBN (ICN)
Principles, the type methods, rules of Priority, effective and valid publications, citation of author's name, rejection of names.

d) Major systems of Plant classification like Betham and Hooker, Arthur Cronquist (1988), Idea of APG I, II, III (2009).

e) Herbarium: Collection of specimens, preparation, preservation and maintenance of herbarium. Important herbaria in India; roles of herbarium; Botanic gardens: Roles and some important gardens in India. Digital Herbarium.

f) Modern evidences in Taxonomy: Anatomy, Cytology, Palynology, Chemotaxonomy, and Numerical taxonomy (Definition, purpose and use only).

g) Diagnostic features and systematic position (Bentham & Hooker, Cronquist) including all economic plants of

Dicot :- Magnoliaceae, Nymphaeaceae, Brassicaceae, Malvaceae, Fabaceae (ss), Caesalpiniaceae, Mimosaceae, Rutaceae, Anacardiaceae, Euphorbiaceae, Apiaceae, Asclepiadaceae, Apocynaceae, Solanaceae, Verbenaceae, Lamiaceae, Scrophulariaceae, Acanthaceae, Rubiaceae, Cucurbitaceae, Asteraceae.

Monocot: Alismataceae, Liliaceae, Zingiberaceae, Arecaceae, Poaceae, Cyperaceae, Orchidaceae.

h) Origin of Angiosperm: Basic idea.

Section II

ECOLOGY, PLANT GEOGRAPHY, BIODIVERSITY.

1. Modern Concepts of Ecology: Shallow and Deep Ecology (Basic ideas only).
2. Ecological factors: their impact on plant life, Different types of plant adaptations (Mesophyte, Xerophyte, Halophyte, Hydrophyte).
3. Concepts of Ecosystem, Ecotone, Edge effect.
4. Concepts of population and its characteristics, Ecological niche and habitat, principle of competitive exclusion, r-and K-strategies.
5. Biogeochemical cycles: Basic ideas of different biogeochemical cycles and their importance (C, N, S, P only).
6. Community Ecology: History and definition, Characteristics of community, community composition, methods of study of the community structure.
7. Pollution: Air, water and soil, effects of pollutants on organisms.
8. An elementary knowledge of Green House effect and Global Warming, Acid precipitation, Ozone depletion.

9. Deforestation-its causes and consequences, Chipko movement, Joint Forest Management.
10. Concept of Social Forestry.
11. Biomonitoring: the state of environmental pollution.
12. Natural Resources and Waste Management (including phytoremediation), Reclamation of wasteland.
13. Basic ideas of Ecotoxicology, Environmental Impact Assessment (EIA) and Biopesticides.
14. Biodiversity: Definition, importance, degeneration and conservation.

ECONOMIC BOTANY

1. Classification of economically important plants based on uses.
2. Scientific names, family and morphological nature of plant parts used, purpose of use of the following.

i)	Cereals & Millets	:	Rice, Maize, Wheat
ii)	Pulses	:	Soyabean, Mung, Lentil.
iii)	Oils & Fats	:	Sunflower, Mustard, Cocoanut, Ground nut.
iv)	Fibres	:	Cotton, Jute, Coir (Cocoanut).
v)	Timber	:	Teak, Sal, Gumhar.
vi)	Latex	:	Rubber, Purging nut (Jatropha).
vii)	Aromatic/ Volatile Oil	:	Lemon grass, Eucalyptus, Clove oil.
viii)	Beverage	:	Tea, Coffee.
ix)	Spices	:	Turmeric, Ginger, Cumin, Coriander.

x)	Medicinal Plants	:	Serpentine root *(Rauvolfia),* Creat *(Andrographis)* Ipecac, Aljun, Yew *(Taxus),* Red periwinkle *(Catharanthus),* Margosa.
xi)	Narcotics	:	Ganja, Opium.
xii)	Fruits	:	Jackfruit, Banana, Litchi, Orange. :
xiii)	Vegetables	:	Potato, Pumpkin, Cauliflower, Lady's finger.
xiv)	Methods of cultivation, yield and uses of	:	Rice, Tea, Cashew nut.

xv) Method of cultivation of Lemon grass and oil extraction method. Methods of cultivation, propagation and trading of Rose, Tuberose, Marigold, *Chrysanthemum* in India.

ETHNOBOTANY

1. Ethnobotany: Definition, scope and relevance.
2. Study of plants used by the different tribes in one or more of the following aspects - as food, clothing, shelter, medicine, beverages and agricultural implements.

Section III

PHARMACOGNOSY

i. Phannacognosy: Definition, Importance, Classification of drug - Chemical and Phannacological, Drug evaluation.

ii. Organoleptic and microscopic studies with reference to nature of active principles and common adulterants of *Alstonia (bark), Adhatoda (leaf), Strychnos (seed), Rauvolfia (root),* and *Zinziber (rhizome).*

iii. Secondary Metabolites: Definition of primary and secondary metabolites and their differences, major types - terpenes, phenolics and alkaloids.
iv. A brief idea about extraction of alkaloids.

PHYTOGEOGRAPHY

1. Definition, its relation to other branches of science, importance of study, phytogeographical regions of India according to D. Chatterjee.
2. Biogeographical Provinces of World, Forest types of India (major types of Champion & Seth's revised classification).
3. A brief idea about GIS (Geographical Information System) in vegetational study.
4. Endemism in India, Study of the vegetation of the following types (a) Eastern Himalayas (b) Gangetic plain and (c) Sundarbans.

Paper IV (Theory)

Section I
Plant Physiology, Biochemistry
Section II
Applied Botany
Section III
Anatomy

Section-I:

PLANT PHYSIOLOGY

1. **Plant water relation:** Role of water in plant life, water potential in plant system, unique physico-chemical properties of water, imbibition, diffusion, osmosis, plasmolysis, osmotic relation ofa plant, types of water in soil and their availability to the plants, soil-plant-atmospherecontinuum (SPAC) concept; Stomatal regulation

of transpiration, role of CO_2 potassium ion, ABA and blue light on stomatal movement, antitranspiratns.

2. **Mineral nutrition:** Essential elements and criteria of essentiality, physiological roles of mineral elements, mechanism of ion uptake.
3. **Organic translocation:** Phloem loading and unloading mechanism, mass flow and pressure flow hypotheses.
4. **Plant pigments:** Chlorophylls, Carotenes, Xanthophylls, Biliprotein anthocyanin; Phytochrome-elementary nature and properties.
5. **Photosynthesis:** Definition, basic concept about the mechanism of light and dark reaction, photosynthetic reaction centre, concept of photosynthesis, regeneration of RuBP in dark phase, comparison between C_3, C_4 and CAM cycles; Bacterial photosynthesis; Photorespiration - organelles involved, mechanism.
6. **Respiration:** Types, Mechanism of aerobic and anaerobic respiration, electron transport, oxidative phosphorylation; Pentose Phosphate pathway and its significance. RQ and its significance. Cyanide resistant respiration.
7. **Nitrogen fixation:** Types of nitrogen fixers, methods of nodulation, biochemistry of nitrogen fixation, (inclusive of concept of nitrogenase, leg haemoglobin, nitrate reductase) elementary idea of 'nif' and 'nod' genes, nitrate assimilation.
8. **Protein synthesis:** Transcription and Translation.
9. **Plant growth regulators:** Classification, natural and synthetic plant growth regulators with examples, chemical nature and physiological roles of Auxins, Gibberellins, Cytokinins, Ethylene and Abscisic acid, mode of action of IAA, application of plant growth regulators in Agrihoritculture.
10. **Seed Physiology:** Definition of dormancy, quiescence and germination; types, causes and significance of dormancy, methods of breaking seed dormancy, phases of seed germination.

11. **Flowering physiology:** Photoperiodism, concept of CDL, classification of plants on the basis of photoperiodic response Phytochrome-chemical nature, role, concept of biological clock and biorhythm.
12. **Vernalization:** Basic concept.
13. **Stress Physiology**: Elementary idea of water, temperature and salinity stress.

BIOCHEMISTRY

1. Bioenergetics: Concepts of free energy, Structure and properties of water.
2. Forces stabilizing atomic and molecular interactions: Formation, properties and biological significance of Van der Walls force, hydrogen bond, ionic bond, covalent bond and hydrophobic interaction, free radicals.
3. pH and buffer: derivation of upper and lower limits of pH; biological significance of pH, Characteristics of buffer, principal buffers of extracellular and intracellular fluids and their function.
4. Oxidation – reduction reaction.
5. Carbohydrate chemistry: Classification and properties of carbohydrates with emphasis on stereoisomerism, optical isomerism, epimerization, mutarotation and reducing action of sugars.
6. Protein chemistry: Classification of proteins, primary, secondary, tertiary and quaternary structure of proteins; Properties of proteins with emphasis on isoelectric pH, biuret test and heat coagulation.
7. Lipid chemistry: Classification and properties of lipids, hydrogenation and rancidity of fats. Fatty acid synthesis, oxidation of fats, alpha and beta oxidation pathways. PUFA and MUFA.

8. Nucleic acid chemistry: Elementary concept of nucleoside, nucleotide, polynucleotide, elementary concept of RNA, chemical properties of DNA.
9. Enzyme: Definition of Apoenzyme Cofactors, Isoenzyme and Prosthetic groups with examples, enzyme classification, mechanism of enzyme action.

Section - II
APPLIED BOTANY
Applied Microbiology & Immunology

I. Source, function and uses of enzymes (amylase, protease, cellulase).
II. General idea and importance of antibiotics (Penicillin. streptomycin, tetracycline, chloramphenicol).
III. Microbiological basis of potable water, detection of water contamination, presumptive, confirmative and completed test.
IV. Harmful Bacteria (spoilage of milk, food).
V. Preservation of milk and food product. Phosphatase test.
VI. Microorganisms in industry (curd, tofu, beer production).
VII. Immunology in Diagnostic methods, Vaccine.

Applied Algology :
I. Algae as food, pharmaceutical.
II. Harmful algae - toxic Cyanophytes, preliminary idea about algal bloom.
III. Role of algae in soil reclamation.

Applied Mycology and plant pathology
I. Mycorrhizae : Types, distribution and their beneficial role in Forestry and Agriculture.

II. Modern approaches to plant disease management, including concept of integrated pest management.
III. Mushroom cultivation and its food value.

Forensic Botany: An idea

Plants used in industry: Importance and applications of *Stevia rebaudiana* (sweetener), *Panax ginseng* (vitalizer), *Chlorophytum borivilianum* (aphrodisiac), *Cryptomeria japonica* (packaging), *Shorea robusta* (leaf plate).

Section - III

ANATOMY

a. Plant cell wall: Gross structure and ultra structure, chemical composition and function.
b. Organisation of shoot and root apex and theories.
c. Mechanical tissue system and its distribution.
d. Stomatal types and ontogeny.
e. Stelar types and evolution, nodal positions.
f. Root - stem transition and its significance.
g. Secondary growth in stem and root (Normal).
h. Anomalous Secondary growth in Stem: *Bignonia, Tecoma, Boerhavia, Strychnos,* and *Dracaena and in root of Tinospora*
i. Wood anatomy of *Tectona, Mangifera,* and *Azadirachta.*

PAPER – V (Practical)

Microbiology (10), Algae (10), Fungi (10), Pathology (5), Bryophyte (10), Pteridophyte (10), Morphology (12), Submission of specimen (5), Identification of slides (6), Practical Note Book (7), Tour report (3), Slide submission (2), Viva voce (10)

1. MICROBIOLOGY **10**

i. Bacteria - Gram staining/ Capsule Staining.
ii. Ennumeration of soil bacteria by dilution plate method.

2. ALGAE **10**

Work out, Camera lucida drawing (with magnification), description and identification of the following genera:
Anabaena, Oedogonium, Chara, Vaucheria, Ectocarpus & *Polysiphonia.*

3. FUNGI **10**

Dissection, mounting, drawing, measurement of reproductive structures, description and identification of the following genera (i) *Rhizopus,* (ii) *Penicillium,* (iii) *Ascobolus,* (iv) *Agaricus.*

4. PLANT PATHOLOGY* **5**

i. Identification of causal organism by cutting section of diseased plant parts - Black stem rust of wheat (uredospore, teleutospore); Brown spot of rice; Tikka disease of ground nut.
ii. Pahological techniques: Demonstration on: Preparation of media (PDS) -Slant, Stab, Petri plates, Sterilization by Autoclave and Hot air oven; Inoculation of culture media.

* Question may be set from part I (A/ B) or part II.

5. BRYOPHYTES **10**

Dissection, mounting, drawing, description and identification of the following genera.
Riccia, Marchantia, Anthoceros, Funaria.

6. PTERIDOPHYTES **10**

Dissection, mounting, drawing, description and identification of the following genera: i) *Lycopodium,* (ii) *Selaginella,* (iii) *Equisetum,* (iv) *Marsilea.*

7. MORPHOLOGY **12**

a. Morphological Studies of the following specimens: *Nymphaea* flower, *Hypanthodium* inflorescence, *Calotropis* flower, *Capitulum* inflorescence *(Tridax* sp. and *Eupatorium* sp.), *Canna* flower; *Oryza* Spikelet.
b. Comment with reasons on the types of inflorescence, modification of leaves, types of stipules, types of cohesion and adhesion of stamens and carpels, types of fruits.

8. SUBMISSION of preserved or dry specimen. **5**

9. IDENTIFICATION: **6**

Microscopic and macroscopic specimen (Algae, Fungi, Bryophyta, Pteridophyta).

Algae: *Anabaena, Oedogonium, Chara, Vaucheria, Ectocarpus, Polysiphonia.*

Fungi: *Rhizopus, Penicillium, Ascobolus, Agaricus, Polyporus.* Bryophyta: *Riccia, Marchantia, Anthoceros, Funaria.* Pteridophyta: *Lycopodium, Selaginella, Equisetum, Marsilea, Pteris..*

10. PRACTICAL NOTE BOOKS (not exeeding three). **7**

i) Microbiology, Algae.
ii) Fungi, Plant Pathology.
iii) Morphology, Anatomy.

11. **TOUR REPORT + SLIDE** **3+2= 05**

12. **VIVA-VOCE** **10**

Part III

Paper VI (Theory)

Section I

Cell Biology and Molecular Biology

Section II

Genetics and Bioinformatics

Section III

Biotechnology

Section IV

Plant Breeding and Biometry

Section - I

CELL BIOLOGY

1. Brief introduction of Microscopy: Light, Phase contrast, Fluorescence and Electron microscope - working principles.
2. Structure and functions of cell membrane, cytoskeleton and cell organelles: Chloroplast, Mitochondria, Ribosomes, Endoplasmic reticulum.
3. Cell cycle: phases and a brief account of the control mechanism; the concept of MPF, its chemical nature and the regulatory points with reference to Yeast.
4. Fundamental differences between mitosis and meiosis. Synaptonemal complex, mitotic spindle, significance of meiosis.
5. Nuclear membrane and Nucleolus: Structure and functions (brief account).
6. Chromosome: General features, chromatin, nucleosome structure, higher order structure of chromatin (upto 30nm fiber), euchromatin and heterochromatin; Structure and significance of polytene and salivary gland chromosomes; brief knowledge of chromosome

banding (only definitions of C-, G-and Q-bands) and its applications.

MOLECULAR BIOLOGY

1. DNA: Structure and different forms.
2. DNA replication: proof of semiconservative replication (Experiment of Meselson and Stahl), mechanism of replication (only prokaryotic with a schematic approach).
3. RNA: structure, types (m-RNA, t-RNA, r- RNA), functions.
4. DNA sequencing (Sanger's method)

Section II

GENETICS:

1. Mendelism, Sum rule and product rule; Chromosomal basis of inheritance.
2. Gene interaction and deviation of Mendelism; incomplete dominance, codominance, dominant epistasis (12:3:1**),** supplementary gene action (9:3:4), polygenic action (9:6:1), complementary gene action (9:7), inhibitory gene action (13:3), duplicate gene action (15:1).
3. Definition and examples of multiple alleles and polygenic control.
4. Linkage: types of linkage, linkage group, linkage map (three point cross), interference and coincidence.
5. Crossing over: cytological proof of crossing over in maize (McClintock's expt.), molecular basis of recombination (Holliday model).
6. The concept of gene: classical to modem, one gene-one polypeptide concept, the complementation test, cistron, recon and muton. Split gene,
7. Transposable elements (IS elements - structure), significance of transposable elements.

8. Genetic code: triplet code, experiments. leading to the deciphering of the genetic code, properties of genetic code.
9. Mutation: gene mutation, definition, types (spontaneous, induced, somatic, germinal, missense, nonsense, transition, transversion, frameshit), mutation- a random nonadaptive process (Replica plating technique of Josuha Lederberg); physical and chemical mutagens, effects of chemical mutagens (5-Bromouracil, Nitrous acid), detection of sex-linked lethal mutation (CIB method). Practical applications of mutation.
10. Structural alteration of chromosomes: deletion, duplication, inversion and translocation.
11. Polyploidy: Autopolyploids, allopolyploids, segmental allopolyploids - definitions and examples, cytology of autopolyploids. Aneuploidy - different types and examples (including humans); induction of polyploidy, practical applications of polyploidy and its significance in evolution.
12. Gene regulation: Operon concept *(lac* operon).

BIOINFORMATICS:

1. Bioinformatics: definition and scope.
2. Genomics and proteomics : Basic idea.
3. Sequence alignment.

Section - III
BIOTECHNOLOGY

1. Genetic engineering: Recombinant DNA and gene cloning - elementary knowledge of restriction endonucleases, DNA ligase, host cell types, types of cloning vectors, major characteristic features of plasmid vector PBR322, genomic library and c-DNA library - basic idea and purpose.

2. Ti-plasmid : Structure and its role in plant genetic engineering. Transgenic plants - basic concept with some examples.
3. Biofertilizers: brief account of different types *(Rhizobium,* BGA, *Azolla*), their production and importance.
4. Applications of recombinant DNA technology in agriculture and human welfare (An overview).
5. Definitions: Axenic culture, Cellular totipotency, explants, callus, recalcitrance, embryoids, synthetic seeds, organogenesis, germplasam, cryopreservation. Tissue culture media - a general idea, different components and their functions (with reference to White's and MS medium).
6. Types of culture: definitions and preliminary ideas (excluding methodology) - Organ culture, cell culture, callus culture, micropropagation, anther culture. Embryo culture techniques and its importance. Elementary knowledge of protoplast culture and its importance.

Section - IV

PLANT BREEDING AND BIOMETRY

1. Aims and methods of plant breeding: a broad outline, different methods for autogamous and allogamous species with special reference to mass selection, clonal selection, and pure line selection.
2. Methods of propagation: Vegetative - cutting, grafting, layering. Definition and examples of apomixis, apogamy, apospory, haploid and diploid parthenogenesis.
3. Hybridization: definition, types, an outline procedure, application and objectives.
4. Inbreeding depression: effects of inbreeding. Heterosis - manifestations of heterosis, genetical and physiological basis, commercial applications of heterosis.

5. Ideotype concept: types, characteristics of a crop ideotype (Rice and sunflower).
6. Introduction to Biostatistics: Variable and attribute: Population Vs Sample, Census vs. sample survey, Arrangement of data, Frequency distribution.
7. Graphical presentation of data: Line diagram, Bar diagram, Pie chart, Histogram.
8. Biometrical techniques in plant breeding and their utilities: preliminary knowledge of sampling, mean, mode, median, coefficient of variation, standard deviation, standard error.

Testing of hypothesis and goodness of fit: Null hypothesis, level of significance, Normal distribution, probability, additive and multiplicative rules, Student's t-test, Chi-square test. Correlation: basic concept.

Paper- VII (Practical)

Taxonomy (18), Pharmacognosy (7), Ecology (10), Anatomy (20)
Identification (15), Submission (6)
Lab Note Book (10), Field report (4), Viva voce (10)

TAXONOMY **18**

a) Taxonomic study of locally available plants of the following families including floral formula, floral diagram and their identification upto genus by published Standard Keys (e.g. Bengal Plants by D. Prain, Flora of Bihar and Orissa by Haines etc.)

Malvaceae, Fabaceae (ss), Euphorhiaceae, Apocynaceae, Acanthaceae, Solanaceae, Scrophulariaceae, Lamiaceae, Verbenaceae, Rubiaceae, and *Poaceae.*

PHARMACOGNOSY **7**

a) Organoleptic and powder microscopy of *Alstonia* bark, *Adhatoda* leaf, *Strychnos* seed and *Zinziber* rhizome.

b) Chemical tests for Tannin *(Terminalia chebula)* and Alkaloid *(Catharanthus roseus)*.

5. Spot identification of angiospermic plants, included under the theoretical syllabus, up to species (mentioning the names of family, genus, species).

ANATOMY **20**

a) Study of internal structure of the following plants (with double stained method):

Stems of *Cucurbita, Dracaena, Bignonia, Boerhaavia,* and *Tecoma;* Leaves of *Bambusa* and *Nerium* and roots of *Vanda* and *Tinospora.*

b) WOOD ANATOMY

Study of anatomical sections (T.S., R.L.S. and T.L.S.) of the wood of the following species *Tectona, Mangifera,* and *Azadirachta.*

ECOLOGY **15**

1. Determination of minimum size and number of the quadrat.
2. Determination of Density, Abundance and Frequency of a herbaceous community.
3. Determination of organic carbon content of soil sample.
4. Comparative study of ecologically significant anatomy in plants: Aquatic (*Eichhornia crassipes* root, *Ipomoea carnea* stem); Xerophytic (*Peperomia pellucida* leaf, *Bambusa* sp. leaf).

IDENTIFICATION: **15**

Microscopic and macroscopic specimen (Gymnosperm including Palaeobotany).

Gymnosperm: *Cycas* - Male cone and microsporophyll, megasporophyll, T.S. of leaflet, *Pinus* - T.S. needle, male cone, female cone, stem (T.S., T.L.S. & R.L.S.)
Gnetum - L.S. of ovule.
Fossil Slides: Palaeobotany
Lyginopteris T.S., *Vertebraria* sp., *Ptilophyllum* sp., *Calamites* stem T.S., *Lepidocarpon.*
Palynology: two pollen types (*Hibiscus* and *Tridex*).

SUBMISSION of herbarium specimens,	**6**
Laboratory note books	**10**
Field records including tour diary and slides.	**4**
Viva-voce	**10**

Note: (i) For submission of herbarium specimens the students are to submit 20 properly identified angiospermic plants of locally abundant species belonging to different families as mentioned in the Syllabus.

Field excursions: At least two field excursions on seasonal basis are to be attended by the students of which one excursion should be arranged to different agro climatic zones including A.J.C. Bose National Botanic Garden (B.S.I)., Shibpur, Howrah. Records of field observation certified by the teachers of the respective college, should be submitted during examination.

Paper VIII (Practical)

Plant Physiology (20)
Biochemistry (10)
Biometry (8)
Cytology (15)
Plant Breeding (6)
Seminar (15)

Identification of cytological slides (6)
Laboratory Note Book (10)
Viva voce (10)

PLANT PHYSIOLOGY (Major) 15

1. Determination of DPD with the help of storage tissue.
2. Transpiration pull of twigs of mesophytic and xerophytic plants.
3. Determination of stomatal frequency and loss of water per stomata per hour.
4. Determination of the effects of CO_2 concentration on the rate of photosynthesis in aquatic plant.
5. Determination of the effect of respiratory inhibitors (Na-Fluride/ Malonic acid) on the "rate of respiration.
6. Determination of percentage of seed viability using TTC method.
7. Determination of the effect of KNO_3 on stomatal opening and closing.
8. Comparison of imbibition of water by starchy, proteinaceous and fatty seeds.

PLANT PHYSIOLOGY (Minor) 05

1. Determination of thermal death point of protoplasm.
2. Plasmolysis (using leaf tissue)
3. Experiment to prove that xylem is the path of conduction of water (anatomical demonstration using transparent plant like *Peperomia* sp.)
4. Determination of pH of soil samples with the help of pH meter.

BIOCHEMISTRY 10

1. Qualitative tests for carbohydrates - reducing and non-reducing sugars, glucose, fructose, sucrose and starch.
2. Qualitative tests for detection of proteins and amino acids.
3. Qualitative tests for citric, tartaric, oxalic and malic acids.
4. Estimation of glucose by Benedicts quantitative reagent.

5. Estimation of protein by Lowry/ Bradford method.

BIOMETRY **08**

1. Determination of goodness of fit by chi-square method in normal and deviations of Mendelian ratios (3: 1, 1: 1, 9:7, 13:3, 15: 1, 9:6: 1)
2. Analysis of data for mean, median, mode, standard deviation and standard error (samples should be taken from seedling population leaflet size).

CYTOLOGY: **15**

1. Basic schedules for chromosome preparation: Pre-treatment, Fixation, Staining, Squash and Smear preparations.
2. Study of different mitotic stages in the pre-fixed root tips of *Allium cepa.*
3. Determination of mitotic index and frequency of different mitotic stages (to be calculated from dividing cells) in the pre-fixed root tips of *Allium cepa !Allium sativum.*
4. Study of metaphase chromosomes from scattered metaphase plates by suitable pre-treatments and determihation of 2n number in the following *specimens-Allium cepa/A. sativum* root tips.
5. Meiosis

PLANT BREEDING

06

1. Demonstration of hybridization technique in a papilionaceous flower (e.g. *Cajanas cajan)* and in a graminaceous flower (e.g. *Oryza sativa).*
2. Demonstration of T-budding, I-budding in rose.
3. Demonstration of grafting (Wedge grafting, V-grafting, tongue grafting, side grafting) and air layering (gootie) in suitable plant specimens.

Submission of dissertation work and its presentation (any relevant topic on Botany): **15**

Identification from permanent slides: **06**

(a) Mitosis - All normal stages (b) Early separation, late separation and sticky bridge (c) Meiosis - Diplotene, Diakinesis, Metaphase-I, Anaphase I, Metaphase II, Anaphase II, Telophase II (d) Ring chromosomes and Chains, laggard, anaphase bridge.

LABORATORY NOTE BOOK: 10 marks
VIVA VOCE: 10 marks

Suggested Books:

- A Manual of Ethnobotany by S. K. Jain, Scientific Publishers, Jodhpur.
- A Text Book of Microbiology by R. C. Dubey And D. K. Maheshwari, S. Chand
- A Text Book of Plant Anatomy by P. Saxena And S. M. Das, Wisdom Press.
- Advanced Plant Taxonomy by A. K. Mondal, New Central Book Agency Pvt Ltd, Kolkata.
- Bioinformatics – Mehrotra Vikas, Vikas Publishing House Pvt. Ltd.
- Botany for Degree Students Algae by B. R. Vashishta, S. Chand, New Delhi.
- Botany for Degree Students Bryophyta by B. R. Vashishta, S. Chand, New Delhi.
- Botany for Degree Students Fungi by B. R. Vashishta, S. Chand, New Delhi.
- Botany for Degree Students Gymnosperms by P. C. Vashishta, S. Chand, New Delhi.
- Botany for Degree Students Pteridophyta by P. C. Vashishta, S. Chand, New Delhi.
- Cell & Molecular Biology – Karp. G., John Wiley & Sons; Inc

- Cell Biology by C. B. Power, Himalaya Publishing House
- College Botany by Gangulee, Das & Datta. New Central Book Agency (P) Limited.
- College Botany Practical Vol I and II by Santra, Das & Chatterjee, New Central Book Agency (P) Limited
- Ecology By P. D. Sharma, Rastogi Publications, Meerut.
- Environmental Chemistry – A. K. Dey, Wiley Eastern Ltd. New Delhi
- Genetics by P.K. Gupta, Rastogi Publications.
- Kuby Immunology by Thomas J. Kindt, Barbara A. Osborne, Richard A. Goldsby, Freeman and Company, New York
- Laboratory Manual in Microbiology By P Gunasekaran
- Microbiology 5e, 5th Edition By Michael J Pelczar, Ecs Chan, N R Krieg, Tata Mcgrahill
- Molecular Biology of Cell – Bruce Alberts et.at, Garland Publications
- Molecular Biotechnology: Principles And Applications Of Recombinant Dna – Bernaral R. Glick And Jack J., Pastemak Asm Press, Washington, D.C.
- Plant Anatomy by A. Fahn, Pergamon Press
- Plant Pathology by P. D. Sharma, Rastogi Publications, Meerut.
- Plant Physiology by S. Mukherjee and A. K. Ghosh, New Central Book Agency (P) Limited.
- Plant Taxonomy by O. P. Sharma, Tata Mcgraw-Hill Education.
- Plant Tissue Culture by K. K. Dey
- Principles of Biochemistry – Albert L. & Lehninger, Cbs Publishers & Distributors.
- Principles of Genetics – E.J. Gardener, M.J. Simmons and D.P. Snustad, John Wiley & Sons Publications.
- Studies in Botany, Vol : I And Ii, By J. N. Mitra, Moulik Library
- Taxonomy of Angiosperms by V. N. Naik, Tata Mcgraw Hill, New Delhi.
- Taxonomy of Vascular Plants by G.H.M. Lawrence, Macmillan, New York.

3-Tier 3 year Syllabus in Botany
B.Sc. (General)

Part – I

Paper – I (Theoretical	F.M. : 100 (90+10)*

Part – II

Paper – II (Theoretical	F.M. : 100 (90+10)*
Paper – III (Practical)	M.M. : 100

Part – III

Paper – IV (Theoretical	F.M. : 75 (67+8)**
Paper – V (Practical)	M.M. : 25

*External Assessment (University level) – 90 marks.
Internal Assessment (College level) – 10 marks
**External Assessment (University level) – 67 marks.
Internal Assessment (College level) – 08 marks

3- Year 3-tier distribution of Syllabus in Botany General
(To be effective from 2014-2015)

No. of paper's and marks allotted to each paper and each group in a paper

For Theoretical Papers-I and II the following patterns will be followed

Full Marks 100. Questions to be set on 90 marks, 10 marks to be evaluated by the College covering the entire syllabus of the paper.

Group - A	
Ten short answer type Questions each having 02 marks covering the entire syllabus of the paper	20 marks.

Group. - B	
Five semi long answer type Questions each having maximum marks of 08 covering all the sections of the paper	40 marks.

Group - C	
Two long answer type Questions each having maximum marks of 15 covering all the sections of the paper	30 marks.

For Theoretical paper IVA the following patterns will be followed. Full marks 75. Questions to be set on 67 marks, 08 marks to be evaluated by the College covering the entire syllabus of the paper.

Group-A	
Five short answer type Questions each having 02 marks covering the entire syllabus of the paper	10 marks.

Group- B	
Five semi long answer type Questions each having maximum marks of 06 covering all the sections of the paper	30 marks.
Group - C	
Two long answer type Questions each having maximum marks of 15 covering all the sections of the paper	27 marks. (12 + 15)

BOTANY

(GENERAL)

No. of papers and distribution of marks

PART - I

Paper - I (Theoretical) Full Marks - 100

Section - I

Bacteria, Viruses, Algae, Fungi and Plant Pathology – 30 Lectures

Section – II

Bryophyte, Pteridophyte, Gymnosperm and Paleobotany – 30 Lectures

Section – III

Morphology and Embryology, Taxonomy of Angiosperms,
Economic Botany – 40 Lectures

Part – II

Paper – II (Theoretical)

Full Marks – 100

Section – I

Anatomy, Ecology, Ethnobotany – 35 Lectures

Section – II

Cell Biology, Genetics – 35 Lectures

Section – III

Plant Physiology and Biochemistry – 30 Lectures

PAPER - III (PRACTICAL)
DISTRIBUTION OF MARKS
Full Marks - 100, Time: 6 (six) hours.

1.	Work out: Algae/ Fungi (anyone)	10
2.	Work out: Bryophytes/ Pteridophytes (any one)	10
3.	Angiospermic plant	15
4.	Plant Physiology Experiment	12
5.	Anatomy	10
6.	Mitosis Squash Preparation	07

7. Identification 18
   Cryptogams-2, Gymnosperm-I, Morphology-I, Cytology-I, Anatomy1, Angiosperm spotting-3 (species and family).
8. Submission 11

Laboratory note books-4, Slides-2, Herbarium Specimens-3, Field Note Book-2

9. Viva-voce 07

Part - III

Paper IV A (Theoretical), Full Marks - 75

Section - I

Genetics, Plant Breeding and Biometry - 20 Lectures.

Section - II

Medicinal Plants, Floriculture, Plant protection, Plant propagation - 12 Lectures.

Section-III

Mushroom culture, Biofertilizer - 06 Lectures.

Section - IV

Seed preservation, Biodiversity - 06 Lectures.

Paper IV B (Practical)

Full Marks - 25

DISTRIBUTION OF MARKS

1. Microbiology (staining-2, drawing-I, identification of morphological types only-2) = 05 marks.
2. Biometry (calculation-2, comment-2) = 04 marks.
3. Seed viability test (result-2, comment-2) = 04 marks.
4. Identification of Medicinal plants (1 x 4) = 04 marks.
5. Practical Note Book = 03 marks.
6. Viva-voce = 05 marks.

Detailed Syllabus
BOTANY (GENERAL)
PART-I

PAPER - I (Theoretical)
Full marks: 100, Time - 3 hours.

Section - I
Bacteria, Viruses, Algae, Fungi and Plant Pathology
Section - II
Bryophyte, Pteridophyte, Gymnosperm and Palaeobotany
Section - **III**
Morphology and Embryology, Taxonomy of Angiosperms, Economic Botany

SECTION - I

Bacteria: Forms, Structure in brief, Typical growth curve. Reproduction - Binary fission, Endospore. Recombination - brief idea of Conjugation, Transformation, Transduction (Generalised), Economic Importance.

Virus: General properties, Structure of a typical plant virus (TMV), Replication (lytic cycle in T-4 and lysogenic cycle in Lambda phage).

Algae: Classification upto class (Smith, 1955) with characters and examples of Cyanophyceae, Bacillariophyceae, Phaeophyceae, Rhodophyceae, Chlorophyceae and Charophyceae. Life histories of *Volvox, Oedogonium* and *Polysiphonia.* Economic Importance of algae.

Fungi: Classification (Ainsworth, 1973) upto sub-division with characters and examples of Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina. Life histories of *Mucor, Saccharomyces, Penicillium* and *Agaricus.* Economic importance.

Plant Pathology: Definitions - disease, pathogen, inoculum, infection, resistance, incubation period, Disease cycle, Koch's postulates. Symptoms

- necrotic, hypoplastic and hyperplastic. Symptoms, causal organism, disease cycle, control measure of the plant diseases - Late blight of potato, Black stem rust of wheat, Bacterial blight of rice.

SECTION - II

Bryophyte: Classification (Proskauer, 1957) upto class with characters and examples of Hepaticopsida, Anthocerotopsida and Bryopsida, Life histories of *Riccia, Anthoceros* and *Funaria.*

Pteridophyte: Classification (Sporne, 1975) upto class with characters and examples of Psilopsida, Lycopsida, Sphenopsida and Filicopsida. Life histories of *Lycopodium, Selaginella* and *Pteris.*

Gymnosperm: Classification upto class (Sporne 1965). Life histories of *Cycas, Pinus, Gnetum.*

Palaeobotany: Introduction and definition, Types offossils, fossilization process, geological time scale, importance offossil study.

SECTION-III

Morphology & Embryology: Inflorescence - different types, Flower - types and forms, flower as a modified shoot, aestivation, floral diagram, floral formulas, placentation types, Ovule structure, self and cross pollination - definition, contrivances and agents, advantages and disadvantages. Fruits and seeds - types and dispersal, germination of seeds.

Embryology: Development of a typical normal (8 nucleated) embryosac, fertilization and post fertilization changes in *Capsella* sp.

Taxonomy: Definition, principles of Taxonomy, preliminary idea about Artificial, Natural and Phylogenetic systems of classification, Principles of ICBN/ ICN, an outline of Bentham and Hooker's and Takhtazan's system of classification, field and herbarium techniques and maintenance.

Distinguishing features of the following families including economically important plants - Poaceae, Liliaceae, Orchidaceae, Brassicaceae,

Papilionaceae, Caesalpiniaceae, Euphorbiaceae, Malvaceae, Apocynaceae, Verbenaceae, Lamiaceae, Solanaceae, Rubiaceae, Asteraceae.

Economic Botany: Classification of commercially important plants. General knowledge about the cultivation of the following economically important plants - Rice, Betel leaf, Cashew nut.

BOTANY (GENERAL) PART - II
PAPER - II (Theoretical) Full Marks: 100, Time - 3 hours.

Section – I	**:**	Anatomy, Ecology, Ethnobotany.
Section – II	:	Cell Biology, Genetics, Plant Breeding.
Section – III	:	Plant Physiology and Biochemistry.

SECTION - I

Anatomy:

Plant cell wall: Gross structure, Ultra structure, Composition and function.

Tissue: Meristamatic and Permanent - structure, distribution and function.

Stele: Defination, types with example.

Normal Secondary growth in dicot stem. Stomatal types.

Ecology:

Brief knowledge on biosphere and biome, ecotype, Climatic factors, Plant succession, Stages of succession like Xerosere and Hydrosere. Ecological adaptations of hydrophyte, halophyte and Xerophyte. Carbon and nitrogen cycle. Air and water pollution: Causes and adverse effects.

Ethnobotany

Concept of ethnobotany and significance of its study.

SECTION – II

Cell biology & Genetics:

Cell cycle: Events in different phages (Excluding regulation).

Mitosis and meiosis: Stages and significance.

Mendelism: Monohybrid and dihybrid cross, test cross, chromosomal basis of Mendelian inheritance.
Allellic and non-allelic interactions: (Dominant epistasis, complementary factor, supplementary factor).
Linkage and Crossing over: Definition, three point test cross.
Chromosome: morphology, chemical constituents. DNA structure (Watson and Crick model) Nucleosome structure.
Aneuploidy and Euploidy: types with examples, role of polyploidy in evolution.
Gene mutation: Definition, types, physical and chemical mutagens - types with examples, mechanism of action of UV and 5-Bromouracil. Genetic code: properties - termination codons.

SECTION - III

Plant Physiology

Water relation: Osmotic pressure, turgor pressure, water potential, Ascent of sap, Mechanism of ion absorption, Transpiration types, mechanism, significance, difference with guttation, Antitranspirant.
Mineral nutrition: essential elements and their roles.
Enzymes: Definition, types, properties.
Photosynthesis: Light and Dark reaction.
C_4 and CAM pathway (brief knowledge).
Respiration: Glycolysis, TCA cycle, Electron transport system. Nitrogen metabolism: Biological nitrogen fixation (symbiotic and nonsymbiotic), Ammonification, Nitrification, Nitrate assimilation.
Plant hormones: Definition and role of IAA, Gibberellins, Cytokinin, ABA and Ethylene in plant growth and developments.
Photoperiodism: Definition, elementary idea of long day and short day plants.

Biochemistry:

Carbohydrate: Mono, di and oligo saccharides-elementary idea. Proteins: Primary, secondary and tertiary structure-elementary idea. Fats: Classification.

BOTANY (GENERAL) PART -II
PAPER - III (Practical)
Full marks: 100, Time - 6 hours.

1. Description and identification (including microscopic preparation) of the following specimens:
   Volvox, Oedogonium, Mucor, Penicillium, Agaricus, Riccia, Funaria, Selaginella and *Pteris.*
2. Morphology: different types of stipules, inflorescences and fruits.
3. a) Dissection, drawing, description of some angiospermic plants under the following prescribed families. Study of their flowers with parts, floral diagram, floral formula and identification of the family with reasons.
   Papilionaceae, Caesalpiniaceae, Malvaceae, Apocynaceae, Verbenaceae, Lamiaceae, Solanaceae, Rubiaceae.
   b) Referring plants to their families from the prescribed theoretical syllabus.
4. Plant physiology experiments:
   1. To determine the transpiration pull of a twig of mesophytic plant.
   2. Determination of the rate of transpiration per unit area of leaf by weighing method.
   3. Determination of the rate of oxygen evolution during photosynthesis.
   4. Determination of the DPD with the help of storage tissue.
   5. Imbibition of water by Starchy and Proteinaceous seeds.

5. Plant Anatomy: Making permanent stained preparation (double staining method) of the following plant parts with drawing, labelling, description of the anatomical features.

   Root - Gram, Arum, Orchid.

   Stem - Sunflower, Maize, *Cucurbita.*

   Leaf - *Nerium, Bambusa*.
6. Cytology: Study of mitotic stages by Aceto-orcein squash preparation in *Allium cepa* root tips.
7. Identification with reasons: Identification of microscopic and macroscopic specimens as prescribed in the theoretical syllabus.
8. Laboratory Records: Signed Laboratory note books and slides are to be submitted at the time of Practical Examination.
9. Field Excursions: At least two local field excursions are to be attended by the students.
10. Field Records: Field notebook certified by the teachers should be submitted during examination. The students are to submit Herbarium specimens of angiospermic weeds at the time of Practical Examination.

DISTRIBUTION OF MARKS (PAPER - III)
Full Marks - 100, Time: 6 (six) hours

1.	Work out: Algae/ Fungi (anyone)	10
2.	Work out: Bryophytes/ Pterodophytes (anyone)	10
3.	Angiospermic plant	15
4.	Plant Physiology Experiment	12
5.	Anatomy	10
6.	Mitosis Squash Preparation	07
7.	Identification Cryptogams-2, Gymnosperm-1, Morphology-1, Cytology-1, Anatomy-1, Angiosperm spotting-3 (species and family).	18
8.	Submission Laboratory note books-4, Slides-2, Herbarium specimens-3, Field Note Book – 2	11
9.	Viva-voce	

BOTANY (GENERAL) PART -III
PAPER IV (A) (Theoretical)
Full marks - 75, Time - 3 hours.

Section-I	Genetics, Plant Breeding and Biometry.
Section-II	Medicinal plants, Floriculture, Plant protection, Plant propagation. .
Section-III	Mushroom culture, Biofertilizer.
Section-IV	Seed preservation, Biodiversity.

1. **Genetics:** Brief knowledge of DNA replication, (prokaryotic), gene regulation in prokaryotes (lac operon).

Deviation of Mendelian laws: incomplete dominance, dominant epistatis and complementary factor.

Brief idea of - Recombinant DNA, Restriction enzymes, (only types - details not required) vector, plasmid - only properties of plasmid as a vector (genetic map not required), idea on gene cloning. Transgenic plants – definition and applications.

2. **Plant Breeding and Biometry**: Definition, aims and objectives. Plant introduction. Principles of hybridization, Heterosis. Elementary knowledge of pure line selection, mass selection and clonal selection. Goodness off it (Chi-square test).
3. **Plant tissue culture**: Introduction, cellular totipotency, preliminary idea of callus culture and their significance, idea on somatic embryo and synthetic seeds. Application of plant tissue culture in the improvement of crop plants.
4. **Medicinal plants**: Importance of study, General knowledge about the cultivation and uses of medicinal plants - *Adhatoda vasica, Rauvolfia serpentina* and *Dioscorea alata.*
5. **Floriculture:** Definition, impact of study, classification of ornamental plants; methods of cultivation and propagation of Rose, Tuberose and Jasmine.
6. **Plant Protection:** Types of protection (preventive and therapeutic). Preventive-isolation, exclusion, quarantine. Therapeutic-Physical (heat and rays), Chemical (pesticides) and Biological (virus, bacteria and fungi).
7. **Plant propagation:** Knowledge about procedures for cutting, grafting, budding and layering with reference to economical plants.
8. **Mushroom culture:** Cultivation technique of *Pleurotus,* food value of mushrooms.
9. **Biofertilizer:** Definition, idea of production and applications of: Bacterial *(Rhizobium),* BGA and *Azolla.* Significance of biofertilizers over chemical fertilizers.

10. **Seed preservation:** General principle of seed storage; concept of modern techniques of seed storage.
11. **Biodiversity:** Brief knowledge, definition of in-situ and ex-situ conservation. Methods of in-situ conservation of threatened plants (including medicinal plants).

BOTANY (GENERAL) PART - III
PAPER - IV B (Practical) Full marks - 25 :: Time 2 hours.

1. Study of laboratory equipments: autoclave, Hot air oven, Incubator, pH meter.
2. Preparation of solutions: Normal, Molar, Molal, Percentage (of Sucrose).
3. Identification of medicinal plants: *Ocimum sanctum*, *Adhatoda vasica*, *Andrographis paniculata*, *Tinospora cordifolia*, *Azadirachta indica*, *Hygrophila spinosa (Asteracantha longifolia)*, *Vinca rosea*, *Vitex negando*, *Boerhaavia repens*, *Holarrhena antidysenterica*.
4. Bacterial staining by simple staining method (methylene blue/crystal violet) from curd.
5. Learning of hybridization technique with the members of *Papilionaceae* available in the locality.
6. Learning of viability test of seeds by TTC method.
7. Determination of goodness of fit of normal monohybrid ratios (3: 1, I: 1) by Chi-square method.

Distribution of marks, Full marks - 25

1. Microbiology (staining-2, drawing-1, identification of morphological types only-2) = 05 marks.
2. Biometry (calculation-2, comment-2) = 04 marks

3. Seed viability test (result-2, comment-2) = 04 marks
4. Identification of Medicinal plants (1 x 4) = 04 marks
5. Practical note book = 03 marks
6. Viva-voce = 05 marks

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year BSc (General)
in

Botany

Under Choice Based Credit System (CBCS)
[w.e.f 2018-2019]

VIDYASAGAR UNIVERSITY

B Sc (General) in Botany

[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
1	I	**SEMESTER-I**					**CA**	**ESE**	**TOTAL**
		Core-1 (DSC-1A)		Biodiversity (Microbes, Algae, Fungi and Archegoniate) - **Practical**	6	4-0-4	15	60	75
		Core-2 (DSC-2A)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-3 (DSC-3A)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC-1 (Elective)		English/MIL	2	1-1-0	10	40	50
		Semester - I : Total			**20**				**275**
		SEMESTER-II							
	II	Core-4 (DSC-1B)		Plant Ecology and Taxonomy - **Practical**	6	4-0-4	15	60	75
		Core-5 (DSC-2B)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-6 (DSC-3B)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC-2 (Elective)		Environmental Studies	4		20	80	100
		Semester - 2 : Total			**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
2	**III**	**SEMESTER-III**					**CA**	**ESE**	**TOTAL**
		Core-7 (DSC-1C)		Plant Anatomy and Embryology - **Practical**	6	4-0-4	15	60	75
		Core-8 (DSC-2C)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-9 (DSC-3C)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-1		SEC-1: Biofertilizers Or Nursery and Gardening	2	1-1-0	10	40	50
		Semester - 3 : Total			**20**				**275**
		SEMESTER-IV							
	IV	Core-10 (DSC-1D)		Plant Physiology and Metabolism - **Practical**	6	4-0-4	15	60	75
		Core-11 (DSC-2D)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-12 (DSC-3D)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-2		SEC-2: Herbal Technology Or Mushroom Culture Technology	2	1-1-0	10	40	50
		Semester - 4 : Total			**20**				**275**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
3	V	SEMESTER-V					CA	ESE	TOTAL
		DSE-1A		Discipline-1(Botany)	6	4-0-4/ 5-1-0	15	60	75
		DSE-2A		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		DSE-3A		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-3		SEC-3: Floriculture Or Ethnobotany	2	1-1-0	10	40	50
				Semester - 5 : Total	**20**				**275**
		SEMESTER-VI							
	VI	DSE-1B		Discipline-1(Botany)	6	4-0-4/ 5-1-0	15	60	75
		DSE-2B		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		DSE-3B		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-4		SEC-4: Medicinal Botany Or Plant Diversity and Human Welfare Or Intellectual Property Rights	2	1-1-0	10	40	50
				Semester - 6 : Total	**20**				**275**
		Total in all semester:			**122**				**1700**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **CP**=Core Practical , **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies ,

List of Core Courses and Electives

Core Course (CC)

DSC-1A: Biodiversity (Microbes, Algae, Fungi and Archegoniate)
DSC-1B: Plant Ecology and Taxonomy
DSC-1C: Plant Anatomy and Embryology
DSC-1D: Plant Physiology and Metabolism

Discipline Specific Electives (DSE)

DSE-1: Cell and Molecular Biology
Or
DSE-1: Economic Botany and Biotechnology
Or
DSE-1: Bioinformatics

DSE-2: Genetics and Plant Breeding
Or
DSE-2: Analytical Techniques in Plant Sciences
Or
DSE-2: Research Methodology

Skill Enhancement Course (SEC)

SEC-1: Bio-fertilizers
Or
SEC-1: Nursery and Gardening

SEC-2: Herbal Technology
Or
SEC-2: Mushroom Culture Technology

SEC-3: Floriculture
Or
SEC-3: Ethnobotany

SEC-4: Medicinal Botany
Or
SEC-4: Plant Diversity and Human Welfare
Or
SEC-4: Intellectual Property Rights

Core Course (CC)

DSC-1A(CC-1) : Biodiversity (Microbes, Algae, Fungi and Archegoniate)

Credits 06

DSC1AT(C1T) : Biodiversity (Microbes, Algae, Fungi and Archegoniate)

Credits 04

Unit 1: 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.

Unit 2: Algae

General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae; Morphology and life-cycles of the following: *Nostoc*, *Chlamydomonas, Oedogonium, Vaucheria*, *Fucus*, *Polysiphonia*. Economic importance of algae

Unit 3: 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: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance

Unit 4: Introduction to Archegoniate

Unifying features of archegoniates, Transition to land habit, Alternation of generations.

U nit 5: 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*.

Unit 6: 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, stelar evolution. Ecological and economical importance of Pteridophytes.

U nit 4: 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.

DSC1P(C1P) : Biodiversity (Microbes, Algae, Fungi and Archegoniate(Practical))

List of Practical **Credits : 02**

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.Gram staining
3. 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)
4. *Rhizopus and Penicillium*: Asexual stage from temporary mounts and sexual structures through permanent slides.
5. *Alternaria:* Specimens/photographs and tease mounts.
6. *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.
7. *Agaricus*: Specimens of button stage and full grown mushroom; Sectioning of gills of *Agaricus*.
8. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose)
9. Mycorrhiza: ecto mycorrhiza and endo mycorrhiza (Photographs)
10. *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).
11. *Funaria*- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.
12. *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).
13. *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).
14. *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).
15. *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).
16. *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:

- Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
- Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
- Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.

- Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.
- Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.
- Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
- Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
- Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.

DSC-1B(CC-2): Plant Ecology and Taxonomy **Credits 06**

DSC1B(C2T): Plant Ecology and Taxonomy **Credits 04**

Unit 1: Introduction

Unit 2: 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.

U nit 3: Plant communities
Characters; Ecotone and edge effect; Succession; Processes and types.

Unit 4: Ecosystem
Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous

Unit 5: Phytogeography
Principle biogeographical zones; Endemism

U nit 6 Introduction to plant taxonomy
Identification, Classification, Nomenclature.

Unit 7: Identification
Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access

Unit 8:Taxonomic evidences from palynology, cytology, phytochemistry and molecular data.

Unit 9: Taxonomic hierarchy
Ranks, categories and taxonomic groups

Unit 10: 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.

U nit 11: Classification
Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series).

Unit 12: Biometrics, numerical taxonomy and cladistics
Characters; variations; OTUs, character weighting and coding; cluster analysis; phenograms, cladograms (definitions and differences).

DSC1BP(C2P): Plant Ecology and Taxonomy(Practical) Credits 02

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.
    a. Study of morphological adaptations of hydrophytes and xerophytes (four each).
    b. Study of biotic interactions of the following: Stem parasite (*Cuscuta),* Root parasite (Orobanche), Epiphytes, Predation (Insectivorous plants)
4. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)
5. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law
6. 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 & Hooker's 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.*
7. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).

Suggested Readings:

- Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition.
- Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
- Simpson, M.G. (2006). *Plant Systematics.* Elsevier Academic Press, San Diego, CA, U.S.A.
- Singh, G. (2012). *Plant Systematics:* Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.

DSC-1C(CC-3) : Plant Anatomy and Embryology Credits 06

DSC 1CT(C3T) : Plant Anatomy and Embryology Credits 04

Unit 1: Meristematic and permanent tissues

Root and shoot apical meristems; Simple and complex tissues.

U nit 2: Organs
Structure of dicot and monocot root stem and leaf.

Unit 3: Secondary Growth
Vascular cambium – structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood).

U nit 4: Adaptive and protective systems
Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.

Unit 5: 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.

Unit 6: Pollination and fertilization
Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms.

Unit 7: Embryo and endosperm
Endosperm types, structure and functions; Dicot and monocot embryo; Embryo endosperm relationship.

Unit 8: Apomixis and polyembryony
Definition, types and practical applications.

DSC1CP(C3P) : Plant Anatomy and Embryology(Practical) Credits 02

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:

- Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
- Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.

DSC-1D(CC-4): Plant Physiology and Metabolism **Credits 06**

DSC1DT(C4T): Plant Physiology and Metabolism **Credits 04**

Unit 1: Plant-water relations
Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.

U nit 2: 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.

Unit 3: Translocation in phloem
Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading.

Unit 4: 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.

Unit 5: Respiration
Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Glyoxylate, Oxidative Pentose Phosphate Pathway.

Unit 6: Enzymes
Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition.

Unit 7: Nitrogen metabolism
Biological nitrogen fixation; Nitrate and ammonia assimilation.

Unit 8: Plant growth regulators
Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene.

Unit 9: 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.

DSC1DP(C4P): Plant Physiology and Metabolism (Practical) **Credits 02**

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 O2 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)

1. Bolting.
2. Effect of auxins on rooting.
3. Suction due to transpiration.
4. R.Q.
5. Respiration in roots.

Suggested Readings:

- Taiz, L., Zeiger, E., (2010). Plant Physiology. Sinauer Associates Inc., U.S.A. 5thEdition.
- Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
- Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.

Discipline Specific Electives (DSE)

DSE-1: Cell and Molecular Biology **Credits 06**

DSE1T: Cell and Molecular Biology **Credits 04**

Unit 1: Techniques in Biology

Principles of microscopy; Light Microscopy; Phase contrast microscopy; Fluorescence microscopy; Confocal microscopy; Sample Preparation for light microscopy;
Electron microscopy (EM) - Scanning EM and Scanning Transmission EM (STEM); Sample preparation for electron microscopy; X-ray diffraction analysis.

Unit 2: Cell as a unit of Life

The Cell Theory; Prokaryotic and eukaryotic cells; Cell size and shape; Eukaryotic Cell components.

Unit 3: Cell Organelles

Mitochondria : Structure, marker enzymes, composition; Semiautonomous nature; Symbiont hypothesis; Proteins synthesized within mitochondria; mitochondrial DNA. Chloroplast Structure, marker enzymes, composition; semiautonomous nature, chloroplast

DNA. ER, Golgi body & Lysosomes : Structures and roles. Peroxisomes and Glyoxisomes :Structures, composition, functions in animals and plants and biogenesis. Nucleus :Nuclear Envelope- structure of nuclear pore complex; chromatin; molecular organization, DNA packaging in eukaryotes, euchromatin and heterochromatin, nucleolus and ribosome structure (brief).

Unit 4: Cell Membrane and Cell Wall

The functions of membranes; Models of membrane structure; The fluidity of membranes; Membrane proteins and their functions; Carbohydrates in the membrane; Faces of the membranes; Selective permeability of the membranes; Cell wall.

Unit 5: Cell Cycle

Overview of Cell cycle, Mitosis and Meiosis; Molecular controls.

Unit 6: Genetic material

DNA : Miescher to Watson and Crick- historic perspective, Griffith's and Avery's transformation experiments, Hershey-Chase bacteriophage experiment, DNA structure, types of DNA, types of genetic material.

DNA replication (Prokaryotes and eukaryotes): bidirectional replication, semi–conservative, semi discontinuous RNA priming, Ø (theta) mode of replication, replication of linear, ds-DNA, replicating the 5′end of linear chromosome including replication enzymes.

Unit 7: Transcription (Prokaryotes and Eukaryotes)

Types of structures of RNA (mRNA, tRNA, rRNA), RNA polymerase - various types; Translation (Prokaryotes and eukaryotes), genetic code.

Unit 8: Regulation of gene expression

Prokaryotes:Lac operon and Tryptophan operon ; and in Eukaryotes.

DSE1P: Cell and Molecular Biology (Practical) Credits 02

Practical

1. To study prokaryotic cells (bacteria), viruses, eukaryotic cells with the help of light and electron micrographs.
2. Study of the photomicrographs of cell organelles
3. To study the structure of plant cell through temporary mounts.
4. To study the structure of animal cells by temporary mounts-squamous epithelial cell and nerve cell.
5. Preparation of temporary mounts of striated muscle fiber
6. To prepare temporary stained preparation of mitochondria from striated muscle cells /cheek epithelial cells using vital stain Janus green.
7. Study of mitosis and meiosis (temporary mounts and permanent slides).
8. Study the effect of temperature, organic solvent on semi permeable membrane.
9. Demonstration of dialysis of starch and simple sugar.
10. Study of plasmolysis and deplasmolysis on *Rhoeo* leaf.
11. Measure the cell size (either length or breadth/diameter) by micrometry.
12. Study the structure of nuclear pore complex by photograph (from Gerald Karp)

13. Study of special chromosomes (polytene & lampbrush) either by slides or photographs.
14. Study DNA packaging by micrographs.
15. Preparation of the karyotype and ideogram from given photograph of somatic metaphase chromosome.

Suggested Readings :

- Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
- De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
- Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
- 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.

Or

DSE-1 : Economic Botany and Biotechnology **Credits 06**

DSE1T : Economic Botany and Biotechnology **Credits 04**

Unit 1: Origin of Cultivated Plants
Concept of centres of origin, their importance with reference to Vavilov's work

Unit 2: Cereals
Wheat -Origin, morphology, uses

U nit 3: Legumes
General account with special reference to Gram and soybean

U nit 4: Spices
General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses)

U nit 5: Beverages
Tea (morphology, processing, uses)

U nit 6: Oils and Fats
General description with special reference to groundnut

Unit 7: Fibre Yielding Plants
General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)

Unit 8: Introduction to biotechnology

U nit 9: Plant tissue culture
Micropropagation ; haploid production through androgenesis and gynogenesis; brief account of embryo & endosperm culture with their applications

Unit 10: Recombinant DNA 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.

DSE1P : Economic Botany and Biotechnology(Practical) Credits 02

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

- Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
- Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
- Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.

Or

DSE-1: Bioinformatics Credits 06

DSE1T: Bioinformatics Credits 04

Unit 1: Introduction to Bioinformatics
Introduction, Branches of Bioinformatics, Aim, Scope and Research areas of Bioinformatics.

Unit 2: Databases in Bioinformatics
Introduction, Biological Databases, Classification format of Biological Databases, Biological Database Retrieval System.

Unit 3 : 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.

Unit 4: 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).

Unit 5: Molecular Phylogeny
Methods of Phylogeny, Software for Phylogenetic Analyses, Consistency of Molecular Phylogenetic Prediction.

Unit 6: Applications of Bioinformatics
Structural Bioinformatics in Drug Discovery, Quantitative structure-activity relationship (QSAR) techniques in Drug Design, Microbial genome applications, Crop improvement.

DSE1P: Bioinformatics (Practical) Credits 02

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:

- Ghosh Z. and Bibekanand M. (2008) Bioinformatics: Principles and Applications. Oxford University Press.
- Pevsner J. (2009) Bioinformatics and Functional Genomics. II Edition. Wiley-Blackwell.
- Campbell A. M., Heyer L. J. (2006) Discovering Genomics, Proteomics and Bioinformatics. _II Edition. Benjamin Cummings.

DSE-2: Genetics and Plant Breeding Credits 06

DSE2T: Genetics and Plant Breeding Credits 04

Unit 1: Heredity

1. Brief life history of Mendel
2. Terminologies
3. Laws of Inheritance
4. Modified Mandelian Ratios: 2:1- lethal Genes; 1:2:1- Co - dominance, incomplete dominance;- 9:7; 9:4:3; 13:3; 12:3:1.
5. Chi Square
6. Pedigree Analysis
7. Cytoplasmic Inheritance: Shell Coiling in Snail, Kappa particles in Paramecium, leaf variegation in Mirabilis jalapa, Male sterility.
8. Multiple allelism
9. Pleiotropism
10. Chromosome theory of Inheritance.

Unit 2: Sex-determination and Sex-linked Inheritance

Unit 3: **Linkage and Crossing over**
Linkage: concept & history, complete & incomplete linkage, bridges experiment, coupling & repulsion, recombination frequency, linkage maps based on two and three factor crosses. Crossing over: concept and significance, cytological proof of crossing over.

Unit 4: Mutations and Chromosomal Aberrations
Types of mutations, effects of physical & chemical mutagens. Numerical chromosomal changes: Euploidy, Polyploidy and Aneuploidy ; Structural chromosomal changes: Deletions, Duplications, Inversions & Translocations.

Unit 5: Plant Breeding
Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding.

Unit 6: 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.

Unit 7: Quantitative inheritance
Concept, mechanism, examples. Monogenic vs polygenic Inheritance.

Unit 8: Inbreeding depression and heterosis
History, genetic basis of inbreeding depression and heterosis; Applications.

Unit 9: Crop improvement and breeding
Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement.

DSE2P: Genetics and Plant Breeding(Practical) Credits 02

Practical

1. Mendel's laws through seed ratios. Laboratory exercises in probability and chisquare.
2. Chromosome mapping using point test cross data.
3. Pedigree analysis for dominant and recessive autosomal and sex linked traits.
4. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4).
5. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes through photographs.
6. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.
7. Hybridization techniques - Emasculation, Bagging (For demonstration only).
8. Induction of polyploidy conditions in plants (For demonstration only).

Suggested Readings:

- Gardner EJ, Simmons MJ, Snustad DP (2008). Principles of Genetics. 8th Ed. Wiley- India.

- Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics, John Wiley & Sons Inc., India. 5th edition.
- Klug WS, Cummings MR, Spencer, C, Palladino, M (2011). Concepts of Genetics, 10th Ed., Benjamin Cummings
- 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.
- Pierce BA (2011) Genetics: A Conceptual Approach, 4th Ed., Macmillan Higher Education Learning
- Singh, B.D. (2005). Plant Breeding: Principles and Methods. Kalyani Publishers. 7th edition.
- Chaudhari, H.K. (1984). Elementary Principles of Plant Breeding. Oxford – IBH. 2nd edition.
- Acquaah, G. (2007). Principles of Plant Genetics & Breeding. Blackwell Publishing.

Or

DSE-2: Analytical Techniques in Plant Sciences **Credits 06**

DSE2T: Analytical Techniques in Plant Sciences **Credits 04**

Unit 1: 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.

Unit 2: Cell fractionation
Centrifugation: Differential and density gradient centrifugation, sucrose density gradient, CsCl2 gradient, analytical centrifugation, ultracentrifugation, marker enzymes.

Unit 3: Radioisotopes
Use in biological research, auto-radiography, pulse chase experiment.

Unit 4: Spectrophotometry
Principle and its application in biological research.

Unit 5: Chromatography
Principle; Paper chromatography; Column chromatography, TLC, GLC, HPLC, Ionexchange chromatography; Molecular sieve chromatography; Affinity chromatography.

Unit 6: 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

Unit 7: 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.

DSE2P: Analytical Techniques in Plant Sciences **Credits 02**

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).

Suggested Readings:

- Plummer, D.T. (1996). An Introduction to Practical Biochemistry. Tata McGraw-Hill Publishing Co. Ltd. New Delhi. 3rd edition.
- Ruzin, S.E. (1999). Plant Microtechnique and Microscopy, Oxford University Press, New York. U.S.A.
- 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.
- Zar, J.H. (2012). Biostatistical Analysis. Pearson Publication. U.S.A. 4th edition.

Or

DSE-2: Research Methodology **Credits 06**

DSE2T: Research Methodology **Credits 04**

Unit 1: Basic concepts of research

Research-definition and types of research (Descriptive vs analytical; applied vs fundamental; quantitative vs qualitative; conceptual vs emperical). Research methods vs methodology. Literature-review and its consolidation; Library research; field research; laboratory research.

Unit 2: 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.

Unit 3: Data collection and documentation of observations
Maintaining a laboratory record; Tabulation and generation of graphs. Imaging of tissue specimens and application of scale bars. The art of field photography.

Unit 4: 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.

Unit 5: **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.

Unit 6: 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.

Unit 7: The art of scientific writing and its presentation
Numbers, units, abbreviations and nomenclature used in scientific writing. Writing references. Powerpoint presentation. Poster presentation. Scientific writing and ethics, Introduction to copyright-academic misconduct/plagiarism.

DSE2P: Research Methodology **Credits 02**

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
3. Development Association, Hong Kong.
4. Ruzin, S.E. (1999). Plant microtechnique and microscopy. Oxford University Press, New York, U.S.A.

Skill Enhancement Course(SEC)

SEC-1: Bio-fertilizers **Credits 02**

SEC1T: Bio-fertilizers

Unit 1: General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.

Unit 2:*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.

Unit 3: Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation, factors affecting growth, blue green algae and *Azolla* in rice cultivation.

Unit 4: 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.

Unit 5: Organic farming – Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting – field Application.

Suggested Readings:

- Dubey, R.C., 2005 A Text book of Biotechnology S.Chand & Co, New Delhi.
- Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
- John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay _Publication, New Delhi.
- Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.
- Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New _Delhi.
- Vayas,S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic _Farming Akta Prakashan, Nadiad

Or

SEC-1: Nursery and Gardening **Credits 02**

SEC1T: Nursery and Gardening

Unit-1: Nursery: definition, objectives and scope and building up of infrastructure fornursery, planning and seasonal activities - Planting - direct seeding and transplants.

Unit-2: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.

Unit-3: 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.

Unit-4: 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.

Unit-5: 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.

Suggested Readings:

- Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH PublishingCo., New Delhi.
- Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
- Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
- Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co.,New Delhi.
- Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture andCooperation, National _Seed Corporation Ltd., NewDelhi.
- Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., SanFrancisco, USA.

SEC-2: Herbal Technology **Credits 02**

SEC2T: Herbal Technology

Unit-1: 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.

Unit-2: Pharmacognosy - systematic position m edicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Goose berry and Ashoka.

Unit-3: Phytochemistry - active principles and methods of their testing - identification andutilization of the medicinal herbs; *Catharanthus roseus* (cardiotonic), *Withania somnifera* (drugs acting on nervous system), *Clerodendron phlomoides* (anti-rheumatic) and *Centella asiatica* (memory booster).

Unit-4: 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)

Unit-5: Medicinal plant banks micro propagation of important species (*Withania somnifera*, neem and tulsi- Herbal foods-future of pharmacognosy)

Suggested Readings:

- Glossary of Indian medicinal plants, R.N.Chopra, S.L.Nayar and I.C.Chopra, 1956. C.S.I.R, New Delhi.
- The indigenous drugs of India, Kanny, Lall, Dey and Raj Bahadur, 1984. International Book _Distributors.
- Herbal plants and Drugs Agnes Arber, 1999. Mangal Deep Publications.
- Ayurvedic drugs and their plant source. V.V. Sivarajan and Balachandran Indra 1994. Oxford IBH _publishing Co.
- Ayurveda and Aromatherapy. Miller, Light and Miller, Bryan, 1998. Banarsidass, Delhi.
- Principles of Ayurveda, Anne Green, 2000. Thomsons, London.
- Pharmacognosy, Dr.C.K.Kokate et al. 1999. Nirali Prakashan.

Or

SEC-2: Mushroom Culture Technology **Credits 02**

SEC2T: Mushroom Culture Technology

Unit-1: Introduction, history. Nutritional and medicinal value of edible mushrooms;Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus.*

Unit-2: 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. 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.

Unit-3: Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.

Unit-4: 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.

Suggested Readings:

- Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
- Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
- Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
- Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

SEC-3: Floriculture **Credits 02**

SEC3T Floriculture

Unit-1: Introduction: History of gardening; Importance and scope of floriculture andl andscape gardening.

Unit-2: 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.

Unit-3: 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.

Unit-4: 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.
Unit-5: Landscaping Places of Public Importance: Landscaping highways and Educational institutions.

Unit-6: 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, Lilium, Orchids).

Unit-7: **Diseases and Pests of Ornamental Plants**.

Suggested Readings:

- Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers.

Or

SEC-3: Ethnobotany **Credits 02**

SEC3T: Ethnobotany
Unit-1: Ethnobotany
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.

Unit-2: Methodology of Ethnobotanical studies
a) Field work b) Herbarium c) Ancient Literature d) Archaeological findings e) temples and sacred places.

Unit-3: 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) *Azadiractha 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 sepentina, Trichopus zeylanicus, Artemisia,Withania*.
Role of ethnic groups in conservation of plant genetic resources. Endangered taxa and forest management (participatory forest management).

Unit-4: 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.

Suggested Readings:

- S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
- S.K. Jain (ed.) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi – 1981
- S.K. Jain (ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, Lucknow, India.
- S.K. Jain, 1990. Contributions of Indian ethnobotny. Scientific publishers, Jodhpur.
- Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons – Chichester
- Rama Ro, 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)

SEC-4: Medicinal Botany **Credits 02**

SEC4T: Medicinal Botany

Unit-1: History, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences; Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridoshaconcepts, Rasayana, plants used in ayurvedic treatments, 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.

Unit-2: 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, Ethnomedicinal plant Gardens. 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.
Unit- 3: Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany. folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of

India. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases.

Suggested Readings

- Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
- Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. Agrobios, India.

Or

SEC-4: Plant Diversity and Human Welfare **Credits 02**

SEC4T: Plant Diversity and Human Welfare

Unit-1: Plant diversity and its scope - Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agro biodiversity 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.

Unit-2: Loss of Biodiversity: Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro-biodiversity, Projected scenario for biodiversity loss,

Management of Plant Biodiversity: Organizations associated with biodiversity management-Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations, Biodiversity information management and communication.

Unit-3: Conservation of Biodiversity: Conservation of genetic diversity, species diversity and ecosystem diversity, *In situ* and *ex situ* conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

Unit-4: 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.

Suggested Readings:

- Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity – Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi

Or

SEC-4: Intellectual Property Rights **Credits 02**

SEC4T: Intellectual Property Rights

Unit-1: 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).

Unit-2 : Patents
Objectives, Rights, Patent Act 1970 and its amendments. Procedure of obtaining patents, Working of patents. Infringement.

Unit-3: Copyrights
Introduction, Works protected under copyright law, Rights, Transfer of Copyright, Infringement.

Unit-4: Trademarks
Objectives, Types, Rights, Protection of goodwill, Infringement, Passing off, Defences, Domain name.

Unit-5: Geographical Indications
Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position.

Unit-6: Protection of Traditional Knowledge
Objective, Concept of Traditional Knowledge, Holders, Issues concerning, Bio-Prospecting and Bio-Piracy, Alternative ways, Protectability, needfor a Sui-Generis regime, Traditional Knowledge on the International Arena, at WTO, at National level, Traditional Knowledge Digital Library.

Unit-7: Industrial Designs
Objectives, Rights, Assignments, Infringements, Defences of Design Infringement

Unit-8: 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.

Unit-9:Information Technology Related Intellectual Property Rights
Computer Software and Intellectual Property, Database and Data Protection, Protection of Semi-conductor chips, Domain Name Protection

Unit-10: Biotechnology and Intellectual Property Rights.
Patenting Biotech Inventions: Objective, Applications, Concept of Novelty, Concept of inventive step, Microorganisms, Moral Issues in Patenting Biotechnological inventions.

Suggested Readings:

- N.K. Acharya: Textbook on intellectual property rights, Asia Law House (2001).
- Manjula Guru & M.B. Rao, Understanding Trips: Managing Knowledge in Developing Countries, Sage Publications (2003).
- P. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy, TataMcGraw-Hill (2001).
- Arthur Raphael Miller, Micheal H.Davis; Intellectual Property: Patents, Trademarks and Copyright in a Nutshell, West Group Publishers (2000).
- Jayashree Watal, Intellectual property rights in the WTO and developing countries, Oxford University Press, Oxford.

VIDYASAGAR UNIVERSITY

Curriculum for 3 -Year B Sc (HONOURS)
in
Botany

Under Choice Based Credit System (CBCS)
w.e.f 2017-2018

VIDYASAGAR UNIVERSITY

B Sc (Honours) in Botany

[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
	Semester-I								
1	I	Core-1		CT1: Algae and Microbiology	6	4-0-0	15	60	75
				CP1: Algae and Microbiology-**Lab**		0-0-4			
		Core-2		CT2: Biomolecule and Cell Biology	6	4-0-0	15	60	75
				CP2: Biomolecule and Cell Biology-**Lab**		0-0-4			
		GE-1		TBD	6	4/5	15	60	75
				TBD		2/1			
		AECC-1		English/MIL	2	1-1-0	10	40	50
	Semester –I: total				**20**				**275**
	Semester-II								
	II	Core-3		CT3: Mycology and Phytopathology	6	4-0-0	15	60	75
				CP3: Mycology and Phytopathology -**Lab**		0-0-4			
		Core-4		CT4: Archegoniate	6	4-0-0	15	60	75
				CP4: Archegoniate-**Lab**		0-0-4			
		GE-2		TBD	6	4/5	15	60	75
				TBD		2/1			
		AECC-2		ENVS	4		20	80	100
	Semester-II : total				**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
2	**Semester-III**								
	III	Core-5		CT5: Morphology and Anatomy	6	4-0-0	15	60	75
				CP5: Morphology and Anatomy - **Lab**		0-0-4			
		Core-6		CT6: Economic Botany	6	4-0-0	15	60	75
				CP6: Economic Botany-**Lab**		0-0-4			
		Core-7		CT7: Genetics	6	4-0-0	15	60	75
				CP7: Genetics -**Lab**		0-0-4			
		GE-3		TBD	6	4/5	15	60	75
						2/1			
		SEC-1		TBD	2		10	40	50
		Semester – III : total			**26**				**350**
	Semester-IV								
	IV	Core-8		CT8: Molecular Biology	6	4-0-0	15	60	75
				CP8: Molecular Biology -**Lab**		0-0-4			
		Core-9		CT9: Plant Ecology and Phytogeography	6	4-0-0	15	60	75
				CP9: Plant Ecology and Phytogeography **-Lab**		0-0-4			
		Core-10		CT10: Plant Systematics	6	4-0-0	15	60	75
				CP10: Plant Systematics-**Lab**		0-0-4			
		GE-4		TBD	6	4/5	15	60	75
						2/1			
		SEC-2		TBD	2		10	40	50
		Semester – IV : total			**26**				**350**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
3	V	**Semester-V**							
		Core-11		CT11: Reproductive Biology Angiosperms	6	4-0-0	15	60	75
				CP11: Reproductive Biology Angiosperms -**Lab**		0-0-4			
		Core-12		CT12: Plant Physiology	6	4-0-0	15	60	75
				CP12: Plant Physiology -**Lab**		0-0-4			
		DSE-1		TBD	6	4-0-0	15	60	75
						0-0-4			
		DSE-2		TBD	6	4-0-0	15	60	75
						0-0-4			
		Semester –V : total			**24**				**300**
		Semester-VI							
	VI	Core-13		CT13: Plant Metabolism	6	4-0-0	15	60	75
				CP13: Plant Metabolism -**Lab**		0-0-4			
		Core-14		CT14: Plant Biotechnology	6	4-0-0	15	60	75
				CP14: Plant Biotechnology-**Lab**		0-0-4			
		DSE-3		TBD	6	4-0-0	15	60	75
						0-0-4			
		DSE-4		TBD	6	4-0-0	15	60	75
						0-0-4			
		Semester – VI : total			**24**				**300**
Total in all semester:					**142**				**1900**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **CP**=Core Practical , **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies ,

List of Core Course (CC)

CC-1: Phycology and Microbiology
CC-2: Bio-molecules and Cell Biology
CC-3: Mycology and Phytopathology
CC-4: Archegoniate
CC-5: Anatomy of Angiosperms
CC-6: Economic Botany
CC-7: Genetics
CC-8: Molecular Biology
CC-9: Plant Ecology and Phytogeography
CC-10: Plant Systematics
CC-11: Reproductive Biology of Angiosperms
CC-12: Plant Physiology
CC-13: Plant Metabolism
CC-14: Plant Biotechnology

Discipline Specific Electives (DSE)

DSE-1: Natural Resource Management
Or
DSE-1: Biostatistics
DSE-2: Plant Breeding
Or
DSE-2: Stress Biology
DSE-3: Industrial and Environmental Microbiology
Or
DSE-3: Bioinformatics
DSE-4: Analytical Techniques in Plant Sciences
Or
DSE- 4: Research Methodology

Skill Enhancement Course (SEC)

SEC-1: Biofertilizers
Or
SEC- 1: Floriculture

SEC-2: Medicinal Botany
Or
SEC-2: Mushroom Culture Technology

Generic Electives (GE)

GE-1: Biodiversity (Microbes, Algae, Fungi and Archegoniate)
GE-2 : Plant Ecology and Taxonomy
GE-3: Economic Botany and Plant Biotechnology
GE-4: Plant Anatomy and Embryology
Or
GE-4: Plant Physiology and Metabolism

Core Courses(CC)

CC-1: Phycology and Microbiology **Credits 06**

C1T: Phycology and Microbiology **Credits 04**

Course Contents:

Unit 1: Introduction to microbial world
Microbial nutrition, growth and metabolism. Economic importance of viruses with reference to vaccine production, role in research, medicine and diagnostics, as causal organisms of plant diseases. Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine).

Unit 2: 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).

Unit 3: 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).

Unit 4: 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; methods of reproduction; Classification; criteria, system of Fritsch, and evolutionary classification of Lee (only upto groups) and Van – den Hoek et.al(1982); 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.

Unit 5: Cyanophyta and Xanthophyta
Ecology and occurrence; Range of thallus organization; Cell structure; Reproduction, Morphology and life-cycle of *Nostoc* and *Vaucheria.*

Unit 6: Chlorophyta and Charophyta
General characteristics; Occurrence; Range of thallus organization; Cell structure; Reproduction. Morphology and life-cycles of *Chlamydomonas, Volvox, Oedogonium, Coleochaete, Chara.*
Evolutionary significance of *Prochloron.*

Unit 7: Phaeophyta and Rhodophyta
Characteristics; Occurrence; Range of thallus organization; Cell structure; Reproduction. Morphology and life-cycles of *Ectocarpus, Fucus* and *Polysiphonia.*

C1P: Phycology and Microbiology (Practical) **Credits 02**

(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).
5. Study of bacteria from root nodules/Curd sample.

Phycology

Study of vegetative and reproductive structures of *Nostoc, Chlamydomonas* (electron micrographs), Volvox, *Oedogonium,Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus and Polysiphonia, Procholoron* through electron micrographs, temporary preparations and permanent slides.

Suggested Readings:

- Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
- Wiley JM, Sherwood LM and Woolverton CJ. (2013) Prescott's Microbiology. 9th Edition. McGraw
- Hill International.
- 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.
- 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.
- Pelczar, M.J. (2001) Microbiology, 5th edition, Tata McGraw-Hill Co, New Delhi.

CC-2 : Bio-molecules and Cell Biology **Credits 06**

C2T : Bio-molecules and Cell Biology **Credits 04**

Course Contents:

Unit-1: Biomolecules

Types and significance of chemical bonds; Structure and properties of water; pH and buffers.

Carbohydrates: Nomenclature and classification; Monosaccharides ; Disaccharides; Oligosaccharides and polysaccharides.

Lipids: Definition and major classes of storage and structural lipids; Fatty acids structure and functions; Essential fatty acids; Triacyl glycerols structure, functions and properties; Phosphoglycerides.
Proteins: Structure of amino acids; Levels of protein structure-primary, secondary, tertiary and quarternary; Protein denaturation and biological roles of proteins.

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.

Unit- 2: 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.

Unit- 3: 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 theroy), Michaelis – Menten equation, enzyme inhibition and factors affecting enzyme activity.

Unit-4: The cell
Cell as a unit of structure and function; Characteristics of prokaryotic and eukaryotic cells; Origin ofeukaryotic cell (Endosymbiotic theory).

Unit- 5: 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.

Unit- 6: Cell organelles
Nucleus: Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus. **Cytoskeleton:** Role and structure of microtubules, microfilaments and intermediary filament. **Chloroplast, mitochondria and peroxisomes:** Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. **Endomembrane system:** Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing; Smooth ER and lipid synthesis, export of proteins and lipids; Golgi Apparatus – organization, protein glycosylation, protein sorting and export from Golgi Apparatus; Lysosomes

Unit -7: Cell division
Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle- checkpoints, role of protein kinases.

C2P : Bio-molecules and Cell Biology **Credits 02**

(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. Cytochemical staining of : DNA- Feulgen Acto carmin and Aceto Orcrin stain and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique.
8. Study the phenomenon of plasmolysis and deplasmolysis.
9. Study the effect of organic solvent and temperature on membrane permeability.
10. Study different stages of mitosis and meiosis.

Suggested Readings:

- Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning
- Campbell, PN and Smith AD (2011) Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone
- Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman
- Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company
- Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.
- Karp, G. (2010). Cell Biology, John Wiley & Sons, U.S.A. 6th edition.
- Hardin, J., Becker, G., Skliensmith, L.J. (2012). Becker's World of the Cell, Pearson Education Inc. U.S.A. 8th edition.
- Cooper, G.M. and Hausman, R.E. (2009) The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
- 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

CC-3 : Mycology and Phytopathology **Credits 06**

C3 T : Mycology and Phytopathology **Credits 04**

Course Contents:

Unit- 1: Introduction to true fungi

General characteristics; Affinities with plants and animals; Thallus organization; Cell wall composition; Nutrition; Classification.

Unit- 2: Chytridiomycota and Zygomycota

Characteristic features; Ecology and significance; Thallus organisation; Reproduction; Life cycle with reference to *Synchytrium, Rhizopus* .

Unit-3: 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, Neurospora* and *Peziza.*

Unit- 4: 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 with special reference to Oyster Mashroom..

Unit- 5: Allied Fungi
General characteristics; Status of Slime molds, Classification; Occurrence; Types of plasmodia; Types of fruiting bodies.

Unit- 6: Oomycota
General characteristics; Ecology; Life cycle and classification with reference to *Phytophthora, Albugo.*

Unit -7: 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.

Unit- 8: 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.

Unit- 9: 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 of cotton. Viral diseases – Tobacco Mosaic viruses, vein clearing. Fungal diseases – Early blight of potato, Black stem rust of wheat, White rust of crucifers.

C3P: Mycology and Phytopathology **Credits 02**

Practical
1. Introduction to the world of fungi (Unicellular, coenocytic/septate mycelium, ascocarps & 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*: Ascobulus 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. Study of phaneroplasmodium from actual specimens and /or photograph. Study of *Stemonitis* sporangia.
9. *Albugo:* Study of symptoms of plants infected with *Albugo*; asexual phase study through section/ temporary mounts and sexual structures through permanent slides.
10. 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 endomycorrhiza (Photographs)
11. Phytopathology : Herbarium specimens of bacterial diseases; Citrus Canker; Angular leaf spot of cotton, Viral diseases: TMV, Vein clearing, Fungal diseases: Early blight of potato, Black stem rust of wheat and White rust of crucifers.

Suggested Readings:

- Agrios, G.N. (1997) Plant Pathology, 4th edition, Academic Press, U.K.
- Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley & Sons (Asia) Singapore. 4th edition.
- Webster, J. and Weber, R. (2007). Introduction to Fungi, Cambridge University Press, Cambridge. 3rd edition.
- Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies, Macmillan Publishers India Ltd.
- Sharma, P.D. (2011). Plant Pathology, Rastogi Publication, Meerut, India.

CC-4: Archegoniate **Credits 06**

C4T: Archegoniate **Credits 04**

Course Contents:

Unit 1: Introduction

Unifying features of archegoniates; Transition to land habit; Alternation of generations.

Unit 2: Bryophytes

General characteristics; Adaptations to land habit; Classification; Range of thallus organization.

Unit 3: Type Studies- Bryophytes

Classification (up to family), morphology, anatomy and reproduction of *Riccia, Marchantia, Pellia, Porella, Anthoceros, Sphagnum and Funaria*; Pogonatum,Reproduction and evolutionary trends in *Riccia, Marchantia, Plagichasma Anthoceros* and *Funaria* (developmental stages not included). Ecological and economic importance of bryophytes with special reference to *Sphagnum*.

Unit 4: Pteridophytes

General characteristics; Classification; Early land plants (*Cooksonia* and *Rhynia*).

Unit 5: Type Studies- Pteridophytes
Classification (up to family), morphology, anatomy and reproduction of *Psilotum*, *Selaginella*, *Equisetum* and *Pteris* (Developmental details not to be included).Apogamy, and apospory, heterospory andseed habit, telome theory, stelar evolution; Ecological and economic importance.

Unit 6: Gymnosperms
General characteristics, classification (up to family), morphology, anatomy and reproduction of *Cycas*, *Pinus* and *Gnetum* (Developmental details not to be included); Ecological and economic importance.

C4P : Archegoniate **Credits 02**

Practical

1. ***Riccia*** – Morphology of thallus.

2. ***Marchantia***- Morphology of thallus, whole mount of rhizoids & Scales, vertical sectionof 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 mounts of leaf (permanent slide only).

6. ***Funaria***- Pogonatum/ Polytrichum 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, wholemount 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:

- Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. Delhi, India.
- Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
- Parihar, N.S. (1991). An introduction to Embryophyta: Vol. I. Bryophyta. Central Book Depot. Allahabad.
- Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi.
- Vanderpoorten, A. & Goffinet, B. (2009) Introduction to Bryophytes. Cambridge University Press.

CC-5: Anatomy of Angiosperms **Credits 06**

C5T: Anatomy of Angiosperms **Credits 04**

Course Contents:

Unit 1: Introduction and scope of Plant Anatomy: Applications in systematics, forensics and pharmacognosy**.**

Unit 2: Structure and Development of Plant Body

Internal organization of plant body: The three tissue systems, types of cells and tissues. Development of plant body: polarity, cytodifferentiation and organogenesis during embryogenic development, Root-stem transition, Nodal anatomy – Basic concept.

Unit 2: 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. Hydathodes, cavities, lithocysts and laticifers.

Unit 3: Apical meristems

Evolution of concept of 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. Origin, development, arrangement and diversity in size and shape of leaves; Structure of dicot and monocot leaf, Kranz anatomy. Organization of root apex (Apical cell theory, Histogen theory, Korper-Kappe theory); Quiescent centre; Root cap; Structure of dicot and monocot root; Endodermis, exodermises and origin of lateral root.

Unit 4: Vascular Cambium and Wood

Structure, function and seasonal activity of cambium; Secondary growth in root and stem. Anomalous secondary growth in Bignonia, Boerhaavia , *Aristolochia* and Dracaena. 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. Development and composition of periderm, rhytidome and lenticels.

Unit 5: 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. Mechanical tissue – distribution and significance.

C5P: Anatomy of Angiosperms **Credits 02**

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:

- Dickison, W.C. (2000). Integrative Plant Anatomy. Harcourt Academic Press, USA.
- Fahn, A. (1974). Plant Anatomy. Pergmon Press, USA.
- Mauseth, J.D. (1988). Plant Anatomy. The Benjammin/Cummings Publisher, USA.
- Evert, R.F. (2006) Esau's Plant Anatomy: Meristems, Cells, and Tissues of the Plant Body: Their Structure, Function and Development. John Wiley and Sons, Inc.

CC-6: Economic Botany **Credits 06**

C6T: Economic Botany **Credits 04**

Course Contents:

Unit 1: 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.

Unit 2: Cereals
Wheat and Rice (origin, morphology, cultivation, management processing & uses); Brief account of millets.

Unit 3: Legumes
Origin, morphology cultivation, management and uses of Chick pea, Pigeon pea and fodder legumes. Importance to man and ecosystem.

Unit 4: Sources of sugars and starches

Morphology cultivation, management and processing of sugarcane, products and by-products of sugarcane industry. Potato – morphology, propagation & uses.

Unit 5: Spices
Listing of important spices, their family and part used. Economic importance with special reference to fennel, saffron, clove and black pepper

Unit 6: Beverages
Tea, Coffee (morphology, processing & uses)

Unit 7: Sources of oils and fats
General description, classification, extraction, their uses and health implications groundnut, coconut, linseed, soybean, mustard and coconut (Botanical name, family & uses). Essential Oils: General account, extraction methods, comparison with fatty oils & their uses.

Unit 8: Natural Rubber
Para-rubber: tapping, processing and uses.

Unit 9: Drug-yielding plants
Therapeutic and habit-forming drugs with special reference to C*inchona, Digitalis, Papaver* and *Cannabis*; Tobacco (Morphology, processing, uses and health hazards).

Unit 10: Timber plants
General account with special reference to teak and pine.

Unit 11: Fibers

Classification based on the origin of fibers; Cotton, Coir and Jute (morphology, extraction and uses).

C6P: Economic Botany **Credits 02**

Practical

1. **Cereals**: Wheat (habit sketch, L. S/T.S. grain, starch grains, micro-chemical tests) Rice (habit sketch, study of paddy and grain, starch grains, micro-chemical tests).
2. **Legumes**: Soybean, Groundnut, (habit, fruit, seed structure, micro-chemical tests).
3. **Sources of sugars and 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. **Sources of oils and 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. **Fiber-yielding plants**: Cotton (specimen, whole mount of seed to show lint and fuzz; whole mount of fiber and test for cellulose), Jute (specimen, transverse section of stem, test for lignin on transverse section of stem and fiber).

Suggested Readings:

- Kochhar, S.L. (2012). Economic Botany in Tropics, MacMillan & Co. New Delhi, India.
- Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.
- Chrispeels, M.J. and Sadava, D.E. 1994 Plants, Genes and Agriculture. Jones & Bartlett_Publishers.

CC-7: Genetics **Credits 06**

C7T: Genetics **Credits 04**

Course Contents:

Unit 1: 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.

Unit 2: Extra-chromosomal 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.*

Unit 3: Linkage, crossing over and chromosome mapping
Linkage and crossing over-Cytological and molecular basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage.

Unit 4: Variation in chromosome number and structure
Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy

Unit 5: Gene mutations
Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: ClB method. Role of Transposons in mutation.DNA repair mechanisms.

Unit 6: Fine structure of gene
Classical vs molecular concepts of gene; Cis-Trans complementation test for functional allelism; Structure of Phage T4, rII Locus.

Unit 6. Population and Evolutionary Genetics
Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation.

C7P: Genetics **Credits 02**

Practical

1. Demonstration on pretreatment, fixation, staining and squash and smear preparation.
2. Study of Mitosis from Onion / Garlic / Lentil root.
3. Study of Meiosis with pollen mother cell (PMC) of Onion / Solanum / Datura by smear preparation.
4. Mendel's laws through seed ratios. Laboratory exercises in probability and chi-square.
5. Chromosome mapping using point test cross data.
6. Pedigree analysis for dominant and recessive autosomal and sex linked traits.
7. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4).
8. Blood Typing: groups & Rh factor.
9. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.
10. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.
11. Study of human genetic traits: Sickle cell anemia, Xeroderma Pigmentosum, Albinism, red-green Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe.

Suggested Readings:

- Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics, John Wiley & sons, India. 8th edition.
- Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics, John Wiley & Sons Inc., India.5th edition.
- Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. Benjamin Cummings, U.S.A. 9th edition.
- 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.

CC-8: Molecular Biology **Credits 06**

C8T: Molecular Biology **Credits 04**

Course Contents:

Unit- 1: Nucleic acids: Carriers of genetic information
Historical perspective; DNA as the carrier of genetic information (Griffith's, Hershey & Chase, Avery, McLeod & McCarty, Fraenkel-Conrat's experiment.

Unit -2. 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.

Unit- 2:The replication of DNA
Chemistry of DNA synthesis (Kornberg's discovery); General principles – bidirectional, semiconservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, θ (theta) mode of replication, replication of linear ds-DNA, replication of the 5'end of linear chromosome; Enzymes involved in DNA replication.

Unit- 3: Central dogma and genetic code
Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features**)**

Unit 4: Transcription
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.

Unit 5: Processing and modification of RNA
Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I and group II intron splicing, alternative splicing eukaryotic mRNA processing(5' cap, 3' polyA tail); Ribozymes; RNA editing and mRNA transport.

Unit 6: Translation
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.

C8P: Molecular Biology **Credits 02**

Practical

1. Preparation of LB medium and raising *E.Coli.*
2. Isolation of genomic DNA from *E.Coli.*
3. DNA isolation from cauliflower head.
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 Stahl's, Avery et al,Griffith's, Hershey & Chase's and Fraenkel & Conrat's 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

- 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.
- Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons Inc.,U.S.A. 5th edition.
- Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. Benjamin Cummings. U.S.A. 9th edition.
- Russell, P. J. (2010). i-Genetics- A Molecular Approach. Benjamin Cummings, U.S.A. 3rd edition.
- 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.

CC-9: Plant Ecology and Phytogeography **Credits 06**

C9T: Plant Ecology and Phytogeography **Credits 04**

Course Contents:

Unit 1: Introduction
Basic concepts; Levels of organization. Inter-relationships between the living world and the environment, the components and dynamism, homeostasis.

Unit 2: Soil
Importance; Origin; Formation; Composition; Physical; Chemical and Biological components; Soil profile; Role of climate in soil development.

Unit 3: Water
Importance: States of water in the environment; Atmospheric moisture; Precipitation types (rain, fog, snow, hail, dew); Hydrological Cycle; Water in soil; Water table.

Unit 4: Light, temperature, wind and fire
Variations; adaptations of plants to their variation.

Unit 5: Ecosystems
Structure; Processes; Trophic organisation; Food chains and Food webs; Ecological pyramids.

Unit 6: Population ecology
Characteristics and Dynamics .Ecological Speciation

Unit 7: Plant communities
Concept of ecological amplitude; Habitat and niche; Characters: analytical and synthetic; Ecotone and edge effect; Dynamics: succession – processes, types; climax concepts.

Unit 8: Biotic interactions
Trophic organization, basic source of energy, autotrophy, heterotrophy; symbiosis, commensalism, parasitism; food chains and webs; ecological pyramids; biomass, standing crop.

Unit 9: Functional aspects of ecosystem
Principles and models of energy flow; Production and productivity; Ecological efficiencies; Biogeochemical cycles; Cycling of Carbon, Nitrogen and Phosphorus.

Unit 10: 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.

C9P: Plant Ecology and Phytogeography **Credits 02**

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
4. two soil samples by rapid field tests.
5. Determination of organic matter of different soil samples by Walkley & Black rapid titration
6. method.

7. Comparison of bulk density, porosity and rate of infiltration of water in soils of three habitats.
8. Determination of dissolved oxygen of water samples from polluted and unpolluted sources.
9. (a). Study of morphological adaptations of hydrophytes and xerophytes (four each).
   (b). Study of biotic interactions of the following: Stem parasite (*Cuscuta*), Root parasite (*Orobanche*) Epiphytes, Predation (Insectivorous plants).
10. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus, by species area curve method (species to be listed).
11. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law.
12. Quantitative analysis of herbaceous vegetation for density and abundance in the college campus.
13. Field visit to familiarise students with ecology of different sites.

Suggested Readings:

- Odum, E.P. (2005). Fundamentals of ecology. Cengage Learning India Pvt. Ltd., New Delhi. 5th edition.
- Singh, J.S., Singh, S.P., Gupta, S. (2006). Ecology Environment and Resource Conservation.
- Anamaya Publications, New Delhi, India.
- Sharma, P.D. (2010). Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
- Wilkinson, D.M. (2007). Fundamental Processes in Ecology: An Earth Systems Approach.
- Oxford University Press. U.S.A.
- Kormondy, E.J. (1996). Concepts of ecology. PHI Learning Pvt. Ltd., Delhi, India. 4th edition.

CC-10: Plant Systematics **Credits 06**

C10T: Plant Systematics **Credits 04**

Course Contents:

Unit 1: Significance of Plant systematics

Introduction to systematics; Plant identification, Classification, Nomenclature. Evidences from palynology, cytology, phytochemistry and molecular data. 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.

Unit 2: Taxonomic hierarchy

Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concept (taxonomic, biological, evolutionary).

Unit 3: 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.

Unit 4: 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.

Unit 5: Biometrics, numerical taxonomy and cladistics
Characters; Variations; OTUs, character weighting and coding; Cluster analysis; Phenograms, cladograms (definitions and differences).

Unit 6: Phylogeny of Angiosperms
Terms and concepts (primitive and advanced, homology and analogy, parallelism and convergence, monophyly, Paraphyly, polyphyly and clades). Origin and evolution of angiosperms; Co-evolution of angiosperms and animals; Methods of illustrating evolutionary relationship (phylogenetic tree, cladogram).

C10P: Plant Systematics **Credits 02**

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 & Hooker's system of classification):
   1. Ranunculaceae - *Ranunculus, Delphinium.*
   2. Brassicaceae - *Brassica, Alyssum / Iberis.*
   3. Malvaceae – *Sida Sp. Urena lobota.*
   4. Myrtaceae - *Eucalyptus, Callistemon*
   5. Umbelliferae - *Coriandrum /Anethum / Foeniculum.*
   6. Asteraceae - *Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax.*
   7. Solanaceae - *Solanum nigrum/Withania, Nicotina, Plumbaginefolia.*
   8. Lamiaceae - *Salvia/Ocimum.*
   9. Euphorbiaceae - *Euphorbia hirta/E.milii, Jatropha.*
   10. Fasaceae – *Tephrosia Sp.,Crotalaria Sp.,*
   11. Caesalpineaeceae – *Cassia* Sp.,
   12. Asclepiadaeceae- *Pesgularia Gygnema,*
   13. Apocynaceae – *Hollorhen, Catharanthus.*
   14. Rubiaceae – *Oldenladeae, Spermoeoceae,*
   15. Liliaceae - *Asphodelus/Lilium/Allium.*
   16. 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:

- Singh, (2012). *Plant Systematics:* Theory and Practice Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.

- Jeffrey, C. (1982). An Introduction to *Plant Taxonomy.* Cambridge University Press, Cambridge.
- 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.
- Maheshwari, J.K. (1963). *Flora* of Delhi. CSIR, New Delhi.
- Radford, A.E. (1986). Fundamentals of *Plant Systematics*. Harper and Row, New York.

CC-11: Reproductive Biology of Angiosperms **Credits 06**

C11T: Reproductive Biology of Angiosperms **Credits 04**

Course Contents:

Unit 1: 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.

Unit 2: Reproductive development
Induction of flowering; flower as a modified determinate shoot. Flower development: genetic and molecular aspects.

Unit 3: Anther and pollen biology
Anther wall: Structure and functions, microsporogenesis, callose deposition and its significance. 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.

Unit 4: 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.

Unit 4: Pollination and fertilization
Pollination types and significance; adaptations; structure of stigma and style; path of pollen tube in pistil; double fertilization.

Unit 5: Self incompatibility
Basic concepts (interspecific, intraspecific, homomorphic, heteromorphic, GSI and SSI); Methods to overcome self- incompatibility: mixed pollination, bud pollination, stub pollination; Intra-ovarian and *in vitro* pollination; Modification of stigma surface, parasexual hybridization; Cybrids, *in vitro* fertilization.

Unit 6: Embryo, Endosperm and Seed
Structure and types; General pattern of development of dicot and monocot embryo and endosperm; Suspensor: structure and functions; Embryo-endosperm relationship; Nutrition

of embryo; Unusual features; Embryo development in *Paeonia*. Seed structure, importance and dispersal mechanisms

Units 7: Polyembryony and apomixis
Introduction; Classification; Causes and applications.

C11P: Reproductive Biology of Angiosperms **Credits 02**

Practical

1. Anther: Wall and its ontogeny; Tapetum (amoeboid and glandular); MMC, spore tetrads, uninucleate, bicelled and dehisced 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. 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:

- Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, Vikas Publishing House. Delhi. 5th edition.
- Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd. Delhi.
- Raghavan, V. (2000). Developmental Biology of Flowering plants, Springer, Netherlands.
- Johri, B.M. l (1984). Embryology of Angiosperms, Springer-Verlag, Netherlands.

CC-12: Plant Physiology **Credits 06**

C12T: Plant Physiology **Credits 04**

Course Contents:

Unit 1: Plant-water relations
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.

Unit 2: 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.

Unit 3: 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.

Unit 4: 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.

Unit 5: Plant growth regulators
Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Abscisic acid, Ethylene, Brassinosteroids and Jasmonic acid.

Unit 6: Physiology of flowering
Photoperiodism, flowering stimulus, florigen concept, vernalization, seed dormancy.

Unit 7: Phytochrome , crytochromes and phototropins
Discovery, chemical nature, role in photomorphogenesis, low energy responses (LER) and high irradiance responses (HIR), mode of action.

C12P: Plant Physiology **Credits 02**

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 effect of different concentrations of IAA on *Avena* coleoptile elongation (IAA Bioassay).

8. To study the induction of amylase activity in germinating barley grains.

Demonstration experiments

1. To demonstrate suction due to transpiration.
2. Fruit ripening/Rooting from cuttings (Demonstration).
3. Bolting experiment/*Avena* coleptile bioassay (demonstration).

Suggested Readings:

- Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons. U.S.A. 4th edition.
- Taiz, L., Zeiger, E., MØller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
- Bajracharya D. (1999). Experiments in Plant Physiology-A Laboratory Manual. Narosa Publishing House, New Delhi.

CC-13: Plant Metabolism **Credits 06**

C13T: Plant Metabolism **Credits 04**

Course Contents:

Unit 1: Concept of metabolism

Introduction, anabolic and catabolic pathways, regulation of metabolism, role of regulatory enzymes (allosteric ,covalent modulation and Isozymes).

Unit 2: 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, CO2 reduction, photorespiration, C4 pathways; Crassulacean acid metabolism; Factors affecting CO2 reduction.

Unit 3: Carbohydrate metabolism

Synthesis and catabolism of sucrose and starch.

Unit 4: 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, cyanide-resistant respiration, factors affecting respiration.

Unit 5: ATP-Synthesis

Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic mechanism (oxidative and photophosphorylation), ATP synthase, Boyers conformational model, Racker's experiment, Jagendorf's experiment; role of uncouplers.

Unit 6: Lipid metabolism

Synthesis and breakdown of triglycerides, β-oxidation, glyoxylate cycle, gluconeogenesis and its role in mobilisation of lipids during seed germination, α oxidation.

Unit 7: Nitrogen metabolism
Nitrate assimilation, biological nitrogen fixation (examples of legumes and non-legumes); Physiology and biochemistry of nitrogen fixation; Ammonia assimilation and transamination.

Unit 8: Mechanisms of signal transduction
Receptor-ligand interactions; Second messenger concept, Calcium calmodulin, MAP kinase cascade.

C13P: Plant Metabolism **Credits 02**

Practical

1. Chemical separation of photosynthetic pigments.
2. Experimental demonstration of Hill's 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
1. during germination.
8. Demonstration of fluorescence by isolated chlorophyll pigments.
9. Demonstration of absorption spectrum of photosynthetic pigments.

Suggested Readings

- Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons. U.S.A. 4th edition.
- Taiz, L., Zeiger, E., MØller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
- Harborne, J.B. (1973). Phytochemical Methods. John Wiley & Sons. New York.

CC-14: Plant Biotechnology **Credits 06**

C14T: Plant Biotechnology **Credits 04**

Course Contents:

Unit -1: Plant Tissue Culture
Historical perspective; Composition of media; Nutrient and hormone requirements (role of vitamins and hormones); 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).

Unit- 2: Recombinant DNA technology

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).

Unit- 3:Gene Cloning

Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCRmediated gene cloning; Gene Construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; PCR

Unit- 4: 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).

Unit - 5: 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); Gentically Engineered Products–Human Growth Hormone; Humulin; Biosafety concerns.

C14P: Plant Biotechnology **Credits 02**

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
6. transfer by electroporation, microinjection, microprojectile bombardment.
7. Study of steps of genetic engineering for production of Bt cotton, Golden rice, Flavr Savr tomato through photographs.
8. Isolation of plasmid DNA.
9. Restriction digestion and gel electrophoresis of plasmid DNA.

Suggested Readings:

- Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
- Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.

- Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms. Vikas Publication House Pvt. Ltd., New Delhi. 5th edition.
- Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons, U.K. 5th edition.
- Stewart, C.N. Jr. (2008). Plant Biotechnology & Genetics: Principles, Techniques and Applications. John Wiley & Sons Inc. U.S.A.

Discipline Specific Electives (DSE)

DSE-1: Natural Resource Management **Credits 06**

DSE1T: Natural Resource Management **Credits 04**

Course Contents:

Unit- 1: Natural resources : Definition and types.

Unit- 2: Sustainable utilization : Concept, approaches (economic, ecological and socio-cultural).

Unit- 3: Land : Utilization (agricultural, pastoral, horticultural, silvicultural); Soil degradation and management.

Unit- 4: Water
Fresh water (rivers, lakes, groundwater, aquifers, watershed); Marine; Estuarine; Wetlands; Threats and management strategies.

Unit- 5: Biological Resources
Biodiversity-definition and types; Significance; Threats; Management strategies; Bio-prospecting; IPR; CBD; National Biodiversity Action Plan).

Unit - 6: Forests
Definition, Cover and its significance (with special reference to India); Major and minor Forest products; Depletion; Management.

Unit- 7: Energy : Renewable and non-renewable sources of energy

Unit- 8: Contemporary practices in resource management
EIA, GIS, Participatory Resource Appraisal, Ecological Footprint with emphasis on carbon footprint, Resource Accounting; Waste management.

Unit- 9: National and international efforts in resource management and conservation

DSE-1P: Natural Resource Management **Credits 02**

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:

- Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House, New Delhi.
- Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.
- Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

Or

DSE-1: Biostatistics **Credits 06**

DSE1T: Biostatistics **Credits 04**

Course Contents:

Unit 1: Biostatistics

Definition - statistical methods - basic principles. Variables - measurements, functions, limitations and uses of statistics.

Unit 2: Collection of data primary and secondary

Types and methods of data collection procedures - merits and demerits. Classification - tabulation and presentation of data - sampling methods.

Unit 3: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.

Unit 4: Correlation

Types and methods of correlation, regression, simple regression equation, fitting prediction, similarities and dissimilarities of correlation and regression

Unit 5: Statistical inference

Hypothesis - simple hypothesis - student 't' test - chi square test.

DSE1P: Biostatistics **Credits 02**

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

- Biostatistic, Danniel, W.W., 1987.New York, John Wiley Sons.

- An introduction to Biostatistics, 3rd edition, Sundarrao, P.S.S and Richards, J. Christian Medical College, Vellore
- Statistical Analysis of epidemiological data, Selvin, S., 1991. New York University Press. Statistics for Biology, Boston, Bishop, O.N. Houghton, Mifflin.
- The Principles of scientific research, Freedman, P. New York, Pergamon Press.
- Statistics for Biologists, Campbell, R.C., 1998.Cambridge University Press.

DSE-2: Plant Breeding **Credits 06**

DSE2T: Plant Breeding **Credits 04**

Course Contents:

Unit -1: Plant Breeding

Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding.

Unit -2: 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.

Unit -3: Quantitative inheritance

Concept, mechanism, examples of inheritance of Kernel colour in wheat, Skin colour in human beings. Monogenic vs polygenic Inheritance.

Unit - 4: Inbreeding depression and heterosis

History, genetic basis of inbreeding depression and heterosis : Applications.

Unit - 5: Crop improvement and breeding

Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement.

DSE2P: Plant Breeding (Practical) **Credits 02**

Practical

1. Identification of offspring's having parental genotypes and recombinant genotypes, based on combination of morphological attributes in a dihybrid cross.

2. Processes of emaculation –

a) By applying higher temperature,
b) By amputing anthers.

3. Determination of genetic inheritance of characters in monohybrid and dihybrid crosses by Chi-square test (including Mendelian ratios and the ratios of gene interactions e.g. Dominant Epistasis, Supplementary gene action, Polymeric Gene action, Complementary Gene action, Inhibitory Gene action and Duplicating Gene action.

4. Identification of fertile and sterile pollens with carmine stain and TTC test.

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 Publishing.

Or

DSE-2: Stress Biology **Credits 06**

DSE2T: Stress Biology **Credits 04**

Course Contents:

Unit 1: Defining plant stress: Acclimation and adaptation.

Unit 2: 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.

Unit 3: Stress sensing mechanisms in plants: Calcium modulation, Phospholipid signaling

Unit 4: Developmental and physiological mechanisms that protect plants against environmental stress: Adaptation in plants; Changes in root: shoot ratio; Aerenchyna development; Osmotic adjustment; Compatible solute production.

Unit 5: Reactive oxygen species–Production and scavenging mechanisms.

DSE2P: Stress Biology **Credits 02**

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. Zymographic analysis of peroxidase.
4. Zymographic analysis of superoxide dismutase activity.
5. Quantitative estimation and zymographic analysis of catalase.
6. Quantitative estimation and zymographic analysis of glutathione reductase.
7. Estimation of superoxide anions.

Suggested Readings:

- Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons. U.S.A. 4th edition.
- Taiz, L., Zeiger, E., MØller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.

DSE-3: Industrial and Environmental Microbiology **Credits 06**

DSE-3T: Industrial and Environmental Microbiology **Credits 04**

Course Contents:

Unit 1: Scope of microbes in industry and environment

Unit 2: 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 air-lift fermenter.

A visit to any educational institute/ industry to see an industrial fermenter, and other downstream processing operations.

Unit 3: 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)

Unit 4: 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**).**

Unit 5: Microbes and quality of environment.
Distribution of microbes in air; Isolation of microorganisms from soil, air and water.

Unit 6: 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.

Unit 7: 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.

DSE-3P: Industrial and Environmental Microbiology Credits 02

Practical

1. Principles and functioning of instruments in microbiology laboratory
2. Hands on sterilization techniques and preparation of culture media.

Suggested Readings:

- Pelzar, M.J. Jr., Chen E.C. S., Krieg, N.R. (2010). Microbiology: An application based approach. Tata McGraw Hill Education Pvt. Ltd., Delhi.
- Tortora, G.J., Funke, B.R., Case. C.L. (2007). Microbiology. Pearson Benjamin Cummings, San Francisco, U.S.A. 9th edition.

OR

DSE-3: Bioinformatics Credits 06

DSE3T: Bioinformatics Credits 04

Course Contents:

Unit 1. Introduction to Bioinformatics
Introduction, Branches of Bioinformatics, Aim, Scope and Research areas of Bioinformatics.

Unit 2. Databases in Bioinformatics
Introduction, Biological Databases, Classification format of Biological Databases, Biological Database Retrieval System.

Unit 3. 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.

Unit 4. 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).

Unit 5. Molecular Phylogeny

Methods of Phylogeny, Software for Phylogenetic Analyses, Consistency of Molecular Phylogenetic Prediction.

Unit 6. Applications of Bioinformatics
Structural Bioinformatics in Drug Discovery, Quantitative structure-activity relationship (QSAR) techniques in Drug Design, Microbial genome applications, Crop improvement

DSE3P: Bioinformatics **Credits 02**

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:

- Ghosh Z. and Bibekanand M. (2008) Bioinformatics: Principles and Applications. Oxford University Press.
- Pevsner J. (2009) Bioinformatics and Functional Genomics. II Edition. Wiley-Blackwell.
- Campbell A. M., Heyer L. J. (2006) Discovering Genomics, Proteomics and Bioinformatics. II Edition. Benjamin Cummings.

DSE-4: Analytical Techniques in Plant Sciences **Credits 06**

DSE4T: Analytical Techniques in Plant Sciences **Credits 04**

Course Contents:

Unit- 1: 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.

Unit- 2: Cell fractionation

Centrifugation: Differential and density gradient centrifugation, sucrose density gradient, CsCl2gradient, analytical centrifugation, ultracentrifugation, marker enzymes.

Unit- 3: Radioisotopes
Use in biological research, auto-radiography, pulse chase experiment.

Unit- 4: Spectrophotometry
Principle and its application in biological research.

Unit- 5: Chromatography
Principle; Paper chromatography; Column chromatography, TLC, GLC, HPLC, Ion-exchange chromatography; Molecular sieve chromatography; Affinity chromatography.

Unit- 6: 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

Unit- 7: 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.

DSE4P: Analytical Techniques in Plant Sciences **Credits 02**

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).

Suggested Readings:

- Plummer, D.T. (1996). An Introduction to Practical Biochemistry. Tata McGraw-Hill Publishing Co. Ltd. New Delhi. 3rd edition.
- Ruzin, S.E. (1999). Plant Microtechnique and Microscopy, Oxford University Press, New York. U.S.A.
- 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.

➢ Zar, J.H. (2012). Biostatistical Analysis. Pearson Publication. U.S.A. 4th edition.

OR

DSE-4: Research Methodology **Credits 06**

DSE4T: Research Methodology **Credits 04**

Course Contents:

Unit 1: Basic concepts of research

Research-definition and types of research (Descriptive vs analytical; applied vs fundamental; quantitative vs qualitative; conceptual vs emperical).Research methods vs methodology. Literature-review and its consolidation; Library research; field research; laboratory research.

Unit 2: 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.

Unit 3: Data collection and documentation of observations

Maintaining a laboratory record; Tabulation and generation of graphs. Imaging of Tissue specimens and application of scale bars. The art of field photography.

Unit 4: 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.

Unit 5: **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, non-coagulant fixatives; tissue dehydration using graded solvent series; Paraffin and plastic infiltration; Preparation of thin and ultrathin sections.

Unit 6: 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.

Unit 7: The art of scientific writing and its presentation

Numbers, units, abbreviations and nomenclature used in scientific writing. Writing references. Powerpoint presentation. Poster presentation. Scientific writing and ethics, Introduction to copyright-academic misconduct/plagiarism.

DSE4P: Research Methodology **Credits 02**

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:

- Dawson, C. (2002). Practical research methods. UBS Publishers, New Delhi.
- 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.
- Ruzin, S.E. (1999). Plant microtechnique and microscopy. Oxford University Press, New York, U.S.A.

Skill Enhancement Course (SEC)

SEC-1: Biofertilizers **Credits 02**

SEC1T: Biofertilizers **Credits 02**

Course Contents:

Unit- 1: General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.

Unit- 2: *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.

Unit- 3: Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation, factors affecting growth, blue green algae and *Azolla* in rice cultivation.

Unit- 4: 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.

Unit-5: Organic farming – Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting – field Application.

Suggested Readings:

- Dubey, R.C., 2005 A Text book of Biotechnology S.Chand & Co, New Delhi.
- Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
- John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay _Publication, New Delhi.

- Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.
- Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New _Delhi.
- Vayas,S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic _Farming Akta Prakashan, Nadiad

OR

SEC- 1: Floriculture **Credits 02**

SEC1T: Floriculture

Course Contents:

Unit 1: Introduction: History of gardening; Importance and scope of floriculture and landscape gardening.

Unit 2: 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.

Unit 3: 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.

Unit 4: 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.

Unit 5: Landscaping Places of Public Importance: Landscaping highways and Educational institutions.

Unit 6: 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, Lilium, Orchids).

Unit 7: Diseases and Pests of Ornamental Plants.

Suggested Readings:

- Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers.

SEC-2: Medicinal Botany **Credits 02**

SEC-2T: Medicinal Botany

Course Contents:

Unit 1:
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, **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.

Unit 2:
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, Ethnomedicinal plant Gardens. 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.

Unit 3:
Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany. Folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of India. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases.

Suggested Readings:

- Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
- Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. Agrobios, India.

Or

SEC-2: Mushroom Culture Technology **Credits 02**

SEC-2T: Mushroom Culture Technology

Course Contents:

Unit 1:
Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms.Types of edible mushrooms available in India - *Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus.*

Unit 2:
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. 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.

Unit 3:
Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.

Unit 4:
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.

Suggested Readings:

- Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
- Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
- Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
- Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

Generic Elective (GE)
[Interdisciplinary for other department]

GE-1: Biodiversity (Microbes, Algae, Fungi and Archegoniate) Credits 06

GE1T: Biodiversity (Microbes, Algae, Fungi and Archegoniate) Credits 04

Course Contents:

Unit 1: 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.

Unit 2: Algae
General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae; Morphology and life-cycles of the following: *Nostoc*, *Chlamydomonas*, *Oedogonium*, *Vaucheria*, *Fucus*, *Polysiphonia*. Economic importance of algae.

Unit 3: 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:General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance.

Unit 4: Introduction to Archegoniate
Unifying features of archegoniates, Transition to land habit, Alternation of generations.

Unit 5: 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*.

Unit 6: 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.

Unit 4: Gymnosperms
General characteristics; Classification (up to family), morphology, anatomy and reproduction of *Cycas* and *Pinus* (Developmental details not to be included). Ecological and economical importance.

GE1P: Biodiversity (Microbes, Algae, Fungi and Archegoniate) (Practical) Credits 02

Practical:

1. EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.

1. Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation; Structure of root nodule.

2. Gram staining.

3. 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).

4. *Rhizopus and Penicillium*: Asexual stage from temporary mounts and sexual Structures through permanent slides.

5. *Alternaria:* Specimens/photographs and tease mounts.

6. *Puccinia*: Herbarium specimens of Black Stem Rust of Wheat and infected Barberryleaves; section/tease 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*.
8. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose)

9. Mycorrhiza: ecto mycorrhiza and endo mycorrhiza (Photographs)

10. *Marchantia*- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemmacup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides).

11. *Funaria*- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.
12. *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).
13. 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).
14. *Cycas*- morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, t.s. rachis, v.s. leaflet,v.s. micro sporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide).

15. *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:

- Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
- Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
- Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
- Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.
- Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.
- Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
- Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
- Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.

GE-2: Plant Ecology and Taxonomy **Credits 06**

GE2T: Plant Ecology and Taxonomy **Credits 04**

Course Contents:

Unit- 1: Introduction

Unit- 2: 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

Unit -3: Plant communities

Characters; Ecotone and edge effect; Succession; Processes and types

Unit- 4: Ecosystem

Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous

Unit- 5: Phytogeography

Principle of Biogeographical zone; Endemism.

Unit- 6: Introduction to plant taxonomy

Identification, Classification, Nomenclature.

Unit- 7 : Identification

Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access

Unit 8 : Taxonomic evidences from palynology, cytology, phytochemistry and molecular data.

Unit 9 : Taxonomic hierarchy
Ranks, categories and taxonomic groups

Unit 10: 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.

Unit 11: Classification

Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series).

Unit 12: Biometrics, numerical taxonomy and cladistics
Characters; variations; OTUs, character weighting and coding; cluster analysis; phenograms, cladograms (definitions and differences).

GE2P: Practical **Credit 02**

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 (*Orobanche*), 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 Raunkiaer's 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 & Hooker's 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-3: Economic Botany and Plant Biotechnology **Credits 06**

GE3T: Economic Botany and Plant Biotechnology **Credits 04**

Course Contents:

Unit 1: Origin of Cultivated Plants
Concept of centres of origin, their importance with reference to Vavilov's work.

Unit 2: Cereals

Wheat - Origin, morphology, uses

Unit 3: Legumes

General account with special reference to Gram and soybean

U nit 4: Spices

General account with special reference to clove and black pepper (Botanical name, family, part used morphology and uses)

U nit 5: Beverages

Tea (morphology, processing, uses)

Unit 6: Oils and Fats

General description with special reference to groundnut

Unit 7: Fibre Yielding Plants

General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)

Unit 8: Introduction to biotechnology

Unit 9: Plant tissue culture

Micropropagation ; haploid production through androgenesis and gynogenesis; brief account of embryo and endosperm culture with their applications

Unit 10: Recombinant DNA 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 Immuno detection. Molecular diagnosis of human disease, Human gene Therapy.

GE3P: Economic Botany and Plant Biotechnology Credits 04

Practical:

1. Study of economically important plants : Wheat, Gram, Soybean, Black pepper, Clove Tea, Cotton, Groundnut through specimens, sections and micro chemical 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:

- Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
- Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
- Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.

GE-4: Plant Anatomy and Embryology **Credits 06**

GE4T: Plant Anatomy and Embryology **Credits 04**

Course Contents:

Unit 1: Meristematic and permanent tissues
Root and shoot apical meristems; Simple and complex tissues

U nit 2: Organs
Structure of dicot and monocot root stem and leaf.

Unit 3: Secondary Growth
Vascular cambium – structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood)

Unit 4: Adaptive and protective systems
Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.

Unit 5: 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.

Unit 6: Pollination and fertilization
Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms.

Unit 7: Embryo and endosperm
Endosperm types, structure and functions; Dicot and monocot embryo; Embryo endosperm relationship

Unit 8: Apomixis and polyembryony
Definition, types and Practical applications

GE4P: Plant Anatomy and Embryology **Credits 02**

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.

OR

GE-4: Plant Physiology and Metabolism **Credits 06**

GE4T: Plant Physiology and Metabolism **Credits 04**

Course Contents:

Unit 1: Plant-water relations
Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.

U nit 2: 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.

Unit 3: Translocation in phloem.

C omposition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading

Unit 4: 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.

U nit 5: Respiration
Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Glyoxylate, Oxidative Pentose Phosphate Pathway.

U nit 6: Enzymes
Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition.

U nit 7: Nitrogen metabolism
Biological nitrogen fixation; Nitrate and ammonia assimilation.

Unit 8: Plant growth regulators
Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene.

Unit 9: 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.

GE4P: Plant Physiology and Metabolism **Credits 02**

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 O2 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)

1. Bolting.
2. Effect of auxins on rooting.
3. Suction due to transpiration.
4. R.Q.
5. Respiration in roots.

Suggested Readings

- Taiz, L., Zeiger, E., MØller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
- Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
- Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.

VIDYASAGAR UNIVERSITY

ZOOLOGY

(Honours & General)

Under Graduate Syllabus

(3 Tier Examination Pattern)

w.e.f. 2014-2015

REVISED

Vidyasagar University

Midnapore 721 102

West Bengal

Syllabus for Three-Year Degree-Course
Zoology (Hons.)

Part-I

Paper- I : Theory	100 marks (90+ 10)
Gr. - A: Non-Chordata	50 marks
Gr. - B: Chordata	50 marks
Paper-II : Theory	100 marks (90+ 10)
Gr. - A: Cell biology, Cytogenetics & Developmental Biology	50 marks
Gr. - B: Bio-systematics, Adaptation & Evolution	50 marks

Part-II

Paper- III: Theory	100 marks (90 + 10)
Gr.-A: Ecology, Ethology, Environmental Biology & Environmental Management	50 marks
Gr. - B: Parasitology, Immunology, Biodiversity & Economic Zoology	50 marks
Paper- IV: Theory	100 marks (90 + 10)
Gr. - A: Microbiology, Biostatistics, Computer Application & Bioinformatics	50 marks
Gr. - B: Histology, Histochemistry, Endocrinology & Bioinstrumentation	50 marks
Paper – V: Practical	100 marks
Unit - A : Dissection, Computer Application	
Unit - B : Cytogenetics, Histology, Histochemistry & Developmental Biology	

Part- III

Paper- VI : Theory	100 marks (90 + 10)
Gr. - A: Molecular Biology & Biotechnology	50 marks
Gr. - B: Animal Physiology, Biochemistry &	50 marks

Biophysics	
Paper- VII: Practical	100 marks
Unit - A : Parasitology, Immunobiology & Microbiology	40 marks
Unit - B : Animal Physiology, Biochemistry & Biophysics	40 marks
Unit - C : Laboratory Note Book and Viva Voce	20 marks
Paper- VIII :Practical	100 marks
Unit - I : Experiments on Ecology & Environmental Management	25 marks
Unit II: Identification	40
Project work	10
Unit - III : Field report, Laboratory Note Book and Viva Voce	25 marks

Zoology Honours Syllabus
Part - I
Paper – I : Theory (University Exam -90, Assignment -10)
F. M. : 100 Marks

Group - A : Non-chordata **F. M. : 50 Marks**

1.	Distinguishing characters & classification of Protozoa (upto Phyla)	2
2.	Structural organisation of *Paramoecium* sp.	2
3.	Amoeboid movement and nutrition in Protozoa.	2
4.	Distinguishing characters and classification of Porifera (upto sub-class).	2
5.	Skeletal elements and canal system of Porifera.	2
6.	Distinguishing characters and classification of Cnidaria (upto sub-class).	2
7.	Polymorphism of Cnidaria.	2
8.	Coral reefs (types, formation, distribution and conservation).	2
9.	Structural organisation of *Hormiphora* sp and its systematic position.	2
10.	Distinguishing characters and classification of Platyhelminthes (up to sub-class).	2
11.	Structural organisation of *Fasciola* sp. and its life-cycle.	2
12.	Distinguishing characters and classification of Nematoda (upto sub-class).	2
13,	Structural organisation of *Ascaris* sp. and its life-cycle.	2
14.	Distinguishing characters and classification of Annelida (upto subclass),	2
15.	Structural organisation of *Pheretima* sp.	2
16.	Distinguishing characters and classification of Arthropoda (upto class).	2
17.	Structural organisation of *Periplaneta* sp.	2
18.	Respiration in Arthropoda.	2
19.	Distinguishing characters and classification of Mollusca (upto stub-class).	2

20.	Structural organisation of *Pila* sp.	2
21.	Torsion in Mollusca.	2
22.	Distinguishing characters and classification of Echinodermata (upto sub-class).	2
23.	Structural organisation of *Asterias* sp.	2
24.	Systematic position of *Peripatus sp*.	2
25.	Systematic position of *Balanoglossus sp*.	2

(Classification as per Levine et al., 1980 for Protozoa; Ruppart-Barnes, 1994, Porifera to Annelida ; Parker & Haswell, 1972 for Arthropoda to Echinodermata)

Group- B : Chordata **F. M. : 50 Marks**

1.	Classification of Chordata (upto order).	7
2.	Structural organisation & life-history of *Ascidia sp.*	2
3.	Structural organisation of *Petromyzon* and Ammocoetes larva	2
4.	Anatomical peculiarities and systematic position of Dipnoi.	2
5.	Accessory respiratory structures in fishes.	2
6,	Axolotl larva and its importance.	2
7.	Anatomical peculiarities and systematic position of *Sphenodon sp*.	2
8.	Poison apparatus and biting mechanism of snakes.	2
9,	Aerodynamics in the flight mechanism of birds.	2
10.	Anatomical peculiarities of Monotremata	2
11.	Structural organisation of *Cavia porcellus*.	6
12.	Exoskeletal, structures of birds & Mammals.	5
13.	Echolocation in Mammals.	2
14.	Comparative study of (i) Heart & aortic arches in vertebrates, (ii) Kidney in invertebrates, (iii) Brain in vertebrates.	12

(Classification as per Young, 1981)

Paper-II Theory

F. M. : 100 Marks (University Exam - 90, Internal Assessment - 10)

Group- A : Cell biology, Cytogenetics & Developmental Biology

F. M.: 50 Marks

1. Cytological techniques - cell fractionation, homogenization & cell centrifugation. 2
2. Ultrastructure & function of Plasma Membrane, Mitochondria, Golgi complex, Endoplasmic Reticulum and Lysosome. 9
3. Nucleic Acids: DNA: Physico-chemical structure, Chromosomes- Nucleosome concept, RNA: types, structure & function. Chromosomal changes during cell division. 9
4. Allele concept and allelic interaction- multiple allele (ABO blood group). 3
5. Genetic determination of sex with special reference to *Drosophila* and man. 3
6. Linkage and Crossing over; Cytological demonstration of crossing. over- Holliday model 2
7. Gene maping in diploid (three point). 3
8. Gene as a structural & functional unit- one gene-one polypeptide; sickle cell anaemia; cistron concept. 3
9. Outline knowledge of gametogenesis. Ultrastructure of sperm & ovum 2
10. Physical & molecular events in fertilization; Egg types and role of yolk in cleavage. 2
11. Comparative account of blastula of *Branchiostoma*, Frog & Chick. 2
12. Morphogenetic movements and fate-map. 2
13. Process of gastrulation in Frog & Chick. 2
14. Role of organisers in development; Transplantation experiments of Speeman & Mangold; Chemistry of Organiser. 2
15. Organogenesis-Development of brain and eye in chick. 2

16. Formation and fate of extra-embryonic membrane in chick. 1
17. Placenta-types, structure and function in rodents. 1

Group B: Biosystematics, Adaptation & Evolution F. M. : 50 Marks

1. Geological time scale, fossils & dating mechanisms. 4
2. Zoogeographical realms & their characteristic fauna with special reference to oriental region 3
3. Barriers, dispersals & their impact on animal distribution. 3
4. Continental drift mechanism and its impact on faunal distribution. 2
5. Theories on the Origin of Life. 4
6. Modem concept of evolution: i) Variation and sources of variations in a population, ii) Hardy-Weinberg equilibrium; Forces altering Hardy-Weinberg equilibrium (non-random mating, genetic drift & natural selection); Founder effects & Population ~bottleneck 10
7. Adaptive radiation & adaptive convergence in mammals; Desert adaptation in animals; Migration of fish and bird. 4
8. Origin of bird. 3
9. Colouration & mimicry: Adaptive significance. 1
10. Species concept: i) Typological, ii) Nominalistic, iii) Biological. 3
11. Taxonomy& Systematics: Definitions, taxonomic levels, types, brief idea of modem trends in taxonomy. 3
12. Early development: spiral and radial cleavage.
    Protostomes and Deuterostomes
    Body cavities: acoelomates, pseudocoelomates, coelomates (schizo and enterocoelomates).
    Homology and analogy. 4
12. Concept & importance of classification; Principles of zoological nomenclature. 3
13. Modern approach of classification including numerical, DNA hybridization & GC content techniques. 2
13. Modes of speciation: sympatric, allopatric & parapatric processes. 1

Part-II
Paper- III : Theory
F. M. : 100 Marks (University Exam – 90, Internal Assessment - 10)
Group- A : Ecology, Ethology , Environmental Biology and Environmental Management
F. M. : 50 Marks

1. Introduction, subdivisions & scope of ecology. 2
2. Concept and Components of Ecosystem; Ecological factors: i) Abiotic: light and their effects on animals, ii) Biotic: intra-specific and inter~specific associations. 6
3. Energy flow in an autotroph based ecosystem. 3
4. Population Ecology : Natality & mortality, growth forms, age pyramids, regulation of population density. 5
5. Community Ecology: habitat & niche concept, species diversity. 4
6. Ecological succession. 2
7. Introduction to animal behaviour. 2
8. Innate and learned behavior; fixed action pattern. 6
   Learning and memory.
09. Biological rhythm. 4
10. Communication: Bee's dance language. Auditory signals, chemicals and bioluminescence in communication. 8
11. Environmental toxicology: LC_{50}; LD_{50}, acute & chronic toxicity. 4
12. Environmental degradation: natural & man-made pollution; nature, sources & effects of major pollutants of air, water & soil; noise pollution. 4

Group - B : Parasitology, Immunology, Biodiversity and Economic Zoology **F.M. : 50 Marks**

1. Basic facts related to Parasitology, related terminologies. 2
2. Life cycle, pathogenicity, clinical features, control and zoonotic aspects of i) *Plasmodium vivax and falciparum*, ii) *Entamoeba histolytica* iii) *Wuchereria bancrofti*, iv) *Echinoccous granulosus*. 4
3. Vectors: Bio-ecology of Mosquitoes & Ticks; role in disease transmission and control. 2
4. Cells and organs in Immunity; Outline structure and classification of immunoglobulin; Concept of antigen, hapten, carrier and adjuvant. Antigen-antibody interaction. 2
5. Acquired & innate immune system with special reference to process, types and principle of vaccination. 2
6. Humoral and cell mediated immune system with special reference to T & B Cell co-operation; antibody production and role of T cells, cytokines. 5
7. Immunological techniques (outline only): Gel diffusion; Immunoelectrophoresis; Immunofluoroscence, RIA; ELISA and monoclonal antibody technique. 4
8. Concept of biodiversity : Types of biodiversity; biodiversity & human welfare; Megadiversity countries & Biodiversity Hotspots with special reference to India. 5
9. *In situ* and *ex situ* conservation. Wildlife (protection) Act & Schedules. Conservation of tiger. 4
10. Bioethics and biosafety. 2
11. Aquaculture: resources in India; Induced breeding of carps; ecohatchery (basic concept); polyculture of fin fish; exotic fishes & their role; fish diseases, symptoms & control; freshwater& brackish water prawn culture; fish byproducts & uses. Ornamental fishery, hatching of egg, rearing, and aquarium management. 10

12. Sericulture : silk varieties in India; mulberry silkworm culture; extraction & reeling of silk; natural enemies & diseases of silkworm and their control. 2
13. Apiculture: species of honey-bees in India; life history of *Apis cerana indica*; apiculture technique; bee products & uses; natural enemies & diseases of honey bees and their control. 2
16. Basic idea of pest control methods & IPM. Life cycle of *Apion* and *Sitophilus* 2
17. Animal husbandry: common poultry breeds (fowl), rearing methods, diseases & control. 2

Paper - IV: Theory
F. M. : 100 Marks (University Exam – 90, Internal Assessment - 10)
Group - A : Microbiology, Biostatistics, Computer Application & Bio-informatics
F. M. : 50 Marks

1. Elementary knowledge on the organisational diversity of microorganisms with special reference to virus and bacteria. 5
2. Culture and staining of bacteria (Gram's staining and Acid fast staining). Microbial Genetics-. Conjugation, Transformation and transduction. 6
3. Applied Microbiology : i) Dairy-microbiology of milk & milk products; ii) Agriculture-microbes in pest control & pesticides degradation; iii) Common microbes in relation to serious endemic diseases (Cholera, AIDS & Shigella). 3
4. Physical and Chemical Control of Microbes, Sterilization. Types of antibiotics. 3
4. Definition of sample and population in biometry : frequency distribution; histograms; X~Y curves; Pie chart. 5
5. Measures of central tendencies (mean, mode & median); dispersion (SD, SE& variance). 5
6. Analysis of simple correlation, regression & related problems. 5
7. Basic concept of hypothesis testing: Chi-square & Student-test. Related problems. 5
8. Elementary idea of Desktop Computer devices: CPU; VDU; Key board; mouse; FD drive; CDIDVD ROM drive; RAM. 5
9. Concept of Internet & its use in information collection. 3
10. Basic concept of Bioinformatics. Internet based tool for DNA and protein sequence databases. PUBMED, ERRICA. 5

Group-B : Histology, Histochemistry, Endocrinology & Bioinstrumentation
F. M. : 50 Marks

1. Histology of liver, endocrine pancreas, kidney, thyroid and pituitary 6
2. Histological techniques: Fixation & fixatives, Staining principles; staining with haematoxylene & eosin; outline classification of dyes. 6
3. Basic concept of histochemistry. PAS, Millon's reaction and Sudan Black B. 4
4. Definition of endocrine glands; Hormones in the regulation of the body function with special reference to the carbohydrate and calcium metabolism; Functions of hypothalamus, pituitary, thyroid, parathyroid, adrenal, pancreas, testis & ovary. 7
5. Types, sources & functions of steroid and peptide hormones. 5
6. Endocrinology of Thyroid, Testis & Ovary. 4
7. Mode of action of Insulin. 3
8. Role of Parathhormone in calcium metabolism. 3
9. Local hormones and their functions. 3
10. Basic principle of optical and electron microscopes. TEM,SEM, Phase contrast microscopes. Resolving power, Resolution and Magnification. 5
11. Electrophoresis, chromatography and spectrophotometer 4

Paper-V: Practical **F. M. : 100 Marks**

Unit – A Dissections and Computer Application (Time- 3h) 50 Marks

Major Dissections: $2 \times 12 = 24$

a) Earthworm : Nervous system & reproductive system.
b) Cockroach : Nervous system& male reproductive system.
c) Rohu: Afferent & Efferent branchial arteries; IXth & Xth Cranial nerves

Minor Dissections: $1 \times 6 = 6$

a) Salivary apparatus of cockroach (hypopharynx to be retained).
b) Mouthparts of cockroach.
c) Female reproductive system of cockroach.
d) Nerve ring of earthworm.
e) Septal nephridia of earthwonn.
f) Brain & pituitary gland of Rohu.

Computer Application: 10

Use of Windows based software (any one) : manipulation of files (in MS Office / Lotus Smart Suit) -file creation& deletion, protection; renaming; editing); handling database (in MS Access / MS Excel or any other) –making tables & charts (Pie, Bar, Polygon etc.).Use of statistical formulas in Excel.

Viva Voce: 5
Laboratory Note Book 5

Unit.; B : Cytology, Histology , Histochemistry & Developmental Biology (TIme:3h) 50 Marks

Unit –I : *15*

a) Study of meiosis from grasshopper.
b) Genetics--Pedigree analysis & Biostatistics- chi square test.

Unit-II: 15

a) Section cutting, staining of histological tissues and mounting of liver, lungs, stomach, pancreas, thyroid, kidney, ovary & testis.

Unit- III : 10

a) Identification of T. S. of liver, pancreas, thyroid, kidney, ovary & testis, lungs, adrenal, stomach.
b) Identification of whole mount of chick embryo (24h; 48h; 72h, 96h).
c) Identification of cleavage stage (blastula& gastrula of frog).
d) Histochemical detection of carbohydrate, protein& lipid by PAS, Millon's test and Sudan Black B techniques respectively.

Viva Voce: 5

Laboratory Note Book: 5

Part-III

Paper – VI Theory F. M. : 100 Marks (University Exam - 90, Internal Assesment - 10)

Group - A : Molecular Biology & Biotechnology

F. M. : 50 Marks

1. Genetics of cell cycle, checkpoints. 6
2. Basic steps and process of replication, transcription and translation in prokaryotes, enzymes and proteins associated with these processes 4+4+4
3. Post transcriptional modifications-Splicing, types and basic steps.
3. Molecular basis of Mutation-origin and types. DNA Repair mechanisms. 6
4. Elementary idea of mitochondrial and chloroplast DNA, Centromeric, telomeric, selfish DNA, C value paradox 3
5. Regulation of gene expression: Lac and Tryp operon. 4
7. Concept of Oncogene. 3
8. Elementary idea of animal biotechnology – basic steps of gene cloning, c DNA and genomic library, restriction endonuclease-action and types, steps and use of PCR. Vermitechnology- basic steps. 8
9. Principle of animal cell culture - i) Basic concept
   ii) Media and its types 2

Group B: Animal Physiology, Biochemistry & Biophysics 50 Marks

1. Osmosis; diffusion; Donnan membrane equilibrium; pH; buffers. Importance Physiological buffer system. 3
2. Laws of thermodynamics; fundamentals of energy concepts. Calculation of G^0 2
3. Classification, structure and biological role of carbohydrate, protein (upto quaternary structure) & lipid. 9
4. Carbohydrate metabolism -Glycogenesis; glycogenolysis; gluconeogenesis. 3

5. Elementary idea of biological oxidation. Oxidative phosphorylation & electron transport chain. 3
6. Protein metabolism-Transamination, deamination and urea cycle. 2
7. Lipid metabolism – oxidation of fatty acid. 3
8. Enzymes, properties, types and enzyme kinetics; Factors affecting enzyme activity. 4
9. Ultra structure of muscle; chemical & physiological basis of skeletal muscle contraction. 4
10. Structure of mammalian nephron; physiology of urine formation; osmoregulators & osmoconformers. 4
11. Nature, origin and propagation of nerve impulse along a neuron; Synaptic & myoneuronal junctions. 4
12. Transport of 0_2 & CO_2 in mammals; Bohr and Haldane Effects; Chloride shift. 3
13. Temperature regulation in mammals. 3
14. Oestrous and menstrous cycle and their regulation. 3

Part-III

Paper – VII Practical **100 marks**

Unit-A: **35 marks**

Parasitology, Immunobiology & Microbiology

1. Parasitology (set any one) : preparation of gut content of cockroach, fowl and seminal vesicle smear from earthworm for observation on endoparasites. 15
2. Immunobiology (set anyone) : isolation of lymphocyte from blood/spleen; identification of lymphoid cells from prepared slides (spleen, lymph gland, bursafabriceous); determination of blood group (ABO & Rh) 5
   Demonstration of ELISA/ Immunofluroscence technique/blotting. 5
3. Microbiology (set any one) : Preparation of culture media; culture of microorganisms; staining of microbes (Gramstain). 10

Unit - B **45 marks**

Biochemistry, Animal Physiology, Biochemistry, Biophysics

1. Biochemistry (set any one) :

a. Qualitative tests for carbohydrate (glucose, fructose, Lactose/Maltose, Sucrose, Starch, Dextrin), Protein (albumin/globulin, gelatine, peptone).

b. Quantitative test- colorimetric analysis (Lowry's method) of protein; 30

2. Animal physiology & biochemistry (set any three; 10+10+5-25); Estimation of Hb; differential count; total count; determination of CT, BT & ESR (for white rat); Tests of ammonia, uric acid and urea in the urine offish (aquarium water) / toad, bird guano and cow respectively);
3. Biophysics-use of pH meter & estimation of pH of solutions. 10
   Demonstration to students on the use of digital balance, homogeniser, colorimeter/spectrophotometer, Electrophoresis and centrifuge machine. 5

Unit C : Laboratory note book & Viva-Voce **20 Marks**

1. Viva Voce 10
2. Laboratory Note Book 10

Part-III

Paper – VIII : Practical **100 marks**

Unit A: Ecology and Environmental Management **25 Marks**

1. Determination of dissolved O_2, free CO_2, alkalinity & hardness.
2. Determination of LC_{50} & LD_{50} of a pollutant.
3. Qualitative and Quantitative Study of Zooplankton and soil fauna.

Unit B: Identification **40 Marks**

Identification (upto sub-class for non chordates and order for chordates)

1. Non-chordates: *Elphidium, Scypha (= Sycon), Neptune's cup, Aurelia, Pennatula, Physalia; Sea-anemone, Madripora, Beroe, Nereis, Chaetopterus, Aphrodite, Squilla, Hippa, Eupagurus, Tachypleus or Carcinoscorpius, Peripatus, Belostoma, Chiton, Patella, Aplysia, Mytilus, Sepia, Loligo, Octopus, Asterias, Astropecten, Sea-urchin, sea-lily*, Hemichordate.
2. Chordates; *Branchiostoma, Ascidia, Petromyzon, Myxine, Torpedo, Sphyrnma, Exocoetus, Hippocampus,Echinus ,lchthyophis, Trilototriton, Axolotl larva, Cryptobranchus, Hyla, Chameleon, Gekko, Vipera, Naja, Hydrophis, Passer, Ploceus,Pycnonotus, Halcyon, Dinopium, Pteropus.*
3. Bones: appendicular bones of *Columba and Cavia; vertebrae of snake, Columba and Cavia; skull of Bufo, Rana, Chelonia,* venomous snake, *Columba, Cavia and Canis.*
4. Applied Zoology : *Entamoeba, Giardia, Trypanosoma, Plasmodium, Leishmania, Ascaris (male & female), Wuchereria bancrofti, Sitophilus, Tribolium, Tryporyza, Hispa, Apion, Leucinodes, skil worm life history stages, honey bee, lac insect, Culex, Anopheles, Aedes, Phlebotomus, Paeneus,Macrobrachium,Labeo rohita, L. bata, Cirhinus mrigala, Catla catla, Mugi/parsia, Lates calcarifer, Harpodon neherias.*

Unit- C : Project work, Field report, Laboratory Note book and Viva voce	**35 marks**
1. Project/review work	10
1. Field report: study of any ecosystem & its biodiversity	10
2. Viva Voce	05
3. Laboratory Note book	10

Note: Number at the end of each topic denotes number of classes required.

Syllabus for Three-Year Degree Course
in
Zoology General Course

Part – I

Paper – I : Theory	100 marks (90 + 10)
Gr. – A : Non-Chordata	30 marks
Gr. – B : Texonomy, Evolution, Adaptation & Distribution	30 marks
Gr. – C : Developmental Biology	20 marks
Gr. – D : Ecology, Ethology & Wildlife	20 marks

Part – II

Paper – II : Theory	100 marks (90 + 10)
Gr. – A : Chordata	30 marks
Gr. – B : Cell Biology, Genetics & Molecular Biology	30 marks
Gr. – C : Physiology & Biochemistry	20 marks
Gr. – D : Parasitology, Histology & Endocrinology	20 marks
Paper – III : Practical	100 marks

Part – III

Paper – IV : Applied Zoology (Theoretical & Practical)	100 marks
Gr. – A : Applied Zoology Theory	70 marks
(Univ. Exam. – 63; Int. Assessment – 07)	
Gr. – B : Applied Zoology Practical	30 marks

Detailed Syllabus

Part – I

Paper – I : Theory (University Exam. – 90, Int. Assessment – 10)

F.M. : 100 Marks **F.M. : 30 Marks**

Group – A : Non-chordata

1. Classification with distinctive features and suitable examples of Sub Kingdom Protozoa (upto Phylum) and Phylum Porifera, Cnidaria, Platyhelminthes, Nemathelminthes, Annelida, Arthropoda, Mollusca & Echinodermata (upto Sub Class) 9
2. General structure & function / processes of the following with reference to the specimens mentioned.
   - I) **Locomotion :** (i) Microfibrils (*Amoeba*), (ii) Flagella (*Euglena*), (ii) Cilia (*Paramoceium*), (iv) Parapodia (*Neanthes*) 3
   - II) **Feeding & Digestion :** (i) Microphagy (*Amoeba*), Macrophagy (*Periplaneta*), Canal system (*Sycon*) 3
   - III) **Respiration :** (i) Respiratory pigments (haemoglobin & hemocyanin), (ii) Ctenidium & Pulmonary sac (*Pila*), Gills, Trachea & book-lung (Prawn, Cockroach, Scorpion); 3
   - IV) **Excretion :** (i) Flame cells (*Taenia*), (ii) Nephridia (Earthworm), Malpighian Tubules (Cockroach), Green gland (Prawn) 3
   - V) **Circulation :** (i) Open circulation (cockroach), (ii) Closed circulation (earthworm), (iii) Haemal circulation (starfish) 3
   - VI) **Neural integration :** (i) Integration – simple & complex nerve nets, (ii) Nervous system cockroach, apple snail) 2
   - VII) **Reproduction & Life cycle :** (i) Fission (*Amoeba*), (ii) Conjugation (Paramoecium), (iii) Budding (*Hydra*), (iv) Metagenesis (*Obelia*), (v) Sexual reproduction (Earthworm & cockroach), (iv) Metamorphosis in insects (Mention only types) 4

Group B : Taxonomy, Evolution, Adaptation & Distribution : 30 marks

1. Definition of systematics & taxonomy. 1
2. Species as unit of evolution (definition & types : biological, sibling & polytypic) 5
3. Chemical basis of origin of life. 3
4. Darwinism & synthetic theory of evolution. 3
5. Hardy-Weinberg equilibrium in relation to natural selection – a brief idea. 2
6. Anatomical & physiological adaptations: aquatic, desert & Volant animals. 9
7. Zoogeographical realms & their subdivisions with characteristics fauna. 4
8. Schematic representation of geological time scale indicating time of origin of major animal groups. 3

Group C : Developmental Biology 20 marks

1. Spermatogenesis & Oogenesis. 5
2. Fertilization in sea-urchin. 2
3. Types of eggs & cleavage, process of cleavage in frog & chick 6
4. Gastrulation in frog & chick. 4
5. Placentation in mammals. (Rabbit) 2
6. Organiser concept 1

Group D : Ecology, Ethology & Wildlife 20 marks

1. *Ecology & Ecosystem* – definition, components, energy flow, food chain, food web, ecological pyramids. 6
2. Population – definition & growth types (logistic & exponential) 1
3. Community – definition & types. (major & minor community) 1
4. Pollution – air, water & noise. 6
5. Social behaviour of honey-bee. 2
6. Echolocation in bat. 2
7. Conservation of wildlife – purpose & methods; Concept of wild life sanctuary, National Park & Biosphere Reserve. 2

Part – II

Paper – II : Theory Full Marks 100

(Univ. Exam 90 & Internal Assessment – 10)

Group – A : Chordata **30 Marks**

1. Classification of Phylum Chordata with distinctive features and suitable example – upto living Orders (Amphibia, Reptilia & Mammalia); upto living Sub Class (Fishes & Aves) 6
2. Functional anatomy in relation to Filter feeding (*Branchiostoma*) 2
3. Structure & functions of the followings :
   (i) Integument – general structure & function; integumentary derivatives (scales in fishes; horny scales & plates in reptilian; feathers of birds; hairs of mammals) 3
   (ii) Digestive system – pharynx (*Ascidia*); stomach (*Columba & Bos*). 3
   (iii) Respiratory system – gills (fishes), accessory respiratory organs (fish), lungs, (*Bufo, Cohlumba* and *Cavia*) 4
   (iv) Excretory system – pro-, meso-, meta-nephric kidneys; modification of urinary ducts in vertebrates; Loop of Henle. 4
   (v) Circulatory system – single circuit heart (fish), double circuit heart (amphibian, bird and mammals); modification of aortic arches in vertebrates. 4
   (vi) Nervous system – Brain in *Bufo* & Man; origin & distribution of cranial nerves in *Bufo* and Man. 4

Group B : **30 Marks**

Cell Biology, Genetics & Molecular Biology

1. Ultrastructure & function of plasmamembrane, GERL system & ribosome. 4
2. Chromosome structure – nucleosome model. 2

3. Cell cycle, oncogene & cancer (basic idea). 3
4. Physico-chemical properties of DNA & RNA. 2
5. Nucleic acids as genetic materials. 2
6. Basic idea of replication, transcription in *Escherichia coli*. 4
7. Modes of inheritance of autosomal & sex-linked genes in man; Thalassemia & Haemophilia. 4
8. Linkage & recombination. 2
9. Point mutation and changes in chromosome number & structure with referene to Sickle-cell and anaemia, Down syndrome, Klinefelter syndrome & Turner syndrome. 4
10. Sex determination in *Drosophila.* 3

Physiology & Biochemistry

Group – C **20 marks**

1. Formed elements in vertebrate blood; clotting & coagulation; ABO blood group & Rh factor. 3
2. Enzyme classification & characteristics. 2
3. Classification of carbohydrate, protein & lipid; Concept of glycolysis, glycogenesis, neoglucogenesis (aerobic, anaerobic & fermentation). 5
4. Vitamins – chemical names, sources & deficiency disorders for Vit. A, B complex, C & E. 4
5. Physiology of nerve impulse & synaptic transmission. 3
6. Osmoconformers & Osmoregulators; Osmoregulation in fishes. 3

Parasitology, Histology & Endocrinology

Group – D **20 marks**

1. Parasitism (definition & different types) and other interspecific (symbiosis, commensalisms & mutualism) interactions. 3
2. Life history, pathogenicity and clinical features of (i) *Entamoeba histolytica*, (ii) *P. falciparum,*(iii) *Ascaris,* (iv) *Fasciola hepatica*.

3. Host-parasite interaction; Immune response, T & B lymphocytes. 4
4. Histology of pituitary, thyroid & pancreas and their hormonal functions in mammals. 5

Practical

Paper – III **100 marks**

1. Dissection : (two major dissections – one invertebrate & one vertebrate). 30 marks
   Earthworm – digestive & nervous systems.
   Apple snail – digestive & nervous systems.
   Cockroach – digestive, nervous & female reproductive system.
   Rohu/ Lata – afferent & efferent, urinogenital system, brain, cranial nerves (IXth & Xth origin & distribution).
2. Mounting & preparations (Two) 15 marks
   (a) Mouth parts of cockroach & mosquito.
   (b) Radula & osphradium of *Pila*.
   (c) Setae of earthworm.
   (d) Mounting of mosquito larva.
   (e) Cycloid, ctenoid & placoid scales.
   (f) Blood film of rat and haemolymph of cockroach (Leishman/ Giemsa stain).
   (g) Seminal vesicle of earthworm for Monocystid gregarines (Ehrlich hematoxylene).
   (h) Gut contents of cockroach for protozoa.
   (i) Whole mount of aquatic micro-arthropods.
   (j) Epithelial cells from buccal semears.
3. Identification with reasons : (one from bones, one from histological slides, two from non-chordates and two from chordate specimens; systematic position upto taxon as mentioned in the theory) 30 marks
   (a) Bones : Skull, vertebrae, limb & girdle bones of *Columba & Cavia*.
   (b) Histological slides : T.S. of mammalian stomach, duodenum, ileum, lung, liver, pancreas, testis, ovary, kidney, thyroid.

(c) Non-chordate specimens : *Amoeba, Plasmodium vivax, Paramoceium, Scypha, Obelia,* Sea-anaemone, *Ascaris Ancylostoma, Hirudinaria,* Centiped, Milliped, Scorpion, *Bombyx mori, Lamellidens, Achatina, Loligo,* Star fish, *Balanoglossus*.

(d) Chordate specimens : *Achatina, Branchiostoma, Petromyzon, Scoliodon, Lates, Anabas, Racophorus,* Axolotl larva, *Tylototriton, Gekko, Hemidactylus, Mabuia,* Turtle, *Naja,* Chiroptera.

4. Report on field study tours : 10 marks
   Any two sites of zoological importance : (Zoogarden, Museum, Sericultre centre, Apiculture centre, Fisheries, Agriculture farm & Coastal region.
5. *Viva voce.* 10 marks
6. Laboratory Note Book 5 marks

Part – III

Paper – IV **Full Marks 100**

Applied Zoology (Theoretical & Practical)

70 marks (University Exam. 63, Int. Ass. 7)

Group – A : Applied Zoology Theory

1. **Sericulture :** Characteristics of sericulture industry and its scope; kinds of silkworm, host plants and improvement of their variety. Life history and raring of *Bombyx mori,* harvesting & processing of cocoon, reeling & extracton of silk, pest on mulberry plants and diseases of *Bombyx mori* and control measures. Research & development of sericulture in India. 12
2. **Aquaculture :** Principles, definition & scope. Fisheries resources of India (Inland & off-shore) and their important inchthyofauna. Exotic fishes and their merits demerits. Fish breeding and their application. Basic principles of different aquaculture systems (polyculture, waste water recycling, Integrated farming). Marine pearl culture and culture of prawn and shrimps. 12
3. **Pest & Pest management :**
   (A) Definition and types of pest with examples. Life history, behaviour, ecology, damage and control of the following pests : (a) Paddy-Scirpophaga (syn. Tryporzya) incertulas (b) Stored grain Sitophilus oryzae (c) Wheat pest-(*Tanymecus inducus*) (d) Brinjal pest (Leucinodes orbinalis) (e) Jute pest-(*Anomis sabulifera*) (g) Mammal pest-(*Bandicoota bengalensis*). 12
   (B) Integrated pest management.
4. **Apiculture :** Development of Apiary in India, Types of honey bee, modern methods of apiary management, products and its uses. Problems and prospects. 6
5. **Lac culture :** Lac incets, Composition of Lac, strains of lac insects, cultivation of lac, Lac host plants (names only), processing of lac and its uses.

6. **Poultry :** Duck and fowl-Types of breeds, rearing and disease management.
7. Environment, Wildlife & Biodiversity : Basic idea of ecotoxicology & xenobiotics; concept of EIA; importance & strategies of wildlife conservation. Conservation act and application. Basic concept of biodiversity; biodiversity hotspots. Scheduled endangered Indian mammals. Animal cruelty (prevention) Act. 10
8. Biotechnology & Immunology : Basic concept of genetic engineering & cloning : Basic principles & techniques of gene manipulation; basic idea of vectors – plasmids, cosmid & bacteriophage; techniques & application of ELISA & RIA (basic idea); outline structure and classification of immunoglobulin; antigen-antibody reaction; basic principle of vaccination. 10

Group B : Applied Zoology Practical **30 marks**

1. Experimental works : 10 marks
   i. Estimation of dissolved O_2 content of water.
   ii. Estimation of salinity of water.
   iii. Pedegree analysis : sex-linked recessive, autosomal recessive & dominant.
   iv. Determination of ABO blood group & rh factor in man.
   v. Differential count of human blood.
   vi. LD_{50} dose determination for any toxicant on any model.
   vii. Measurement of water & soil pH handling pH meter.
   viii. Sampling of zooplankton & extraction of soil micro-arthropods.
   ix. Narcotisation of earthworm and *Achatina* using suitable techniques.
   x. Tests for food colours/ adulteration : mustard oil, red chilli powder, turmeric powder, toxic colours in vegetables/sweets.

2. Field training: (submit report of field training at any two places from below) 10 marks

i. Estuarine bheri/freshwater fish farm
ii. Poultry centre.
iii. Apiary.
iv. Sericulture centre.
v. Places of wildlife interest (Sanctuary, national park, biosphere reserves etc.)
vi. Agricultural farms for pest study & have idea of IPM practices.
vii. Species diversity studies in forest ecosystem/ coastal regions.

3. Identification : (write specimen characters & applied importance)

10 marks

*Plasmodium vivax, P. falciparum,*microfilaria of *Wucherria bancrofti, Taenia solium, Scirpophaga incertulus, Sitophilus oryzae, Tanymecus indicus, Leucinodes orbonalis, Anomis sabulifera, Lepisma, Termite, Bandicoota bengalensis, Labeo rohita, L bata, L. calbasu, Catla catla, Cirrhinus nirigala, Hypophthalmichthyes molitrix, Cyprinus carpio, Ctenopharyngodon idella, Ilsa ilisha, Penaeus monodon, Macrobrachium rosenbergi.*

Note : Number at the end of each topic denotes number of classes required.

Vidyasagar University

Curriculum for B.Sc. Honours in Zoology

[Choice Based Credit System]

Semester-I

Sl.No.	Name of the Subject	Nature	Code	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
C1	**C1T:** Non- Chordates-I	Core Course-1		4	0	0	6	75
	C1P: Non- Chordates-I (Practical)	Core Course1 [Practical]		0	0	4		
C2	**C2T:** Ecology	Core Course-2		4	0	0	6	75
	C2P: Ecology (Practical)	Core Course-2 [Practical]		0	0	4		
GE-1	GE-1	GE					4/5	75
	GE-1	GE					2/1	
AECC	English	AECC					2	50
				Total Credits =20				

L=Lecture, T=Tutorial, P=Practical

AECC- Ability Enhancement Compulsory Course: English /Modern Indian Language.

<u>Interdisciplinary/Generic Elective (GE) from other Department</u>

[**Four papers are to be taken and each paper will be of 6 credits**]:

[Papers are to be taken from any of the following discipline **(GE-1 Preferably Chemistry/Physiology)]:Chemistry/Botany/Physiology/ComputerSc./Microbiology/Bio Technology/ Geology /Nutrition /Aquaculture Management.**

Semester -1

Core Courses-1

CC-1: Non-Chordates I — Credits 06

C1T1 –Non-Chordates I — Credits 04

Non-Chordates I		
	4 Credits	**Class**
Unit 1: Basics of Animal Classification		4
Definitions: Classification, Systematics and Taxonomy; Taxonomic Hierarchy, Taxonomic types Codes of Zoological Nomenclature; Principle of priority; Synonymy and Homonymy; Six kingdom concept of classification (Card woese)		
Unit 2: Protista and Metazoa		15
Protozoa General characteristics and Classification up to phylum (according to Levine et. al., 1981) Locomotion in *Euglena*, *Paramoecium* and *Amoeba*; Conjugation in *Paramoecium*. Life cycle and pathogenicity of *Plasmodium vivax* and *Entamoeba histolytica* **Metazoa** Evolution of symmetry and segmentation of Metazoa		

Unit 3: Porifera	6
General characteristics and Classification up to classes; Canal system and spicules in sponges	
Unit 4: Cnidaria	10
General characteristics and Classification up to classes Metagenesis in *Obelia* & *Aurelia* Metagenesis in *Obelia* Polymorphism in Cnidaria Corals and coral reef diversity, function & conservation	
Unit 5: Ctenophora	2
General characteristics	
Unit 6: Platyhelminthes	6
General characteristics and Classification up to classes Life cycle and pathogenicity and control measures of *Fasciola hepatica* and *Taenia solium*	
Unit 7: Nematoda	7
General characteristics and Classification up to classes Life cycle, and pathogenicity and control measures of *Ascaris lumbricoides* and *Wuchereria bancrofti* Parasitic adaptations in helminthes	
Reference Books	
▸Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.	

- Invertebrates by Brusca & Brusca. Second edition, 2002.

Classification for metazoans to be followed from: Rupert and Barnes, 1994, 6th Edition.

C1 P1 –Non-Chordates I Lab Credits 02

List of Practical

1. Study of whole mount of *Euglena*, *Amoeba* and *Paramoecium*
2. Identification of *Amoeba, Euglena, Entamoeba, Opalina, Paramecium, Plasmodium vivax* and *Plasmodium falciparum* (from the prepared slides)
3. Identification of *Sycon*, Neptune's Cup, *Obelia*, *Physalia*, *Millepora*, *Aurelia*, *Tubipora*, *Corallium*, *Alcyonium*, *Gorgonia*, *Metridium*, *Pennatula*, *Fungia*, *Meandrina*, *Madrepora*
4. Identification and significance of adult *Fasciola hepatica*, *Taenia solium* and *Ascaris lumbricoides*
5. Staining/mounting of any protozoa/helminth from gut of cockroach

Core -2

CC-2: Ecology Credits 06

C2 T2 –Ecology Credits 04

Ecology		
	4 Credits	**Class**
Unit 1: Introduction to Ecology		4
History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors,Study of Physical factors, The Biosphere.		
Unit 2: Population		20
Unitary and Modular populations Unique and group attributes of population: Demographic factors, life tables, fecundity tables, survivorship curves, dispersal and dispersion. Geometric, exponential and logistic growth, equation and patterns, r and K strategies Population regulation - density-dependent and independent factors Population Interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation for competition.		
Unit 3: Community		11
Community characteristics: species diversity, abundance, , dominance, richness, Vertical stratification, Ecotone and edge effect. Ecological succession with one example		
Unit 4: Ecosystem		10
Types of ecosystem with an example in detail, 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 with an example of Nitrogen cycle Human modified ecosystem	
Unit 5: Applied Ecology	5
Wildlife Conservation (in-situ and ex-situ conservation). Management strategies for tiger conservation; Wild life protection act (1972)	

Reference Books

- Krebs, C. J. (2001). Ecology. VI Edition. Benjamin Cummings.
- Odum, E.P., (2008). Fundamentals of Ecology. Indian Edition.
- Brooks/Cole Robert Leo Smith Ecology and field biology
- Harper and Row publisher
- Ecology: Theories & Application (2001). 4th Edition by Peter Stilling.

Ecology by Cain, Bowman & Hacker. 3rd edition. Sinauer associates

C2 P2 –Ecology Lab Credits 02

List of 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 quadrate method and calculation of Shannon-Weiner diversity index for the same community

3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature,

   turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO_2

4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary

Note: In field report costal area to be included.

Generic Elective Syllabus

GE-1 [Interdisciplinary for other department]

GE-1 -Animal Cell Biotechnology Credits 06

GE-1 T1 -Animal Cell Biotechnology Credits 04

Animal Cell Biotechnology		
	4 Credits	**Class**
Unit 1: Introduction		2
Concept and Scope of Biotechnology		
Unit 2: Techniques in Gene manipulation		15
Recombinant DNA technology, Isolation of genes, Concept of restriction and modification: Restriction endonucleases, DNA modifying enzymes Cloning Vectors: Plasmids, Phage vectors, Cosmids, Phagemids, BAC, YAC, and HAC. Shuttle and Expression Vectors. Construction of Genomic libraries and cDNA libraries Transformation techniques: microbial, plants and animals: Cloning in mammalian cells, Integration of DNA into mammalian genome- Electroporation and Calcium Phosphate Precipitation method.		
Unit 3: Animal cell Culture		9
Basic techniques in animal cell culture and organ culture, Primary Culture and Cell lines,		

Culture

media- Natural and Synthetic, Stem cells, Cryopreservation of cultures.

Agarose and Polyacrylamide Gel Electrophoresis, Southern, Northern and Western blotting, DNA

sequencing: Sanger method, Polymerase chain reaction, DNA Fingerprinting and DNA microarrays.

Unit 4: Fermentation 8

Different types of Fermentation: Submerged & Solid state; batch, Fed batch & Continuous; Stirred

tank, Air Lift, Fixed Bed and Fluidized.

Downstream Processing: Filtration, centrifugation, extraction, chromatography, spray drying and

lyophilization.

Unit 5: Transgenic Animal Technology 6

Production of transgenic animals: nuclear transplantation, Retroviral method, DNA microinjection

method, Dolly and Polly.

Unit 6: Application in Health 6

Development of recombinant Vaccines, Hybridoma technology, Gene Therapy. Production of

recombinant Proteins: Insulin and growth hormones.

Unit 7: Bio safety Physical and Biological containment 4

Bio safety Physical and Biological containment

Reference Books

- Animal Cells Culture and Media, D.C. Darling and S.J. Morgan, 1994. BIOS Scientific

  Publishers Limited.

- Methods in Cell Biology, Volume 57, Jennie P. Mathur and David Barnes, 1998. Animal

  Cell Culture Methods Academic Press.

- P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2003).

- B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001).

- T.A. Brown: Gene cloning and DNA analysis: An Introduction, Blackwell Science (2001).

- Bernard R. Click & Jack J. Pasternak: Molecular Biotechnology, ASM Press, Washington

  (1998).

- Methods in Gene Biotechnology, W. Wu, M.J. Welsh, P.B. Kaufman &H.H. Zhang, 1997,

  CRC Press, New York

- Griffiths, A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart,

  W.M. (2009). An introduction to genetic analysis. IX Edition. Freeman & Co., N.Y., USA

GE-1 P1 –Animal Cell Biotechnology Lab Credits 02

List of Practical

1. Packing and sterilization of glass and plastic wares for cell culture.
2. Preparation of culture media.
3. Preparation of genomic DNA from E. coli/animals/ human.
4. Plasmid DNA isolation (p UC 18/19) and DNA quantitation using agarose gel electrophoresis (by using lambda DNA as standard).
5. Restriction digestion of lambda (λ) DNA using EcoR1 and Hind III.
6. Preparation of competent cells and Transformation of E. coli with plasmid DNA using CaCl2, Selection of transformants on X-gal and IPTG (Optional).
7. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting, PCR, DNA Microarrays

Vidyasagar University

Curriculum for B.Sc. Honours in Zoology [Choice Based Credit System]

Semester-II

Sl.No.	Name of the Subject	Nature	Code	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
C3	**C3T:** Non- Chordates-II	Core Course-3		4	0	0	6	75
	C3P: Non- Chordates-II (Practical)	Core Course-3 [Practical]		0	0	4		
C4	**C4T:** Cell Biology	Core Course-4		4	0	0	6	75
	C4P: Cell Biology (Practical)	Core Course-4 [Practical]		0	0	4		
GE-2	GE-2	GE					4/5	75
	GE-2	GE					2/1	
AECC -2	Environmental Studies	AECC					4	100
				Total Credits =22				

L=Lecture, T=Tutorial, P=Practical

AECC- Ability Enhancement Compulsory Course: Environmental Studies.

<u>Interdisciplinary/Generic Elective (GE) from other Department</u>
[**Four papers are to be taken and each paper will be of 6 credits**]:
[Papers are to be taken from any of the following discipline **Chemistry/Botany/Physiology/Computer Sc./Microbiology/Bio Technology/ Geology /Nutrition /Aquaculture Management.**

Semester –II

Core Courses
Core-3

CC-3 :Non-Chordates II — Credits 06

C3 T - Non-Chordates II — Credits 04

C3 T - Non-Chordates II

	4 Credits	Class
Unit 1: Introduction		2
Evolution of coelom and metamerism		
Unit 2: Annelida		10
General characteristics and Classification up to classes Excretion in Annelida through nephridia. Metamerism in Annelida.		
Unit 3:Arthropoda		16
General characteristics and Classification up to classes Vision in Insecta only. Respiration in Arthropoda (Gills in prawn and trachea in cockroach) Metamorphosis in Lepidopteran Insects. Social life in termite		
Unit 4: Onychophora		2
General characteristics and Evolutionary significance		
Unit 5: Mollusca		10
General characteristics and Classification up to classes Nervous system and torsion in Gastropoda Feeding and respiration in *Pila* sp		
Unit 6: Echinodermata		8

General characteristics and Classification up to classes

Water-vascular system in Asteroidea

Larval forms in Echinodermata

Affinities with Chordates

Unit 7: Hemichordata **2**

General characteristics of phylum Hemichordata. Relationship with non-chordates and chordates

Reference Books

- Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition
- TheInvertebrates: A New Synthesis, III Edition, Blackwell Science

Note: Classification to be followed from Rupert and Barnes, 1994, 6th Edition.

C3 P – Non-Chordates II Credits 02

List of Practical

1. Study of following specimens:
    a. Annelids - *Aphrodite, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus, Pheretima, Hirudinaria*
    b. Arthropods - *Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, Bombyx, Periplaneta*, termites and honey bees *Onychophora - Peripatus*
    c. Molluscs - *Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Pinctada, Sepia, Octopus, Nautilus*
    d. Echinodermates - *Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria* and
    e. Antedon
2. Study of digestive system, septal nephridia and pharyngeal nephridia of earthworm
3. T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm
4. Mount of mouth parts and dissection of digestive system and nervous system of *Periplaneta**
5. To submit a Project Report on any related topic to larval forms (crustacean, mollusc and echinoderm)

Core-4

CC-4 : Cell Biology — Credits 06

C4 T: Cell Biology — Credits 04

C4 T - Cell Biology

4 Credits — **Class**

Unit 1: Overview of Cells — 2

Basic structure of Prokaryotic and Eukaryotic cells, Viruses, Viroid, Prion and Mycoplasma

Unit 2: Plasma Membrane — 6

Ultra structure and composition of Plasma membrane: Fluid mosaic model

Transport across membrane: Active and Passive transport, Facilitated transport

Cell junctions: Tight junctions, Gap junctions, Desmosomes

Unit 3: Cytoplasmic organelles I — 5

Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes

Protein sorting and mechanisms of vesicular transport

Unit 4: Cytoplasmic organelles II — 6

Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis
Mitochondrial Respiratory Chain, Chemi-osmotic hypothesis
Peroxisomes: Structure and Functions

Centrosome: Structure and Functions

Unit 5: Cytoskeleton — 5

Type, structure and functions of cytoskeleton

Accessory proteins of microfilament & microtubule

A brief idea about molecular motors

Unit 6: Nucleus — 8

Structure of Nucleus: Nuclear envelope, Nuclear pore complex, Nucleolus

Chromatin: Euchromatin and Hetrochromatin and packaging (nucleosome)

Unit 7: Cell Division — 10

Cell cycle and its regulation, Cancer (Concept of oncogenes and tumor suppressor genes with special reference to p53, Retinoblastoma and Ras and APC. Mitosis and Meiosis: Basic process and their significance

Unit 8: Cell Signaling — 8

Cell signalling transduction pathways; Types of signaling molecules and receptors
GPCR and Role of second messenger (cAMP)
Extracellular matrix-Cell interactions
Apoptosis and Necrosis

Reference Books

- Lewin's Cells – 3rd Edition – Cassimeris/Lingappa/Plopper – Johns & Bartlett Publishers
- Biology of Cancer by Robert. A. Weinberg. 2nd edition.
- Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. V Edition. ASM Press and Sunderland, Washington, D.C.; Sinauer Associates, MA.
- Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James (2008). Molecular Biology of the Cell, V Edition, Garland publishing Inc., New York and London.

C4P–Cell Biology (Lab) Credits 02

Cell Biology

List of Practical

1. Preparation of temporary stained squash of onion root tip to study various stages of mitosis
2. Study of various stages of meiosis.
3. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.
4. Preparation of permanent slide to demonstrate:

    a. DNA by Feulgen reaction
    b. Cell viability study by Trypan Blue staining
    c. Mitochondria identification through vital staining

Generic Elective Syllabus

GE-2 [Interdisciplinary for other department]

GE-2 :Animal Diversity — Credits 06

GE2 T:Animal Diversity — Credits 04

GE2 T-Animal Diversity

	4 Credits	Class
Unit 1: Protista		**3**
Protozoa : General characters of Protozoa; Life cycle of *Plasmodium*		
Unit 2: Porifera		3
General characters and canal system in Porifera		
Unit 3: Radiata		3
General characters of Cnidarians and polymorphism		
Unit 4: Aceolomates		2
General characters of Helminthes		
Unit 5: Pseudocoelomates		3
General characters of Nematoda Parasitic adaptations		
Unit 6: Annelida		3
General characters of Annelida Metamerism		
Unit 7: Arthropoda		4
General characters. Social life in insects.		
Unit 8: Mollusca		4
General characters of mollusk. Pearl Formation		
Unit 9: Echynodermata		4
General characters of Echinodermata. Water Vascular system in Starfish.		

Unit 10: Protochordata 2

Salient features

Unit 11: Pisces 3

General Characters.
Osmoregulation, Migration of Fish

Unit 12: Amphibia 4

General characters, Adaptations for terrestrial life, Parental care

Unit 13: Reptilia 4

General Characters.
Amniotes; Origin of reptiles. Terrestrial adaptations in reptiles.

Unit 14: Aves 4

General Characters.
The origin of birds; Flight adaptations

Unit 15: Mammalia 4

General Characters.
Early evolution of mammals; Primates; Dentition in mammals.

Reference Books

- Barnes, R.D. (1992). Invertebrate Zoology. Saunders College Pub. USA.
- Ruppert, Fox and Barnes (2006) Invertebrate Zoology. A functional Evolutionary Approach
  7th Edition, Thomson Books/Cole
- Campbell & Reece (2005). Biology, Pearson Education, (Singapore) Pvt. Ltd.

Kardong, K. V. (2002). Vertebrates Comparative Anatomy. Function and Evolution. Tata McGraw Hill Publishing Company. New Delhi.

Raven, P. H. and Johnson, G. B. (2004). Biology, 6th edition, Tata McGraw Hill Publications. New Delhi.

GE2 P –Animal Diversity Lab Credits 02

List of Practical

1. Study of following specimens:

    a. Non Chordates: *Euglena*, *Noctiluca*, *Paramecium*, *Sycon*, , *Physalia*, *Tubipora*, *Metridium*, *Taenia*, *Ascaris*, *Nereis*, *Aphrodite*, Leech, *Peripatus*, *Limulus*, Hermitcrab, *Daphnia*, Millipede, Centipede, Beetle, *Chiton*, *Dentalium*, *Octopus*, *Asterias*, and *Antedon*.

    b. Chordates: *Balanoglossus*, *Amphioxus*, *Petromyzon*, *Pristis*, *Hippocampus*, *Labeo*, *Icthyophis*/*Uraeotyphlus*, Salamander, *Rhacophorus*, *Draco*, *Uromastix*, *Naja*, *Viper*, model of Archaeopteryx, any three common birds-(Crow, duck, Owl), Squirrel and Bat.

2. Study of following Permanent Slides:

    Cross section of *Sycon*, Sea anemone and *Ascaris* (male and female). T. S. of Earthworm passing through pharynx, gizzard, and typhlosolar intestine. Bipinnaria and Pluteus larva.

3. Temporary mounts of:

    a. Septal & pharyngeal nephridia of earthworm.

    b. Unstained mounts of Placoid, cycloid and ctenoid scales.

4. Dissections of:

    a. Digestive and nervous system of Cockroach

    b. Urinogenital system of Rat

Vidyasagar University

Curriculum for B.Sc (Honours) in Zoology
[Choice Based Credit System]

Semester-III

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
CC-5		**C5T:**Chordates	Core Course - 5	4	0	0	6	75
		C5P: Chordates Lab		0	0	4		
CC-6		**C6T:**Animal Physiology: Controlling & Coordinating Systems	Core Course - 6	4	0	0	6	75
		C6P: Animal Physiology: Controlling & Coordinating Systems Lab		0	0	4		
CC-7		**C7T:**Fundamentals of Biochemistry	Core Course - 7	4	0	0	6	75
		C7P: Fundamentals of Biochemistry Lab		0	0	4		
GE-3	TBD		Generic Elective -3				4/5	75
							2/1	
SEC-1		**SEC-1:**Apiculture Or **SEC-1:**Aquarium Fish Keeping	Skill Enhancement Course-1	1	1	0	2	50
Semester Total							**26**	**350**

L=Lecture, **T=** Tutorial, **P=**Practical, **CC =** Core Course, **GE**= Generic Elective, **SEC** = Skill Enhancement Course, **TBD =** to be decided

Generic Elective (GE) (Interdisciplinary) from other Department [**Four papers are to be taken and each paper will be of 6 credits**]:

Papers are to be taken from any of the following discipline:

Chemistry /Botany/Physiology/Computer Sc./Microbiology /Bio Technology/ Geology /Nutrition /Aquaculture Management.

Modalities of selection of Generic Electives (GE): A student shall have to choose **04** Generic Elective (GE1 to GE4) strictly from **02** subjects / disciplines of choice taking exactly **02** courses from each subjects of disciplines. Such a student shall have to study the curriculum of Generic Elective (GE) of a subject or discipline specified for the relevant semester.

Semester- III
Core Course (CC)

CC-5: Chordates **Credits 06**

C5T: Chordates **Credits 04**

Unit 1: Introduction to Chordates
General characteristics and outline classification of Phylum Chordata

Unit 2: Protochordata
General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. Retrogressive metamorphosis in *Ascidia*. Chordate Features and Feeding in *Branchiostoma*

Unit 3: Origin of Chordata
Dipleurula concept and the Echinoderm theory of origin of chordates
Advanced features of vertebrates over Protochordata

Unit 4: Agnatha
General characteristics and classification of cyclostomes up to order

Unit 5: Pisces
General characteristics and classification of Chondrichthyes and Osteichthyes up to Subclasses
Accessory respiratory organ, migration and parental care in fishes
Swim bladder in fishes. Classification up to Sub-Classes

Unit 6: Amphibia
General characteristics and classification up to living Orders.
Metamorphosis and parental care in Amphibia

Unit 7: Reptilia
General characteristics and classification up to living Orders.
Poison apparatus and Biting mechanism in Snake

Unit 8: Aves
General characteristics and classification up to Sub-Classes
Exoskeleton and migration in Birds
Principles and aerodynamics of flight

Unit 9: Mammals
General characters and classification up to living orders
Affinities of Prototheria
Exoskeleton derivatives of mammals
Adaptive radiation in mammals with reference to locomotory appendages
Echolocation in Micro chiropterans and Cetaceans

Unit 10: Zoogeography

Zoogeographical realms, Plate tectonic and Continental drift theory, distribution of birds and mammals in different realms

Suggested Readings :

1. Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.
2. Pough H. Vertebrate life, VIII Edition, Pearson International.
3. Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub Co.
4. Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc.
5. Parker, T. J. &Haswell, W. (1972). Text Book of Zoology, Volume II: Marshall and Willam (Eds.) 7th Ed. Macmillan Press, London.
6. Kardong, K. V. (2002). Vertebrates: Comparative anatomy, function evolution. Tata McGraw Hill.
7. Kent, G. C. & Carr, R. K. (2001). Comparative anatomy of the Vertebrates. 9th Ed. McGraw Hill.
8. Nelson, J.S., (2006) : Fishes of the World, 4th Edn., Wiley.
9. Romer, A. S. & Parsons, T. S. (1986). The vertebrate body. 6th Ed. Saunders College Publishing.
10. Jordan, E.L. &Verma, P.S. (2003). Chordate Zoology. S. Chand & Company Ltd. New Delhi.
11. Sinha, K. S., Adhikari, S., Ganguly, B. B. & Bharati Goswami, B. D. (2001). Biology of Animals. Vol. II. New Central Book Agency (p) Ltd.
12. Futuyama, D. (1997). Evolutionary Biology. 3rd Ed. Sinauer Associates, INC.

Note: Classifications for Protochordata, Agnatha, Reptilia, Aves and Mammalia to be followed from Young (1981), for Pisces to be followed from Romer (1959), for Amphibia to be followed from Duellman and Trueb (1986).

CP5: Chordates Lab **Credits 02**

List of Practical

1. Protochordata
   Balanoglossus, Herdmania, Branchiostoma
2. Agnatha
   Petromyzon, Myxine
3. Fishes
   Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetrodon/ Diodon, Anabas, Flat fish
4. Amphibia
   Necturus, Bufo, Hyla, Alytes, Axolotl, Tylototriton
5. Reptilia
   Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus. Key for Identification of poisonous and non-poisonous snakes
6. Mammalia: Bat (Insectivorous and Frugivorous), *Funambulus*
7. Pecten from Fowl head
8. Dissection of brain and pituitary of Tilapia

9. Power point presentation on study of any two animals from two different classes by students (may be included if dissections not given permission)

CC-6: Animal Physiology: Controlling & Coordinating Systems Credits 06

C6T: Animal Physiology: Controlling & Coordinating Systems Credits 04

Unit 1: Tissues
Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue and, fixation and staining of tissues.

Unit 2: Bone and Cartilage
Structure and types of bones and cartilages, Ossification

Unit 3: Nervous System
Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; Types of synapse, Synaptic transmission and Neuromuscular junction; Reflex action and its types

Unit 4: Muscular system
Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle fibre

Unit 5: Reproductive System
Histology of testis and ovary
Physiology of Reproduction

Unit 6: Endocrine System
Histology and function of pituitary, thyroid, pancreas and adrenal
Classification of hormones; Mechanism of Hormone action
Signal transduction pathways for Steroidal and Non steroidal hormones
Hypothalamus (neuroendocrine gland) - principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system
Placental hormones

Suggested Readings :

1. Histology: A Text and Atlas. Sixth Edition. Ross & Pawlina. Lippincott Williams & Wilkins.
2. Eckert Animal Physiology by David Randall and Warren Burggren. 4th edition. W. H. Freeman.

C6P: Animal Physiology: Controlling & Coordinating Systems Lab Credits 02

List of Practical

1. Recording of simple muscle twitch with electrical stimulation (or Virtual)

2. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex)
3. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells
4. Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid
5. Microtomy: Preparation of permanent slide of any five mammalian (Goat/white rat) tissues

CC-7: Fundamentals of Biochemistry **Credits 06**

C7T: Fundamentals of Biochemistry **Credits 04**

Unit 1: Carbohydrates
Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of Monosachharides

Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis

Unit 2: Lipids
Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpinoids.

Lipid metabolism: β-oxidation of fatty acids; Fatty acid biosynthesis

Unit 3: Proteins
Amino acids
Structure, Classification, General and Electro chemical properties of α-amino acids; Physiological importance of essential and non-essential amino acids
Proteins
Bonds stabilizing protein structure; Levels of organization
Protein metabolism: Transamination, Deamination, Urea cycle, Fate of C-skeleton of Glucogenic and Ketogenic amino acids

Unit 4: Nucleic Acids
Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids
Types of DNA and RNA, Complementarity of DNA, Hpyo- Hyperchromaticity of DNA
Basic concept of nucleotide metabolism

Unit 5: Enzymes
Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Derivation of Michaelis-Menten equation, Lineweaver-Burk plot;
Factors affecting rate of enzyme-catalyzed reactions; Enzyme inhibition; Allosteric enzymes and their kinetics; Strategy of enzyme action- Catalytic and Regulatory (Basic concept with one example each)

Unit 5: Oxidative Phosphorylation
Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System

C7P: Fundamentals of Biochemistry Lab **Credits 02**

List of Practical

1. Qualitative tests of functional groups in carbohydrates, proteins and lipids.
2. Paper chromatography of amino acids.
3. Quantitative estimation of Lowry Methods.
4. Demonstration of proteins separation by SDS-PAGE.
5. To study the enzymatic activity of Trypsin and Lipase.
6. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.

Suggested Readings:

1. Cox, M.M and Nelson, D.L. (2008). Lehninger's Principles of Biochemistry, V Edition, W.H. Freeman and Co., New York.
2. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2007). Biochemistry, VI Edition, W.H. Freeman and Co., New York.
3. Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A.(2009). Harper's Illustrated Biochemistry, XXVIII Edition, International Edition, The McGraw- Hill Companies Inc.
4. Hames, B.D. and Hooper, N.M. (2000). Instant Notes in Biochemistry, II Edition, BIOS Scientific Publishers Ltd., U.K.
5. Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R. (2008). Molecular Biology of the Gene, VI Edition, Cold Spring Harbor Lab. Press, Pearson Pub.

Skill Enhancement Course (SEC)

SEC1: Apiculture **Credits 02**

SEC1T: Apiculture

Unit 1: Biology of Bees
History, Classification and Biology of Honey Bees
Social Organization of Bee Colony

Unit 2: Rearing of Bees
Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth
Bee Pasturage
Selection of Bee Species for Apiculture
Bee Keeping Equipment
Methods of Extraction of Honey (Indigenous and Modern)

Unit 3: Diseases and Enemies
Bee Diseases and Enemies
Control and Preventive measures

Unit 4: Bee Economy
Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc

Unit 5: Entrepreneurship in Apiculture
Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens

Suggested Readings :

1. Prost, P. J. (1962). Apiculture. Oxford and IBH, New Delhi.
2. Bisht D.S., Apiculture, ICAR Publication.
3. Singh S., Beekeeping in India, Indian council of Agricultural Research, New Delhi.

Or

SEC1: Aquarium Fish Keeping **Credits 02**

SEC1T: Aquarium Fish Keeping

Aquarium Fish Keeping

Unit 1: Introduction to Aquarium Fish Keeping
The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes

Unit 2: Biology of Aquarium Fishes
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 3: Food and feeding of Aquarium fishes
Use of live fish feed organisms. Preparation and composition of formulated fish feeds, Aquarium fish as larval predator

Unit 4: Fish Transportation
Live fish transport - Fish handling, packing and forwarding techniques.

Unit 5: Maintenance of Aquarium
General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry

Generic Elective
GE-3 [Interdisciplinary for other department]

GE-3: Aquatic Biology **Credits 06**

GE3T: Aquatic Biology **Credits 04**

Unit 1: Aquatic Biomes
Brief introduction to the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs.

Unit 2: Freshwater Biology
Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico–chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity, dissolved gases (Oxygen, Carbon dioxide). Nutrient Cycles in Lakes (Nitrogen, Sulphur and Phosphorous).

Streams: Different stages of stream development, Physico-chemical environment, Adaptation of hill- stream fishes.

Unit 3: Marine Biology
Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds.

Unit 4: Management of Aquatic Resources
Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD

GE3 P: Aquatic Biology Lab **Credits 02**

List of Practical

1. Determine the area of a lake using graphimetric and gravimetric method.
2. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.
3. Determine the amount of Turbidity/transparency, Dissolved Oxygen, and Free Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from a nearby lake / water body.
4. Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.

5. A Project Report on a visit to a Sewage treatment plant/Marine bio- reserve/Fisheries Institute.

Suggested Readings :

1. Anathakrishnan : Bioresources Ecology 3rd Edition
2. Goldman : Limnology, 2nd Edition
3. Odum and Barrett : Fundamentals of Ecology, 5th Edition
4. Pawlowski: Physicochemical Methods for Water and Wastewater Treatment, 1st Edition
5. Wetzel : Limnology, 3rd edition
6. Trivedi and Goyal : Chemical and biological methods for water pollution studies
7. Welch : Limnology Vols. I-II

Vidyasagar University

Curriculum for B.Sc (Honours) in Zoology
[Choice Based Credit System]

Semester-IV

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
CC-8		**C8T:** Comparative Anatomy of Vertebrates	Core Course - 8	4	0	0	6	75
		C8P: Practical		0	0	4		
CC-9		**C9T:** Animal Physiology: Life Sustaining Systems	Core Course - 9	4	0	0	6	75
		C9P: Practical		0	0	4		
CC-10		**C10T:** Immunology	Core Course - 10	4	0	0	6	75
		C10P: Practical		0	0	4		
GE-4	TBD		Generic Elective -4				4/5	75
							2/1	
SEC-2		**SEC2:** Medical Diagnostic Techniques **Or** Sericulture	Skill Enhancement Course-2	1	1	0	2	50
Semester Total							**26**	**350**

L=Lecture, **T**= Tutorial, **P**=Practical, **CC** = Core Course, **GE**= Generic Elective, **SEC** = Skill Enhancement Course, **TBD** = to be decided

Generic Elective (GE) (Interdisciplinary) from other Department [**Four papers are to be taken and each paper will be of 6 credits**]: **Chemistry/Botany/Physiology/Computer Sc./Microbiology/Bio Technology/ Geology /Nutrition /Aquaculture Management.**

Modalities of selection of Generic Electives (GE): A student shall have to choose **04** Generic Elective (GE1 to GE4) strictly from **02** subjects / disciplines of choice taking exactly **02** courses from each subjects of disciplines. Such a student shall have to study the curriculum of Generic Elective (GE) of a subject or discipline specified for the relevant semester.

Semester-IV

Core Course (CC)

CC-8: Comparative Anatomy of Vertebrates **Credits 06**

C8T: Comparative Anatomy of Vertebrates **Credits 04**

Course Contents:

Unit 1: Integumentary System

Structure, function and derivatives of integument in amphibian, birds and mammals

Unit 2: Skeletal System

Overview of axial and appendicular skeleton; Jaw suspension; Visceral arches.

Unit 3: Digestive System

Comparative anatomy of stomach; dentition in mammals

Unit 4: Respiratory System

Respiratory organs in fish, amphibian, birds and mammals

Unit 5: Circulatory System

General plan of circulation, Comparative account of heart and aortic arches

Unit 6: Urinogenital System

Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri

Unit 7: Nervous System

Comparative account of brain, Cranial nerves in mammals

Unit 8: Sense Organs

Classification of receptors, Brief account of olfactory and auditory receptors in vertebrate

Suggested Readings:

- Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution. IV Edition. McGraw-Hill Higher Education
- Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies
- Hilderbrand, M and Gaslow G.E. Analysis of Vertebrate Structure, John Wiley and Sons Saxena, R.K. &Saxena, S.C.(2008) : Comparative Anatomy of Vertebrates, Viva Books Pvt. Ltd.

C8P: Comparative Anatomy of Vertebrates **Credits 02**

List of Practical

1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs.
2. Study of disarticulated skeleton of Toad, Pigeon and Guineapig.
3. Demonstration of Carapace and plastron of turtle.
4. Identification of mammalian skulls: One herbivorous (Guineapig) and one carnivorous (Dog) animal.
5. Dissection of Tilapia: Circulatory system, Brain, pituitary, urinogenital system.

CC-9: Animal Physiology: Life Sustaining Systems **Credits 06**

C9T: Animal Physiology: Life Sustaining Systems **Credits 04**

Course Contents:

Unit 1: Physiology of Digestion

Structural organisation and functions of Gastrointestinal tract and Associated glands; Mechanical and chemical digestion of food, absorption of Carbohydrates, Lipids, Proteins and Nucleic Acids; Digestive enzymes

Unit 2: Physiology of Respiration

Mechanism of Respiration, Respiratory volumes and capacities, transport of Oxygen and Carbon dioxide in blood, Dissociation curves and the factors influencing it, respiratory pigments; Carbon monoxide poisoning

Unit 3: Physiology of Circulation

Components of Blood and their functions; Structure and functions of haemoglobin Haemostasis; Blood clotting system, Fibrinolytic system Haemopoiesis; Basic steps and its regulation Blood groups; ABO and Rh factor

Unit 4: Physiology of Heart

Structure of mammalian heart, Coronary Circulation, Structure and working of conducting myocardial fibres, Origin and conduction of cardiac impulses Cardiac Cycle and cardiac output Blood pressure and its regulation

Unit 5: Thermoregulation & Osmoregulation

Physiological classification based on thermal biology.

Thermal biology of endotherms

Osmoregulation in aquatic vertebrates

Extrarenal osmoregulatory organs in vertebrates

Unit 6: Renal Physiology

Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acid-base balance

Suggested Readings:

- Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hercourt
- Asia PTE Ltd. W.B. Saunders Company.
- Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition John Wiley & sons,
- Eckert Animal Physiology: Mechanisms and adaptations Randall, Burggren and FrenchVander A, Sherman J. and Luciano D. (2014). Vander's Human Physiology: The Mechanism of Body Function. XIII Edition, McGraw Hills
- Victor P. Eroschenko. (2008). diFiore's Atlas of Histology with Functional correlations. XII Edition. Lippincott W. & Wilkins.
- Vander A, Sherman J. and Luciano D. (2014). Vander's Human Physiology: The Mechanism of Body Function. XIII Edition, McGraw Hills

C9P: Animal Physiology: Life Sustaining Systems Lab **Credits 02**

List of Practical

1. Determination of ABO Blood group
2. Enumeration of red blood cells and white blood cells using haemocytometer
3. Estimation of haemoglobin using Sahli's haemoglobinometer
4. Preparation of haemin and haemochromogen crystals
5. Recording of blood pressure using a sphygmomanometer

CC-10: Immunology **Credits 06**

C10T: Immunology **Credits 04**

Course Contents:

Unit 1: Overview of Immune System

Basic concepts of health and diseases, Historical perspective of Immunology, Cells and organs of the Immune system

Unit 2: Innate and Adaptive Immunity

Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral).

Unit 3: Antigens

Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T-Cell epitopes

Unit 4: Immunoglobulins

Structure and functions of different classes of immunoglobulins, Antigen- antibody interactions,

Immunoassays (ELISA and RIA), Hybridoma technology, Monoclonal antibody production

Unit 5: Major Histocompatibility Complex

Structure and functions of MHC molecules.

Structure of T cell Receptor and its signalling, T cell development & selection

Unit 6: Cytokines

Types, properties and functions of cytokines.

Unit 7: Complement System

Components and pathways of complement activation.

Unit 8: Hypersensitivity

Gell and Coombs' classification and brief description of various types of hypersensitivities.

Unit 9: Immunology of diseases

Malaria, Filariasis, Dengue and Tuberculosis

Unit 10: Vaccines

Various types of vaccines. Active & passive immunization (Artificial and natural).

Suggested Readings:

- Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2006). Immunology, VI Edition. W.H. Freeman and Company.
- Abbas, K. Abul and Lechtman H. Andrew (2003.) Cellular and Molecular Immunology. V Edition. Saunders Publication.

C10P: Immunology Lab **Credits 02**

List of Practical

1. Demonstration of lymphoid organs.
2. Histological study of spleen, thymus and lymph nodes through slides/ photographs
3. Preparation of stained blood film to study various types of blood cells.
4. ABO blood group determination.
5. Demonstration of ELISA

Skill Enhancement Courses (SEC)

SEC-2: Medical Diagnostic Techniques **Credits 02**

SEC2T: Medical Diagnostic Techniques

Course Contents:

Unit 1: Introduction to Medical Diagnostics and its Importance

Unit 2: Diagnostics Methods Used for Analysis of Blood

Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)

Unit 3: Diagnostic Methods Used for Urine Analysis

Urine Analysis: Physical characteristics; Abnormal constituents

Unit 4: Non-infectious Diseases

Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit

Unit 5: Infectious Diseases

Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis, Malarial parasite (Microscope based and ELISA based)

Unit 6: Clinical Biochemistry

LFT, Lipid profiling

Unit 7: Clinical Microbiology

Antibiotic Sensitivity Test

Unit 8: Tumours

Types (Benign/Malignant), Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan (using photographs).

Unit 9: Visit to Pathological Laboratory and Submission of Project

Suggested Readings:

- Park, K. (2007), *Preventive and Social Medicine*, B.B. Publishers
- Godkar P.B. and Godkar D.P. *Textbook of Medical Laboratory Technology*, II Edition, Bhalani Publishing House
- Cheesbrough M., *A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses*
- Guyton A.C. and Hall J.E. T*extbook of Medical Physiology*, Saunders Robbins and Cortan, *Pathologic Basis of Disease*, VIII Edition, Saunders
- Prakash, G. (2012), *Lab Manual on Blood Analysis and Medical Diagnostics*, S. Chand and Co. Ltd.

Or

SEC-2: Sericulture **Credits 02**

SEC2T: Sericulture

Course Contents:

Unit 1: Introduction

Sericulture: Definition, history and present status; Silk route

Types of silkworms, Distribution and Races

Exotic and indigenous races

Mulberry and non-mulberry Sericulture

Unit 2: Biology of Silkworm

Life cycle of *Bombyx mori*

Structure of silk gland and secretion of silk

Unit 3: Rearing of Silkworms

Selection of mulberry variety and establishment of mulberry garden

Rearing house and rearing appliances.

Disinfectants: Formalin, bleaching powder, RKO

Silkworm rearing technology: Early age and Late age rearing

Types of mountages

Spinning, harvesting and storage of cocoons

Unit 4: Pests and Diseases

Pests of silkworm: Uzi fly, dermestid beetles and vertebrates

Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial

Control and prevention of pests and diseases

Unit 5: Entrepreneurship in Sericulture

Prospectus of Sericulture in India: Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture Visit to various sericulture centres.

Suggested Readings:

- Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
- Solar energy - M P Agarwal - S Chand and Co. Ltd.

- Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd Godfrey Boyle, “Renewable Energy, Power for a sustainable future”, 2004,
- Oxford University Press, in association with The Open University.
- Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
- J. Balfour, M. Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA). http://en.wikipedia.org/wiki/Renewable_energy

Generic Elective Syllabus
GE-4 [Interdisciplinary for other department]

GE-4: Insect Vectors and Diseases **Credits 06**

GE4T: Insect Vectors and Diseases **Credits 04**

Course Contents:

Unit 1: Introduction to Insects

General Features of Insects, Morphological features, Head – Eyes, Types of antennae, Mouth Parts

Unit 2: Concept of Vectors

Brief introduction to Vectors (mechanical and biological vectors),Reservoirs, Host-vector relationship, Adaptations as vectors, Host specificity

Unit 3: Insects as Vectors

Detailed features of orders with insects as vectors – Diptera, Siphonaptera, Siphunculata, Hemiptera

Unit 4: Dipteran as Disease Vectors

Dipterans as important insect vectors – Mosquitoes, Sand fly, Houseflies

Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis Control of mosquitoes

Study of sand fly-borne diseases –Leishmaniasis,; Control of Sand fly

Study of house fly as important mechanical vector, Myiasis, Control of house fly

Unit 5: Siphonaptera as Disease Vectors

Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas

Unit 6: Siphunculata as Disease Vectors

Human louse (Head, Body and Pubic louse) as important insect vectors; Control of human louse

Unit 7: Hempitera as Disease Vectors

Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures

Suggested Readings:

- Imms, A.D. (1977). A General Text Book of Entomology. Chapman & Hall, UK
- Chapman, R.F. (1998). The Insects: Structure and Function. IV Edition, Cambridge University Press, UK
- Pedigo L.P. (2002). Entomology and Pest Management. Prentice Hall Publication
- Mathews, G. (2011). Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases. Wiley-Blackwell
- Mosquito (2000) Chandra G, Sribhumi Publication Co. Kolkata
- Medical Entomology, Hati A. K Allied Book Agency, Kolkata

GE4P: Insect Vectors and Diseases Lab **Credits 02**

List of Practical

1. Study of different kinds of mouth parts of insects
2. Study of following insect vectors through permanent slides/ photographs: *Aedes*, *Culex*, *Anopheles*, *Pediculus humanus capitis*, *Pediculus humanus corporis*, *Phithirus pubis*, *Xenopsylla cheopis*, *Cimex lectularius*, *Phlebotomus argentipes*, *Musca domestica* through permanent slides/ photographs
3. Study of different diseases transmitted by above insect vectors

Submission of a project report on any one of the insect vectors and disease transmitted

Or

GE-4: Environment and Public Health **Credits 06**

GE4T: Environment and Public Health **Credits 04**

Course Contents:

Unit 1: Introduction

Sources of Environmental hazards, Hazard identification and accounting, Fate of toxic and persistent substances in the environment, Dose response evaluation, Exposure assessment.

Unit 2: Climate Change

Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health

Unit 3: Pollution

Air, water, noise pollution sources and effects, Pollution control.

Unit 4: Waste Management Technologies

Sources of waste, types and characteristics, Sewage disposal and its management, Solid waste disposal, Biomedical waste handling and disposal, Nuclear waste handling and disposal, Waste from thermal power plants.

Unit 5: Diseases

Causes, symptoms and control of tuberculosis, Asthma, Cholera, Minamata disease, typhoid, filariasis

Suggested Readings:

- Cutter, S.L., Environmental Risk and Hazards, Prentice-Hall of India Pvt. Ltd., New Delhi, 1999.
- Kolluru Rao, Bartell Steven, Pitblado R and Stricoff "Risk Assessment and Management Handbook", McGraw Hill Inc., New York, 1996.
- Kofi Asante Duah "Risk Assessment in Environmental management", John Wiley and sons, Singapore, 1998.
- Kasperson, J.X. and Kasperson, R.E. and Kasperson, R.E., Global Environmental Risks, V. N. University Press, New York, 2003.
- Joseph F Louvar and B Diane Louver Health and Environmental Risk Analysis
- fundamentals with applications, Prentice Hall, New Jersey 1997.

GE4P: Environment and Public Health Lab **Credits 02**

List of Practical

To determine pH, Cl, SO_4, NO_3 in soil and water samples from different locations.

Vidyasagar University

Curriculum for B.Sc. (Honours) in Zoology [Choice Based Credit System]

Semester-V

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
CC- 11		C11T: Molecular Biology	Core Course-11	4	0	0	6	75
		- Lab		0	0	4		
CC- 12		C12T: Genetics	Core Course-12	4	0	0	6	75
		- Lab		0	0	4		
DSE-1		TBD	Discipline Specific Elective - 1	4	0	0	6	75
				0	0	4		
DSE-2		TBD	Discipline Specific Elective -2	4	0	0	6	75
				0	0	4		
Semester Total							**24**	**300**

L= Lecture, **T=** Tutorial, **P =** Practical, **CC -** Core Course, **TBD -** To be decided, **DSE:** Discipline Specific Elective.

Semester-V

List of Core Course (CC)

CC-11: Molecular Biology
CC-12: Genetics

Discipline Specific Electives (DSE)

DSE-1: Animal Behaviour and Chronobiology
Or
DSE-1: Fish and Fisheries
Or
DSE-1: Reproductive Biology

DSE-2: Animal Biotechnology
Or
DSE-2: Microbiology

Semester-V

Core Courses (CC)

CC-11: Molecular Biology **Credits 06**

C11T: Molecular Biology **Credits 04**

Course Contents:

Unit 1: Nucleic Acids

Salient features of DNA and RNA. Watson and Crick Model of DNA

Unit 2: DNA Replication

Mechanism of DNA Replication in Prokaryotes, Semi-conservative, bidirectional and discontinuous Replication, RNA priming, Replication of telomeres

Unit 3: Transcription

Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription.

Unit 4: Translation

Mechanism 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; Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation

Unit 5: Post Transcriptional Modifications and Processing of Eukaryotic RNA

Capping and Poly A tail formation in mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA

Unit 6: Gene Regulation

Regulation of Transcription in prokaryotes: *lac* operon and *trp* operon;
Regulation of Transcription in eukaryotes: Activators, enhancers, silencer, repressors, miRNA mediated gene silencing, Genetic imprinting

Unit 7: DNA Repair Mechanisms

Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair

Unit 8: Molecular Techniques

PCR, Western and Southern blot, Northern Blot, Sanger DNA sequencing

Suggested Readings:

1. Molecular Cell Biology by Harvey Lodish. 7th Edition. W.H. Freeman.
2. Molecular Biology of the Gene by Watson. 7th Edition. Pearson.

3. iGenetics: A Molecular Approach by Peter. J. Russell. 3rd edition. Pearson Benjamin Cummings.

C11P: Molecular Biology (Lab) **Credits 02**

List of Practical

1. Demonstration of polytene and lampbrush chromosome from photograph
2. Isolation and quantification of genomic DNA using spectrophotometer (A260 measurement)
3. Agarose gel electrophoresis for DNA

CC-12: Genetics **Credits 06**

C12T: Genetics **Credits 04**

Course Contents:

Unit 1: Mendelian Genetics and its Extension
Principles of inheritance, Incomplete dominance and co-dominance, Epistasis Multiple alleles, Lethal alleles, Pleiotropy, Sex-linked, sex- influenced and sex-limited inheritance, Polygenic Inheritance.

Unit 2: Linkage, Crossing Over and Chromosomal Mapping
Linkage and Crossing Over, molecular basis of crossing over, Measuring Recombination frequency and linkage intensity using three factor crosses, Interference and coincidence

Unit 3: Mutations
Types of gene mutations (Classification), Types of chromosomal aberrations (Classification with one suitable example of each), Non-disjunction and variation in chromosome number; Molecular basis of mutations in relation to UV light and chemical mutagens

Unit 4: Sex Determination
Mechanisms of sex determination in *Drosophila*
Sex determination in mammals
Dosage compensation in *Drosophila* & Human

Unit 5: Extra-chromosomal Inheritance
Criteria for extra chromosomal inheritance, Antibiotic resistance in *Chlamyadomonas,* Kappa particle in *Paramoecium* Shell spiralling in snail

Unit 6: Recombination in Bacteria and Viruses
Conjugation, Transformation, Transduction, Complementation test in Bacteriophage

Unit 7: Transposable Genetic Elements
Transposons in bacteria, Ac-Ds elements in maize and P elements in *Drosophila,* LINE, SINE, Alu elements in humans

Suggested Readings:

1. Developmental biology by Scott. F. Gilbert, 9th edition.
2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc

3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings
4. Russell, P. J. (2009). Genetics- A Molecular Approach.III Edition. Benjamin Cummings Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B.

C12P: Genetics (Lab) **Credits 02**

List of Practical

1. Chi-square analyses
2. Linkage maps based on conjugation
3. Identification of chromosomal aberration in Drosophila and man from photograph
4. Pedigree analysis of some human inherited traits

Discipline Specific Electives (DSE)

DSE-1 : Animal Behaviour and Chronobiology **Credits 06**

DSE1T : Animal Behaviour and Chronobiology **Credits 04**

Course Contents:

Unit 1: Introduction to Animal Behaviour

Origin and history of Ethology, Brief profiles of Karl Von Frish, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen Proximate and ultimate causes of behaviour, Methods and recording of a behaviour

Unit 2: Patterns of Behaviour

Stereotyped Behaviours (Orientation, Reflexes); Individual Behavioural patterns; Instinct vs. Learnt Behaviour; Associative learning, classical and operant conditioning, Habituation, Imprinting.

Unit 3: Social and Sexual Behaviour

Social Behaviour: Concept of Society; Communication and the senses

Altruism; Insects' society with Honey bee as example; Foraging in honey bee and advantages of the waggle dance.

Sexual Behaviour: Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Sexual conflict in parental care.

Unit 4: Introduction to Chronobiology

Historical developments in chronobiology; Biological oscillation: the concept of Average, amplitude, phase and period.

Adaptive significance of biological clocks

Unit 5: Biological Rhythm

Types and characteristics of biological rhythms: Short- and Long- term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms; Concept of synchronization and masking; Photic and non-photic zeitgebers; Circannual rhythms; Photoperiod and regulation of seasonal reproduction of vertebrates; Role of melatonin.

Suggested Readings:

1. Animal Behaviour by Drickamar.
2. John Alcock, Animal Behaviour, Sinauer Associate Inc., USA.
3. Paul W. Sherman and John Alcock, Exploring Animal Behaviour, Sinauer Associate Inc., Massachusetts, USA.
4. Chronobiology Biological Timekeeping: Jay. C. Dunlap, Jennifer. J. Loros Patricia J. De Coursey (ed). 2004, Sinauer Associates, Inc. Publishers, Sunderland, MA, USA
5. Insect Clocks D.S. Saunders, C.G.H. Steel, X., Afopoulou (ed.) R.D. Lewis. (3rdEd) 2002 Barens and Noble Inc. New York, USA
6. Biological Rhythms: Vinod Kumar (2002) Narosa Publishing House, Delhi/ Springer-Verlag, Germany.

DSE1P: Animal Behaviour and Chronobiology (Lab) **Credits 02**

List of Practical

1. To study nests and nesting habits of the birds and social insects.
2. To study the behavioural responses of wood lice to dry and humid conditions.
3. To study geotaxis behaviour in earthworm.
4. To study the phototaxis behaviour in insect larvae.
5. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report.
6. Study and actogram construction of locomotor activity of suitable animal models.
7. Study of circadian functions in humans (daily eating, sleep and temperature patterns).

Or

DSE-1: Fish and Fisheries **Credits 06**

DSE1T: Fish and Fisheries **Credits 04**

Course Contents:

Unit 1: Introduction and Classification

General description of fish
Feeding habit, habitat and manner of reproduction
Classification of fish (up to Subclasses)

Unit 2: Morphology and Physiology

Types of fins and their modifications; Locomotion in fish; Hydrodynamics; Types of Scales, Use of scales in Classification and determination of age of fish; Gills and gas exchange; Swim Bladder: Types and role in Respiration, buoyancy; Osmoregulation in Elasmobranchs; Reproductive strategies (special reference to Indian fish); Electric organ, Bioluminescence

Unit 3: Fisheries

Inland Fisheries; Marine Fisheries; Environmental factors influencing the seasonal variations in fish catches in the Arabian Sea and the Bay of Bengal; Fishing crafts and Gears; Depletion of fisheries resources; Application of remote sensing and GIS in fisheries; Fisheries law and regulations

Unit 4: Aquaculture

Sustainable Aquaculture; Extensive, semi-intensive and intensive culture of fish; Pen and cage culture; Polyculture; Composite fish culture; Brood stock management; Induced breeding of fish; Management of finfish hatcheries; 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 5: Fish in research

Transgenic fish

Zebrafish as a model organism in research

Suggested Readings:

1. Q Bone and R Moore, Biology of Fishes, Talyor and Francis Group, CRC Press, U.K.
2. D. H. Evans and J. D. Claiborne, The Physiology of Fishes, Taylor and Francis Group, CRC Press, UK von der Emde, R.J. Mogdans and B.G. Kapoor.The Senses of Fish: Adaptations for the Reception of Natural Stimuli Springer, Netherlands
3. C.B.L. Srivastava, Fish Biology, Narendra Publishing House J.R. Norman, A history of Fishes, Hill and Wang Publishers
4. Khanna and H.R. Singh, A text book of Fish Biology and Fisheries, Narendra Publishing House.

Note: Classification to be followed from: Romar A. S. (1959)

DSE1P: Fish and Fisheries (Lab) **Credits 02**

List of Practical

1. Morphometric and meristic characters of fishes
2. Study of *Petromyzon*, *Myxine*, *Pristis*, *Chimaera*, *Exocoetus*, *Hippocampus*, *Gambusia*, *Labeo*, *Heteropneustes*, *Anabas*
3. Study of different types of scales (through permanent slides/ photographs).
4. Study of crafts and gears used in Fisheries
5. Water quality criteria for Aquaculture: Assessment of pH, conductivity, Total solids, Total dissolved solids
6. Study of air breathing organs in *Channa*, *Heteropneustes*, *Anabas* and *Clarias*
7. Project Report on a visit to any fish farm/ pisciculture unit/Zebrafish rearing Lab.

Or

DSE-1: Reproductive Biology **Credits 06**

DSE1T: Reproductive Biology **Credits 04**

Course Contents:

Unit 1: Reproductive Endocrinology

Mechanism of action of steroids and glycoprotein hormones. hypothalamo – hypophyseal – gonadal axis, regulation of gonadotrophin secretion in human (male and female) Reproductive system:

Development and differentiation of gonads, genital ducts and external genitalia

Unit 2: Functional anatomy of male reproduction

Histoarchitechture of testis in human; Spermatogenesis; Kinetics and hormonal regulation; Androgen synthesis and metabolism; Accessory glands functions

Unit 3: Functional anatomy of female reproduction
Histoarchitechture of ovary in human; Oogenesis; Kinetics and hormonal regulation; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (human) and their regulation, fertilization; Hormonal control of implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto – maternal relationship; Mechanism of parturition and its hormonal regulation; Lactation and its Regulation

Unit 4: Reproductive Health
Infertility in male and female: causes, diagnosis and management Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization Modern contraceptive technologies

Suggested Readings:

1. Ross & Pawlina. Histology: A text and Atlas. 6th edition.
2. Guyton & Hall. Medical Physiology. 11th edition.
3. Knobil, E. et al. (eds). The Physiology of Reproduction. Raven Press Ltd.
4. Hatcher, R.A. et al. The Essentials of Contraceptive Technology. Population Information Programme.

DSE1P: Reproductive Biology (Lab) **Credits 02**

List of Practicals:

1. Study of animal house: set up and maintenance of animal house, breeding techniques, care of normal and experimental animals.
2. Examination of vaginal smear rats from live animals.
3. Tissue fixation, embedding in paraffin, microtomy and slide preparation of any endocrine gland
4. Examination of histological sections from photomicrographs/ permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems; Sections of ovary, fallopian tube, uterus (proliferative and secretory stages), cervix and vagina.
5. Sperm count and sperm motility in rat

DSE-2: Animal Biotechnology **Credits 06**

DSE2T: Animal Biotechnology **Credits 04**

Course Contents:

Unit 1: Introduction
Organization of prokaryotic and eukaryotic genome, Concept of genomics

Unit 2: Molecular Techniques in Gene manipulation
Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors (characteristics).Restriction enzymes: Nomenclature, detailed

study of Type II. Transformation techniques: Calcium chloride method and electroporation. Construction of genomic and cDNA libraries and screening by colony and plaque hybridization Southern, Northern and Western blotting
DNA sequencing: Sanger method
Polymerase Chain Reaction, DNA Finger Printing and DNA micro array

Unit 3: Genetically Modified Organisms
Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection. Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knock out mice

Unit 4: Culture Techniques and Applications
Animal cell culture, expressing cloned genes in mammalian cells, Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia)

Suggested Readings:

1. Brown, T.A. (1998). Molecular Biology Labfax II: Gene Cloning and DNA Analysis. II Edition, Academic Press, California, USA.
2. Glick, B.R. and Pasternak, J.J. (2009). Molecular Biotechnology - Principles and Applications of Recombinant DNA. IV Edition, ASM press, Washington, USA.
3. Weaver. Molecular Biology of Gene. 5th edition.
4. Primrose & Twyman. Principles of Gene Manipulation and Genomics. 7th edition.

DSE2P: Animal Biotechnology (Lab) **Credits 02**

List of Practical

1. Genomic DNA isolation from E. coli
2. Plasmid DNA isolation (pUC 18/19) from E. coli
3. Restriction digestion of plasmid DNA.
4. Construction of circular and linear restriction map from the data provided.
5. Calculation of transformation efficiency from the data provided.
6. To study following techniques through photographs
    a. Southern Blotting
    b. Northern Blotting
    c. Western Blotting
    d. DNA Sequencing (Sanger's Method)
    e. PCR
    f. DNA fingerprinting
7. Project report on animal cell culture

Or

DSE-2: Microbiology **Credits 06**

DSE2T: Microbiology **Credits 04**

Course Contents:

Unit 1: Introduction to Microbiology

Historical perspective of Microbiology, Prokaryotic pathogens, Eukaryotic pathogens

Unit 2: Bacterial taxonomy
Principles and modern approaches of bacterial taxonomy. Basic idea about Hackel and Whittaker's kingdom concept and domain concept of Carl Woose

Unit 3: Morphology of Bacteria and Virus
Cell wall (Structure of peptidoglycan), Cell envelope (Cell membrane, Differences between ram- positive and gram-negative species, External capsule and glycocalyx, Plasmids and episomes. Nuclear material, Bacterial Chromosome (Fundamental differences with eukaryotic chromosome). Reserve materials (carbon and phosphate reserve, cyanophycin), Cytoplasmic inclusions (Chlorosome, magnetosome, carboxysome, gas vesicles, ribosome). Structural organization of viruses, Prions and viroids

Unit 4: Normal flora
Distribution of normal flora in the body: Skin, eye, mouth, intestinal tract, urino-genital tract, Beneficial functions of normal flora. Harmful effects of normal flora

Unit 5: Pathogenicity of Microorganisms
Bacterial pathogenesis: Entry to the host, Adherence to host cells, Invasiveness, Bacterial toxins Exotoxins, Endotoxins, Antigenic switching.Viral Pathogenesis:Cellular level (Cell death, Transformation, Cell fusion, Cytopathic effect).Initial infections: Routes of entry and dissemination to secondary sites, Typical secondary sites of localization, Virus shedding and mode of transmission; Factors involved in termination of acute infection

Unit 6: Infection of pathogens to human populations
Communicable, Non-communicable, Endemic, Epidemic, Pandemic and Sporadic

Unit 7: Diagnostic Microbiology and Bacteria culture
Koch's postulates, Sensitivity and specificity of test results, Principles and applications: Simple staining, Gram-staining, Acid-fast staining, Collection of specimens, Growth requirements and Growth factors, Oxygen requirement. Culture Media: Simple media, Complex media, Selective media and Enriched media

Unit 8: Genetic recombination in bacteria
Transformation, Conjugation- F+, F-, Hfr & F' strain, Transduction, Generalised & specialized types.

Unit 9: Microbial Diseases
Name of pathogen, symptoms, pathogenesis, mode of action & preventive measures of following diseases: Bacterial (Polio, Typhoid, Staphylococcal Food Poisoning) , Viral (Dengue, AIDS)

Suggested Readings:

1. Alexander, M. (1977). Introduction to Soil Microbiology. John Wiley and Sons, New York.
2. Atlas, R. M. and Bartha, R. (1997). Microbial Ecology: Fundamentals and Applications, 4th ed.
3. Benjamin/ Cummings. Black, J. G. (2011). Microbiology: Principles and Explorations. 8th ed. John Wiley and Sons, New York.
4. Campbell, R. (1983). Microbial Ecology. 2nd ed. Oxford, Blackwell.

5. Pinehuk, G. (2003). Schaum's outline Series: Theory and Problems of Immunology.
6. McGrawHill.
7. Presscott, L. M., Harley, J. P. and Klein, D. A. (2011). Microbiology, 8th ed. McGrawHill, New York.
8. Schlegel, H. G. (1993). General Microbiology. 7th ed. Cambridge University Press.
9. Slonczeweski, J.L. and Foster, J.W. (2009). Microbiology- An Evolving Science. Norton.
10. Stanier, R. Y., Adelberg, E. A. and Ingraham, J. L. (1986). General Microbiology. 5th ed. Macmillan.
11. Talaro, K. and Talaro, A. (1999). Foundations in Microbiology. 3rd ed. Dubuque, McGraw Hill.
12. Tortora, G. J., Funke, B. R., and Case. C. L. (2008). Microbiology. An Introduction. 9th ed. Benjamin/Cummings Publishing. Menlo Park Calif.
13. Voyleys, B. A. (2002). The biology of viruses, 2nd ed. McGraw-Hill.

DSE2P: Microbiology (Lab) **Credits 02**

List of Practical:

1. Simple staining and Gram's staining of bacteria.
2. Preparation of liquid media (broth) and solid media for routine cultivation of bacteria.
3. Preparation of slant and stab.
4. Pure culture techniques: Spread plate, Pour plate and Streak plate
5. Biochemical test for characterization:
   Catalase, Nitrate-reduction, Indole production, Methyl Red and Voges-Proskauer Test.
6. Microbiological examination of milk (Methylene blue reductase test).
7. Sugar fermentation test.

Vidyasagar University

Curriculum for B.Sc. (Honours) in Zoology [Choice Based Credit System]

Semester-VI

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
CC- 13		**C13T**: Developmental Biology	Core Course-13	4	0	0	6	75
		- Lab		0	0	4		
CC- 14		**C14T:** Evolutionary Biology	Core Course-14	4	0	0	6	75
		- Lab		0	0	4		
DSE-3		TBD	Discipline Specific Elective - 3	4	0	0	6	75
				0	0	4		
DSE-4		TBD	Discipline Specific Elective -4	4	0	0	6	75
				0	0	4		
Semester Total							**24**	**300**

L= Lecture, **T=** Tutorial, **P =** Practical, **CC -** Core Course, **TBD -** To be decided, **DSE:** Discipline Specific Elective.

Semester-VI

List of Core Course (CC)

CC-13: Developmental Biology

CC-14: Evolutionary Biology

Discipline Specific Electives (DSE)

DSE-3: Parasitology
Or
DSE-3: Endocrinology

DSE-4: Biology of Insects
Or
DSE-4: Wild Life Conservation and Management

Semester-VI

Core Courses (CC)

CC-13: Developmental Biology — Credits 06

C13T: Developmental Biology — Credits 04

Course Contents:

Unit 1: Introduction
Basic concepts: Phases of Development, Cell cell interaction, Differentiation and growth, Differential gene expression.

Unit 2: Early Embryonic Development
Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal): Changes in gametes, Blocks to polyspermy; Planes and patterns of cleavage; Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers.

Unit 3: Late Embryonic Development
Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta).

Unit 4: Post Embryonic Development
Development of brain and Eye in Vertebrate. Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each).

Unit 5: Implications of Developmental Biology 8 Class
Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis.

Suggested Readings:

1. Gilbert, S. F. (2010). Developmental Biology, IX Edition, Sinauer Associates, Publishers, Sunderland, Massachusetts, USA
2. Slack JMW , Essential Developmental Biology Inc.,

C13P: Developmental Biology Lab — Credits 02

List of Practical

1. 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).
2. Study of the developmental stages and life cycle of Drosophila from stock culture.
3. Study of different sections of placenta (photomicropgraph/ slides).
4. Project report on Drosophila culture/chick embryo development.

CC-14: Evolutionary Biology Credits 06

C14T: Evolutionary Biology Credits 04

Course Contents:

Evolutionary Biology

Unit-1: Life's Beginnings: Chemogeny, RNA world, Biogeny, Origin of photosynthesis, volution of eukaryotes.

Unit-2: Historical review of Evolutionary concepts, Lamarkism, Darwinism and Neo Darwinism.

Unit-3: Geological time scale, Fossil records of Hominids (from *Australopithacus* to *Homo sapiens*), evolution of horse. Neutral theory of molecular evolution, Molecular clock.

Unit-4: Sources of variations: Heritable variations and their role in evolution.

Unit-5: Population genetics: Hardy-Weinberg Law (statement and derivation of equation, application Of law to biallelic Population); Evolutionary forces upsetting H-W equilibrium; Natural selection (concept of fitness, types of selection, selection coefficient, mode of selection heterozygous superiority).Genetic Drift mechanism (founder's effect, bottleneck phenomenon)**.** Role of Migration and Mutation in changing allele frequencies.

Unit-6: Species concept, Isolating mechanisms, modes of speciation. Adaptive radiation /macroevolution (exemplified by Galapagos finches).

Unit-7: Extinctions, Back ground and mass extinctions (causes and effects), detailed example of K-T extinction.

Unit-8: Origin and Evolution of Man, Unique Hominin characteristics contrasted with primate characteristic Molecular analysis of human origin.

Unit-9: Phylogenetic trees, Construction & interpretation of Phylogenetic tree using parsimony, Convergent & Divergent evolution.

Suggested Readings:

1. Campbell, N.A. and Reece J.B (2011). Biology. IX Edition. Pearson, Benjamin, Cummings.
2. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.
3. Geneics: A Molecular Approach. 3rd edition. Peter. J. Russell.

C14P: Evolutionary Biology Lab Credits 02

List of Practical

1. Study of fossils from models/ pictures
2. Study of homology and analogy from suitable specimens
3. Study and verification of Hardy-Weinberg Law by chi square analysis
4. Graphical representation and interpretation of data of height/ weight of a sample of 100 humans in relation to their age and sex.

Discipline Specific Electives (DSE)

DSE-3: Parasitology — Credits 06

DSE3T: Parasitology — Credits 04

Course Contents:

Unit-1: Introduction to Parasitology

Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector Host parasite relationship

Unit-2: Parasitic Protists

Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani.*

Unit-3: Parasitic Platyhelminthes

Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Schistosoma haematobium*, *Taenia sajinata*

Unit-4: Parasitic Nematodes

Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Ascaris lumbricoides, Ancylostoma duodenale, Wuchereria bancrofti* and *Trichinella spiralis, Brugia malayi*; Nematode plant interaction; Gall formation.

Unit-5: Parasitic Arthropods

Biology, importance and control of ticks (Soft tick *Ornithodoros,* Hard tick *Ixodes*), mites (*Sarcoptes*), Lice (*Pediculus*), Flea (*Xenopsylla*) and Bug (*Cimex*).

Unit-6: Parasite Vertebrates

Brief account of Cookicutter Shark, Hood Mocking bird, Vampire bat.

Suggested Readings:

1. Arora, D. R and Arora, B. (2001) Medical Parasitology. II Edition. CBS Publications and Distributors

2. E.R. Noble and G.A. Noble (1982) Parasitology: The biology of animal parasites. V Edition, Lea & Febiger
3. Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. (2007) Biology of Disease.
4. Taylor and Francis Group
5. Parija, S. C. Textbook of medical parasitology, protozoology & helminthology (Text and colour Atlas), II Edition, All India Publishers & Distributers, Medical Books Publishers, Chennai, Delhi
6. Rattan Lal Ichhpujani and Rajesh Bhatia. Medical Parasitology, III Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
7. Page66Meyer, Olsen & Schmidt's Essentials of Parasitology, Murray, D. Dailey, W.C. Brown Publishers.
8. K. D. Chatterjee (2009). Parasitology: Protozoology and Helminthology. XIII Edition, CBS Publishers & Distributors (P) Ltd.

DSE3P: Parasitology Lab **Credits 02**

List of Practical:

1. Study of life stages of *Giardia intestinalis*, *Trypanosoma gambiense*, *Leishmania donovani* through permanent slides/micro photographs.
2. Study of adult and life stages of *Schistosoma haematobium, Taenia sajinata* through permanent slides/micro photographs.
3. Study of adult and life stages of *Ancylostoma duodenale*, *Brugia malayi* and *Trichinella spiralis* through permanent slides/micro photographs.
4. Study of plant parasitic root knot nematode, Meloidogyne from the soil sample.
5. Study of *Pediculus humanus, Xenopsylla cheopis* and *Cimex lectularius* through permanent slides/ photographs.
6. Study of monogenea from the gills of fresh/marine fish [Gills can be procured from fish market as by product of the industry].
7. Study of nematode/cestode parasites from the intestines of Poultry bird [Intestine can be procured from poultry/market as a by-product.

Submission of a brief report on parasitic vertebrates.

Or

DSE-3: Endocrinology **Credits 06**

DSE3T: Endocrinology **Credits 04**

Course Contents:

Unit-1: Introduction to Endocrinology

General idea of Endocrine systems, Classification, Characteristic and Transport of Hormones, Neurosecretions and Neurohormones

Unit-2: Epiphysis, Hypothalamo-hypophysial Axis

Structure of pineal gland, Secretions and their functions in biological rhythms and reproduction. Structure and functions of hypothalamus and Hypothalamic nuclei, Regulation of neuroendocrine glands, Feedback mechanisms Structure of pituitary gland, Hormones and their functions, Hypothalamo-hypophysial portal system, Disorders of pituitary gland.

Unit-3: Peripheral Endocrine Glands

Structure, Hormones, Functions and Regulation of Thyroid gland, Parathyroid, Thymus, Adrenal, Pancreas, Ovary and Testis. Hormones in homeostasis, Disorders of endocrine glands

Unit-4: Regulation of Hormone Action

Mechanism of action of steroidal, non-steroidal hormones with receptors. Bioassays of hormones using RIA & ELISA. Estrous cycle in rat and menstrual cycle in human. Multifaceted role of Vasopressin & Oxytocin. Hormonal regulation of parturition.

Suggested Readings:

1. Guyton and Hall. Textbook of Medical Physiology. 13th Edition
2. Histology: A Text and Atlas. Sixth Edition. Ross & Pawlina. Lippincott Williams & Wilkins.
3. Vertebrate Endocrinology by David O. Norris,

DSE3P: Endocrinology Lab — Credits 02

List of Practical

1. Dissect and display of Endocrine glands in laboratory bred rat.
2. Study of the permanent slides of all the endocrine glands
3. Tissue fixation, embedding in paraffin, microtomy and slide preparation of any endocrine gland
4. Estimation of plasma level of any hormone using ELISA.
5. Designing of primers of any hormone.

DSE-4: Biology of Insects — Credits 06

DSE4T: Biology of Insects — Credits 04

Course Contents:

Unit-1: Introduction

General Features of Insects. Distribution and Success of Insects on the Earth.

Unit-2: Insect Taxonomy

Basis of insect classification; Classification of insects up to orders (according to Brusca and Brusca, 2016).

Unit-3: General Morphology of Insects
External Features; Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits. Thorax: Wings and wing articulation, Types of Legs adapted to diverse habitat Abdominal appendages and genitalia.

Unit-4: Physiology of Insects
Structure and physiology of Insect body systems - Integumentary, digestive, excretory, circulatory, respiratory, endocrine, reproductive, and nervous system. Photoreceptors: Types, Structure and Function Metamorphosis: Types and Neuroendocrine control of metamorphosis.

Unit-5: Insect Society
Social insects with special reference to termites. Trophallaxis in social insects such as ants, termites and bees.

Unit-6: Insect Plant Interaction
Theory of co-evolution, role of allelochemicals in host plant mediation Host-plant selection by phytophagous insects, Major insect pests in paddy.

Unit-7: Insects as Vectors
Insects as mechanical and biological vectors, Brief discussion on houseflies and mosquitoes as important vectors.

Suggested Readings:

1. A general text book of entomology, Imms , A. D., Chapman & Hall, UK
2. The Insects: Structure and function, Chapman, R. F., Cambridge University Press, UK
3. Principles of Insect Morphology, Snodgrass, R. E., Cornell Univ. Press, USA
4. Introduction to the study of insects, Borror, D. J., Triplehorn, C. A., and Johnson, N. F.,M , Saunders College Publication, USA
5. The Insect Societies, Wilson, E. O., Harward Univ. Press, UK
6. Host Selection by Phytophagous insects, Bernays, E. A., and Chapman, R. F., Chapman and Hall, New York, USA
7. Physiological system in Insects, Klowden, M. J., Academic Press, USA
8. The Insects, An outline of Entomology, Gullan, P. J. , and Cranston, P. S., Wiley Blackwell, UK
9. Insect Physiology and Biochemistry, Nation, J. L., CRC Press, USA
10. Mosquito, Chandra G (2000), Sribhumi Pub. Co.
11. Medical Entomology, Hati A. K., Allied Book Agency, 2010

[Note: Classification to be followed from IMMS A. D. (1938)]

DSE4P: Biology of Insects Lab Credits 02

List of Practical

1. Study of life cycle of Mosquito
2. Study of different kinds of antennae, legs and mouth parts of insects
3. Mounting of insect wings, spiracles and genitalia of any insects
4. Methodology of collection, preservation and identification of insects.
5. Morphological studies of various castes of *Apis*, *Camponotus Odontotermes*
6. Study of major insect pests of paddy and their damages
7. Study of Mulberry silk moth as beneficial insect

Or

DSE-4: Wild Life Conservation and Management Credits 06

DSE4T: Wild Life Conservation and Management Credits 04

Course Contents:

Unit-1: Introduction to Wild Life
Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies.

Unit-2: Evaluation and management of wild life

Habitat analysis, Physical parameters: Topography, Geology, Soil and water
Biological Parameters: food, cover, forage, browse and cover estimation.
Standard evaluation procedures: remote sensing and GIS.

Unit-3: Management of habitats

Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity Restoration of degraded habitats.

Unit-4: Population estimation

Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores; Pug marks and census method.

Unit-5: Aims and objectives of wildlife conservation

Wildlife conservation in India – through ages; different approaches of wildlife conservation; modes of conservation; in-situ conservation and ex-situ conservation: necessity for wildlife conservation.

Unit-6: Management planning of wild life in protected areas

Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbence.

Unit-7: Man and Wildlife

Causes and consequences of human-wildlife conflicts; mitigation of conflict – an overview; Management of excess population.

Unit-8: Protected areas

National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve.

Suggested Readings:

1. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.
2. Woodroffe R., Thirgood, S. and Rabinowitz, A. (2005). People and Wildlife, Conflict or Co-existence? Cambridge University.
3. Bookhout, T.A. (1996). Research and Management Techniques for Wildlife and Habitats, 5 th edition. The Wildlife Society, Allen Press.
4. Sutherland, W.J. (2000). The Conservation Handbook: Research, Management and Policy. Blackwell Sciences
5. Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008). Problem-Solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory. Blackwell Publishing.

DSE4P: Wild Life Conservation and Management Lab Credits 02

List of 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, Parker's 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).

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year B. Sc (General)
in

Zoology

Under Choice Based Credit System (CBCS)
[w.e.f 2018-2019]

VIDYASAGAR UNIVERSITY

B Sc (General) in Zoology

[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
1	I	SEMESTER-I					CA	ESE	TOTAL
		Core-1 (DSC-1A)		Animal Diversity - **Lab**	6	4-0-4	15	60	75
		Core-2 (DSC-2A)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-3 (DSC-3A)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC-1 (Elective)		English/MIL	2	1-1-0	10	40	50
		Semester - I : Total			**20**				**275**
	II	SEMESTER-II							
		Core-4 (DSC-1B)		Comparative Anatomy and Development Biology of Vertebrates - **Lab**	6	4-0-4	15	60	75
		Core-5 (DSC-2B)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-6 (DSC-3B)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC-2 (Elective)		Environmental Studies	4		20	80	100
		Semester - 2 : Total			**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
2	**III**	**SEMESTER-III**					**CA**	**ESE**	**TOTAL**
		Core-7 (DSC-1C)		Physiology and Biochemistry - **Lab**	6	4-0-4	15	60	75
		Core-8 (DSC-2C)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-9 (DSC-3C)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-1		TBD	2	1-1-0	10	40	50
		Semester - 3 : Total			**20**				**275**
	IV	**SEMESTER-IV**							
		Core-10 (DSC-1D)		Genetics and Evolution Biology - **Lab**	6	4-0-4	15	60	75
		Core-11 (DSC-2D)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-12 (DSC-3D)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-2		TBD	2	1-1-0	10	40	50
		Semester - 4 : Total			**20**				**275**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
3	V	SEMESTER-V					CA	ESE	TOTAL
		DSE-1A		Discipline-1(Zoology)	6	4-0-4	15	60	75
		DSE-2A		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		DSE-3A		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-3		TBD	2	1-1-0	10	40	50
		Semester - 5 : Total			**20**				**275**
	VI	SEMESTER-VI							
		DSE-1B		Discipline-1(Zoology)	6	4-0-4	15	60	75
		DSE-2B		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		DSE-3B		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-4		TBD	2	1-1-0	10	40	50
		Semester - 6 : Total			**20**				**275**
	Total in all semester:				**122**				**1700**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **CP**=Core Practical , **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies ,

List of Core and Elective Courses

Core Courses (CC)

DSC-1A: **Animal Diversity**
DSC-1B: **Comparative Anatomy and Developmental Biology of Vertebrates**
DSC-1C: **Physiology and Biochemistry**
DSC-1D: **Genetics and Evolutionary Biology**

Discipline Specific Electives (DSE)

DSE-1: **Applied Zoology**
Or
DSE-1: **Aquatic Biology**
Or
DSE-1: **Immunology**
DSE-2: **Animal Biotechnology**
Or
DSE-2: **Reproductive Biology**
Or
DSE-2: **Insect, Vector and Diseases**
Or
DSE-2: **Project work**

Skill Enhancement Courses (SEC)

SEC-1: **Apiculture**
SEC-2: **Aquarium Fish Keeping**
SEC-3: **Medical Diagnostics**
Or
SEC-3: **Research Methodology**
SEC-4: **Sericulture**

List of the Core and Elective Courses

Core Courses

DSC-1A (CC-1): Animal diversity **Credits: 06**

DSC1AT: Animal diversity **Credits: 04**

Course Contents:

Unit 1: Kingdom Protista
General characters and classification up to classes; Locomotory Organelles and locomotion in Protozoa

Unit 2: Phylum Porifera
General characters and classification up to classes; Canal System in *Sycon*

Unit 3: Phylum Cnidaria
General characters and classification up to classes; Polymorphism in Hydrozoa

Unit 4: Phylum Platyhelminthes
General characters and classification up to classes; Life history of *Taenia solium*

Unit 5: Phylum Nemathelminthes
General characters and classification up to classes; Life history of *Ascaris lumbricoides* and its parasitic adaptations

Unit 6: Phylum Annelida
General characters and classification up to classes; Metamerism in Annelida

Unit 7: Phylum Arthropoda
General characters and classification up to classes; Vision in Arthropoda, Metamorphosis in Insects

Unit 8: Phylum Mollusca
General characters and classification up to classes; Torsion in gastropods

Unit 9: Phylum Echinodermata
General characters and classification up to classes; Water-vascular system in Asteroidea

Unit 10: Protochordates
General features and Phylogeny of Protochordata

Unit 11: Agnatha
General features of Agnatha and classification of cyclostomes up to classes

Unit 12: Pisces
General features and Classification up to orders; Osmoregulation in Fishes

Unit 13: Amphibia

General features and Classification up to orders; Parental care

Unit 14: Reptiles
General features and Classification up to orders; Poisonous and non-poisonous snakes, Biting mechanism in snakes

Unit 15: Aves
General features and Classification up to orders; Flight adaptations in birds

Unit 17: Mammals
Classification up to orders; Origin of mammals

Note: Classification of Unit 1-9 to be followed from "Barnes, R.D. (1982). *Invertebrate Zoology*, V Edition"

DSC1AP: Animal diversity (Practical) **Credits: 02**

1. Study of the following specimens:
Amoeba, *Euglena*, *Plasmodium*, *Paramecium*, *Sycon*, *Hyalonema*, and *Euplectella*, *Obelia*, *Physalia*, *Aurelia*, *Tubipora*, *Metridium*, *Taenia solium*, Male and female *Ascaris lumbricoides*, *Aphrodite*, *Nereis*, *Pheretima*, *Hirudinaria*, *Palaemon*, *Cancer*, *Limulus*, *Palamnaeus*, *Scolopendra*, *Julus*, *Periplaneta*, *Apis*, *Chiton*, *Dentalium*, *Pila*, *Unio*, *Loligo*, *Sepia*, *Octopus*, *Pentaceros*, *Ophiura*, *Echinus*, *Cucumaria* and *Antedon*, *Balanoglossus*, *Herdmania*, *Branchiostoma*, *Petromyzon*, *Sphyrna*, *Pristis*, *Torpedo*, *Labeo*, *Exocoetus*, *Anguilla*, *Ichthyophis/Ureotyphlus*, *Salamandra*, *Bufo*, *Hyla*, *Chelone*, *Hemidactylus*, *Chamaeleon*, *Draco*, *Vipera*, *Naja*, *Crocodylus*, *Gavialis*, Any six common birds from different orders, *Sorex*, Bat, *Funambulus*, *Loris*

2. Study of the following permanent slides:
1. T.S. and L.S. of *Sycon*,
2. Study of life history stages of *Taenia*,
3. T.S. of male and female *Ascaris*

3. Key for identification of poisonous and non-poisonous snakes
An "animal album" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

Suggested Readings:

- Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
- Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science
- Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.
- Pough H. *Vertebrate life*, VIII Edition, Pearson International.
- Hall B.K. and Hallgrimsson B. (2008). *Strickberger's Evolution*. IV Edition. Jones and Bartlett Publishers Inc.

DSC-1B (CC-2): Comparative Anatomy and Developmental Biology of Vertebrates

Credits: 06

DSC1BT: Comparative Anatomy and Developmental Biology of Vertebrates

Credits: 04

Course Contents:

Unit 1: Integumentary System
Derivatives of integument w.r.t. glands and digital tips

Unit 2: Skeletal System
Evolution of visceral arches

Unit 3: Digestive System
Brief account of alimentary canal and digestive glands

Unit 4: Respiratory System
Brief account of gills, lungs, air sacs and swim bladder

Unit 5: Circulatory System
Evolution of heart and aortic arches

Unit 6: Urinogenital System
Succession of kidney, Evolution of urinogenital ducts

Unit 7: Nervous System
Comparative account of brain

Unit 8: Sense Organs
Receptors and its types.

Unit 9: Early Embryonic Development
Gametogenesis: Spermatogenesis and oogenesis w.r.t. mammals, vitellogenesis in birds; Fertilization: external (amphibians), internal (mammals), blocks to polyspermy; Early development of frog and humans (structure of mature egg and its membranes, patterns of cleavage, fate map, up to formation of gastrula);types of morphogenetic movements; Fate of germ layers; Neurulation in frog embryo.

Unit 10: Late Embryonic Development
Implantation of embryo in humans, Formation of human placenta and functions, other types of placenta on the basis of histology; Metamorphic events in frog life cycle and its hormonal regulation.

Unit 11: Control of Development
Fundamental processes in development (brief idea) – Gene activation, determination, induction, Differentiation, morphogenesis, intercellular communication, cell movements and cell death

DSC1BP: Comparative Anatomy and Developmental Biology of Vertebrates (Practical) Credits: 02

1. Osteology:
    a) Disarticulated skeleton of fowl and rabbit
    b) Carapace and plastron of turtle /tortoise
    c) Mammalian skulls: One herbivorous and one carnivorous animal.
2. Frog - Study of developmental stages - whole mounts and sections through permanent slides – cleavage stages, blastula, gastrula neurula, tail bud stage, tadpole external and internal gill stages.
3. Study of the different types of placenta- histological sections through permanent slides or photomicrographs.
4. Study of placental development in humans by ultrasound scans.
5. Examination of gametes - frog/rat - sperm and ova through permanent slides or photomicrographs.

Suggested Readings:

- Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*. IV Edition. McGraw-Hill Higher Education.
- Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition. The McGraw-Hill Companies.
- Hilderbrand, M and Gaslow G.E. *Analysis of Vertebrate Structure*, John Wiley and Sons.
- Walter, H.E. and Sayles, L.P; *Biology of Vertebrates*, Khosla Publishing House.
- Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.
- Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.
- Carlson, Bruce M (1996). Patten's Foundations of Embryology, McGraw Hill, Inc.

DSC-1C (CC-3): Physiology and Biochemistry Credits: 06

DSC1CT: Physiology and Biochemistry Credits: 04

Course Contents:

Unit 1: Nerve and muscle
Structure of a neuron, Resting membrane potential, Graded potential, Origin of Action potential and its propagation in myelinated and non-myelinated nerve fibres, Ultra-structure of skeletal muscle, Molecular and chemical basis of muscle contraction

Unit 2: Digestion
Physiology of digestion in the alimentary canal; Absorption of carbohydrates, proteins, lipids

Unit 3: Respiration
Pulmonary ventilation, Respiratory volumes and capacities, Transport of oxygen and carbon dioxide in blood.

Unit 4: Excretion
Structure of nephron, Mechanism of Urine formation, Counter-current Mechanism

Unit 5: Cardiovascular system
Composition of blood, Hemostasis, Structure of Heart, Origin and conduction of the cardiac impulse,Cardiac cycle

Unit 6: Reproduction and Endocrine Glands
Physiology of male reproduction: Hormonal control of spermatogenesis; Physiology of female reproduction: hormonal control of menstrual cycle Structure and function of pituitary, thyroid, parathyroid, pancreas and adrenal

Unit 7: Carbohydrate Metabolism
Glycolysis, Krebs Cycle, Pentose phosphate pathway, Gluconeogenesis, Glycogen metabolism, Review of electron transport chain

Unit 8: Lipid Metabolism
Biosynthesis and β oxidation of palmitic acid

Unit 9: Protein metabolism
Transamination, Deamination and Urea cycle

Unit 10: Enzymes
Introduction, Mechanism of action, Enzyme kinetics, inhibition and regulation

DSC1CP: Physiology and Biochemistry (Practical): Credits: 02

1. Preparation of hemin and hemochromogen crystals.
2. Study of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland.
3. Study of permanent slides of spinal cord, duodenum, liver, lung, kidney, bone, cartilage.
4. Qualitative tests to identify functional groups of carbohydrates in given solutions (Glucose, Fructose, Sucrose, Lactose).
5. Estimation of total protein in given solutions by Lowry's method.
6. Study of activity of salivary amylase under optimum conditions

Suggested Readings:

- Tortora, G.J. and Derrickson, B.H. (2009). *Principles of Anatomy and Physiology*, XII Edition, John Wiley & Sons, Inc.
- Widmaier, E.P., Raff, H. and Strang, K.T. (2008) *Vander's Human Physiology*, XI Edition., McGraw Hill
- Guyton, A.C. and Hall, J.E. (2011). T*extbook of Medical Physiology*, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company
- Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). *Biochemistry*. VI 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). *Harper's Illustrated Biochemistry*. XXVIII Edition. Lange Medical Books/Mc Graw3Hill.

DSC-1D (CC-4): Genetics and Evolutionary Biology **Credits: 06**

DSC1DT: Genetics and Evolutionary Biology **Credits: 04**

Course Contents:

Unit 1: Introduction to Genetics
Mendel's work on transmission of traits, Genetic Variation, Molecular basis of genetic information

Unit 2: Mendelian Genetics and its Extension
Principles of Inheritance, Chromosome theory of inheritance, Incomplete dominance and codominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, sex linked inheritance, extra-chromosomal inheritance

Unit 3: Linkage, Crossing Over and Chromosomal Mapping
Linkage and crossing over, Recombination frequency as a measure of linkage intensity, two factor and three factor crosses, Interference and coincidence, Somatic cell genetics – an alternative approach to gene mapping

Unit 4: Mutations
Chromosomal Mutations: Deletion; Duplication; Inversion; Translocation; Aneuploidy and Polyploidy; Gene mutations: Induced versus Spontaneous mutations, Back versus Suppressor mutations,

Unit 5: Sex Determination
Chromosomal mechanisms, dosage compensation

Unit 6: History of Life
Major Events in History of Life

Unit 7: Introduction to Evolutionary Theories
Lamarckism, Darwinism, Neo-Darwinism

Unit 8: Direct Evidences of Evolution
Types of fossils, Incompleteness of fossil record, Dating of fossils, Phylogeny of horse

Unit 9: Processes of Evolutionary Change
Organic variations; Isolating Mechanisms; Natural selection (Example: Industrial melanism); Types of natural selection (Directional, Stabilizing, Disruptive), Artificial selection

Unit 10: Species Concept

Biological species concept (Advantages and Limitations); Modes of speciation (Allopatric, Sympatric)

Unit 11: Macro-evolution
Macro-evolutionary Principles (example: Darwin's Finches)

Unit 12: Extinction
Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail), Role of extinction in evolution

DSC1DP: Genetics and Evolutionary Biology (Practical) Credits: 02

1. Study of Mendelian inheritance and gene interactions (Non- Mendelian inheritance) using suitable examples. Verify the results using Chi-square test.
2. Study of Linkage, recombination, gene mapping using the data.
3. Study of Human Karyotypes (normal and abnormal).
4. Study of fossil evidences from plaster cast models and pictures
5. Study of homology and analogy from suitable specimens/ pictures
6. Charts:
    a. Phylogeny of horse with diagrams/ cut outs of limbs and teeth of horse ancestors
    b. Darwin's Finches with diagrams/ cut outs of beaks of different species
7. Visit to Natural History Museum and submission of report

Suggested Readings:

- Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). *Principles of Genetics*. VIII Edition. Wiley India.
- Snustad, D.P., Simmons, M.J. (2009). *Principles of Genetics*. V Edition. John Wiley and Sons Inc.
- Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). *Concepts of Genetics*. X Edition. Benjamin Cummings.
- Russell, P. J. (2009). *Genetics- A Molecular Approach.* III Edition. Benjamin Cummings.
- Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. *Introduction to Genetic Analysis*. IX Edition. W. H. Freeman and Co.
- Ridley, M. (2004). *Evolution*. III Edition. Blackwell Publishing
- Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007). *Evolution*. Cold Spring, Harbour Laboratory Press.
- Hall, B. K. and Hallgrimsson, B. (2008). *Evolution*. IV Edition. Jones and Bartlett Publishers
- Campbell, N. A. and Reece J. B. (2011). *Biology*. IX Edition, Pearson, Benjamin, Cummings.
- Douglas, J. Futuyma (1997). *Evolutionary Biology*. Sinauer Associates.

Discipline Specific Elective (DSE)

DSE - 1: Applied Zoology **Credits: 06**

DSE1T: Applied Zoology **Credits: 04**

Course Contents:

Unit 1: Introduction to Host-parasite Relationship
Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir, Zoonosis

Unit 2: Epidemiology of Diseases
Transmission, Prevention and control of diseases: Tuberculosis, typhoid

Unit 3: Rickettsiae and Spirochaetes
Brief account of *Rickettsia prowazekii*, *Borrelia recurrentis* and *Treponema pallidum*

Unit 4: Parasitic Protozoa
Life history and pathogenicity of *Entamoeba histolytica*, *Plasmodium vivax* and *Trypanosoma gambiense*

Unit 5: Parasitic Helminthes
Life history and pathogenicity of *Ancylostoma duodenale* and *Wuchereria bancrofti*

Unit 6: Insects of Economic Importance
Biology, Control and damage caused by *Helicoverpa armigera*, *Pyrilla perpusilla* and *Papilio demoleus*, *Callosobruchus chinensis*, *Sitophilus oryzae* and *Tribolium castaneum*

Unit 7: Insects of Medical Importance
Medical importance and control of *Pediculus humanus corporis*, *Anopheles*, *Culex*, *Aedes*, *Xenopsylla cheopis*

Unit 8: Animal Husbandry
Preservation and artificial insemination in cattle; Induction of early puberty and synchronization of estrus in cattle

Unit 9: Poultry Farming
Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs

Unit 10: Fish Technology
Genetic improvements in aquaculture industry; Induced- breeding and transportation of fish seed

DSE1P: Applied Zoology (Practical) **Credits: 02**

1. Study of *Plasmodium vivax*, *Entamoeba histolytica*, *Trypanosoma gambiense*, *Ancylostoma duodenale* and *Wuchereria bancrofti* and their life stages through permanent slides/photomicrographs or specimens.
2. Study of arthropod vectors associated with human diseases: *Pediculus*, *Culex*, *Anopheles*, *Aedes* and *Xenopsylla.*
3. Study of insect damage to different plant parts/stored grains through damaged products/photographs.
4. Identifying feature and economic importance of *Helicoverpa* (*Heliothis*) *armigera*, *Papilio demoleus*, *Pyrilla perpusilla*, *Callosobruchus chinensis*, *Sitophilus oryzae* and *Tribolium castaneum*
5. Visit to poultry farm or animal breeding centre. Submission of visit report
6. Maintenance of freshwater aquarium

Suggested Readings:

- Park, K. *Preventive and Social Medicine*. XVI Edition. B.B Publishers.
- Arora, D. R and Arora, B. (2001). *Medical Parasitology*. II Edition. CBS Publications and Distributors.
- Kumar and Cotran. *Pathological Basis of Diseases*.
- Atwal, A.S. (1986). *Agricultural Pests of India and South East Asia*, Kalyani Publishers.
- Dennis, H. (2009). *Agricultural Entomology.* Timber Press.
- Hafez, E. S. E. (1962). *Reproduction in Farm Animals*. Lea & Fabiger Publisher
- Dunham R.A. (2004). *Aquaculture and Fisheries Biotechnology Genetic Approache*s. CABI publications, U.K.
- Pedigo, L.P. (2002). *Entomology and Pest Management*, Prentice Hall.

Or

DSE- 1: Aquatic biology **Credits: 06**

DSE1T: Aquatic biology **Credits: 04**

Course Contents:

UNIT 1: Aquatic Biomes

Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs.

UNIT 2: Freshwater Biology

Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico–chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; Dissolved gases (oxygen, carbon dioxide). Nutrient Cycles in Lakes-Nitrogen, Sulphur and Phosphorous.

Streams: Different stages of stream development, Physico-chemical environment, Adaptation of hill-stream fishes.

UNIT 3: Marine Biology

Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds.

UNIT 4: Management of Aquatic Resources
Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD.

DSE1P: Aquatic Biology (Practical) **Credits: 02**

1. Determine the area of a lake using graphimetric and gravimetric method.
2. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.
3. Determine the amount of Turbidity/transparency, Dissolved oxygen, carbon dioxide, alkalinity (carbonates & bicarbonates) in water collected from a nearby lake/ water body.
4. Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.
5. A Project Report on a visit to a Sewage treatment plant/Marine bioreserve/ Fisheries Institutes.

Suggested Readings:

- Anathakrishnan : Bioresources Ecology 3rd Edition
- Goldman : Limnology, 2nd Edition
- Odum and Barrett : Fundamentals of Ecology, 5th Edition
- Pawlowski : Physicochemical Methods for Water and Wastewater Treatment, 1st Edition
- Wetzel : Limnology, 3rd edition
- Trivedi and Goyal : Chemical and biological methods for water pollution studies
- Welch : Limnology Vols. I-II

Or

DSE- 1: Immunology **Credits: 06**

DSE1T: Immunology **Credits: 04**

Course Contents:

Unit 1: **Overview of the Immune System**
Introduction to basic concepts in immunology, components of immune system, principles of innate and adaptive immune system

Unit 2: **Cells and Organs of the Immune System**
Haematopoeisis, Cells of immune system and organs (primary and secondary lymphoid organs) of the immune system

Unit 3: Antigens
Basic properties of antigens, B and T cell epitopes, haptens and adjuvants

Unit 4: **Antibodies**
Structure, classes and function of antibodies, monoclonal antibodies, antigen antibody interactions as tools for research and diagnosis

Unit 5: **Working of the immune system**
Structure and functions of MHC, exogenous and endogenous pathways of antigen presentation and processing, Basic properties and functions of cytokines, Complement system: Components and pathways.
Unit 6: **Immune system in health and disease**
Gell and Coombs' classification and brief description of various types of hypersensitivities, Introduction to concepts of autoimmunity and immunodeficiency,

Unit 7: Vaccines
General introduction to vaccines, Various types of vaccines

DSE1P: Immunology (Practical) **Credits: 02**

1. Demonstration of lymphoid organs
2. Histological study of spleen, thymus and lymph nodes through slides/ photographs
3. Preparation of stained blood film to study various types of blood cells.
4. Ouchterlony's double immuno-diffusion method.
5. ABO blood group determination.
6. Cell counting and viability test from splenocytes of farm bred animals/cell lines.
7. Demonstration of
    a. ELISA
    b. Immunoelectrophoresis

(*Subject to UGC guidelines)

Suggested Readings:

- Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2006). *Immunology*, VI Edition. W.H. Freeman and Company.
- David, M., Jonathan, B., David, R. B. and Ivan R. (2006). *Immunology*, VII Edition, Mosby, Elsevier Publication.
- Abbas, K. Abul and Lechtman H. Andrew (2003.) *Cellular and Molecular Immunology*. V Edition. Saunders Publication.

DSE - 2: Animal Biotechnology **Credits: 06**

DSE2T: Animal Biotechnology **Credits: 04**

Course Contents:

Unit 1: Introduction
Concept and scope of biotechnology

Unit 2: Molecular Techniques in Gene manipulation

Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors (characteristics) Restriction enzymes: nomenclature, detailed study of Type II. Transformation techniques: Calcium chloride method and electroporation. Construction of genomic and cDNA libraries and screening by colony and plaque hybridization Southern, Northern and Western blotting; DNA sequencing: Sanger method; Polymerase Chain Reaction, DNA Finger Printing and DNA micro array

Unit 3: Genetically Modified Organisms

Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection, Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knockout mice. Production of transgenic plants: *Agrobacterium* mediated transformation. Applications of transgenic plants: insect and herbicide resistant plants.

Unit 4: Culture Techniques and Applications

Animal cell culture, Expressing cloned genes in mammalian cells, Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia); Recombinant DNA in medicines: Recombinant insulin and human growth hormone, Gene therapy

DSE2P: Animal Biotechnology (Practical): Credits: 02

1. Genomic DNA isolation from *E. coli*
2. Plasmid DNA isolation (pUC 18/19) from *E. coli*
3. Restriction digestion of plasmid DNA.
4. Construction of circular and linear restriction map from the data provided.
5. Calculation of transformation efficiency from the data provided.
6. To study following techniques through photographs
    a. Southern Blotting
    b. Northern Blotting
    c. Western Blotting
    d. DNA Sequencing (Sanger's Method)
    e. PCR
    f. DNA fingerprinting

7. Project report on animal cell culture

Suggested Readings:

- Brown, T.A. (1998). *Molecular Biology Labfax II: Gene Cloning and DNA Analysis*. II Edition, Academic Press, California, USA.
- Glick, B.R. and Pasternak, J.J. (2009). *Molecular Biotechnology - Principles and Applications of Recombinant DNA*. IV Edition, ASM press, Washington, USA.
- Griffiths, A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart, W.M. (2009). *An Introduction to Genetic Analysis*. IX Edition. Freeman and Co., N.Y., USA.
- Snustad, D.P. and Simmons, M.J. (2009). *Principles of Genetics*. V Edition, John Wiley and Sons Inc.
- Watson, J.D., Myers, R.M., Caudy, A. and Witkowski, J.K. (2007). *Recombinant DNAGenes and Genomes- A Short Course*. III Edition, Freeman and Co., N.Y., USA.

➢ Beauchamp, T.I. and Childress, J.F. (2008). *Principles of Biomedical Ethics.* VI Edition, Oxford University Press. *CBCS Undergraduate Program in Zoology*

Or

DSE- 2: Reproductive Biology **Credits: 06**

DSE2T: Reproductive Biology **Credits: 04**

Course Contents:

Unit 1: Reproductive Endocrinology
Gonadal hormones and mechanism of hormone action, steroids, glycoprotein hormones, and prostaglandins, hypothalamo – hypophyseal – gonadal axis, regulation of gonadotrophin secretion in male and female; Reproductive System: Development and differentiation of gonads, genital ducts, external genitalia, mechanism of sex differentiation.

Unit 2: Functional anatomy of male reproduction
Outline and histological structure of male reproductive system in rat and human; Testis: Cellular functions, germ cell, system cell renewal; Spermatogenesis: kinetics and hormonal regulation; Androgen synthesis and metabolism; Epididymal function and sperm maturation;
Accessory glands functions; Sperm transportation in male tract

Unit 3: Functional anatomy of female reproduction
Outline and histological structure of female reproductive system in rat and human; Ovary: folliculogenesis, ovulation, corpus luteum formation and regression; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (rat and human) and their regulation, changes in the female tract; Ovum transport in the fallopian tubes; Sperm transport in the female tract, fertilization; Hormonal control of implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto – maternal relationship; Mechanism of parturition and its hormonal regulation; Lactation and its regulation

Unit 4: Reproductive Health
Infertility in male and female: causes, diagnosis and management; Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization, ET, EFT, IUT, ZIFT, GIFT, ICSI, PROST; Modern contraceptive technologies; Demographic terminology used in family planning

DSE2P: Reproductive Biology (Practical) **Credits: 02**

1. Study of animal house: set up and maintenance of animal house, breeding techniques, care of normal and experimental animals.
2. Examination of vaginal smear rats from live animals.
3. Surgical techniques: principles of surgery in endocrinology. Ovarectomy, hysterectomy, castration and vasectomy in rat.
4. Examination of histological sections from photomicrographs/ permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems;

Sections of ovary, fallopian tube, uterus (proliferative and secretory stages), cervix and vagina.

5. Human vaginal exfoliate cytology.
6. Sperm count and sperm motility in rat
7. Study of modern contraceptive devices

Suggested Readings:

- Austin, C.R. and Short, R.V. reproduction in Mammals. Cambridge University Press.
- Degroot, L.J. and Jameson, J.L. (eds). Endocrinology. W.B. Saunders and Company.
- Knobil, E. et al. (eds). The Physiology of Reproduction. Raven Press Ltd.
- Hatcher, R.A. et al. The Essentials of Contraceptive Technology. Population Information Programme.

Or

DSE- 2: Insect, Vector and Diseases **Credits: 06**

DSE2T: Insect, Vector and Diseases **Credits: 04**

Course Contents:

Unit I: Introduction to Insects

General Features of Insects, Morphological features, Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits

Unit II: Concept of Vectors

Brief introduction of Carrier and Vectors (mechanical and biological vector), Reservoirs, Host-vector relationship, Vectorial capacity, Adaptations as vectors, Host Specificity

Unit III: Insects as Vectors

Classification of insects up to orders, detailed features of orders with insects as vectors – Diptera, Siphonaptera, Siphunculata, Hemiptera

Unit IV: Dipteran as Disease Vectors

Dipterans as important insect vectors – Mosquitoes, Sand fly, Houseflies; Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis; Control of mosquitoes Study of sand fly-borne diseases – Visceral Leishmaniasis, Cutaneous Leishmaniasis, Phlebotomus fever; Control of Sand fly Study of house fly as important mechanical vector, Myiasis, Control of house fly

Unit IV: Siphonaptera as Disease Vectors

Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas

Unit V: Siphunculata as Disease Vectors

Human louse (Head, Body and Pubic louse) as important insect vectors; Study of louse-borne diseases –Typhus fever, Relapsing fever, Trench fever, Vagabond's disease, Phthiriasis; Control of human louse

Unit VI: Hempitera as Disease Vectors
Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures

DSE2P: Insect Vector and Diseases (Practical) **Credits: 02**

1. Study of different kinds of mouth parts of insects
2. Study of following insect vectors through permanent slides/ photographs: *Aedes, Culex, Anopheles*, *Pediculus humanus capitis, Pediculus humanus corporis, Phithirus pubis, Xenopsylla cheopis, Cimex lectularius, Phlebotomus argentipes, Musca domestica,* through permanent slides/ photographs
3. Study of different diseases transmitted by above insect vectors
4. Submission of a project report on any one of the insect vectors and disease transmitted

Suggested Readings:

- Imms, A.D. (1977). *A General Text Book of Entomology*. Chapman & Hall, UK
- Chapman, R.F. (1998). *The Insects: Structure and Function.* IV Edition, Cambridge University Press, UK
- Pedigo L.P. (2002). *Entomology and Pest Management.* Prentice Hall Publication
- Mathews, G. (2011). *Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases*. Wiley-Blackwell

Or

DSE- 2: Project Work **Credits: 06**

Skill Enhancement Courses (SEC)

SEC - 1: Apiculture **Credits: 02**

SECT: Apiculture

Course Contents:

Unit 1: Biology of Bees
History, Classification and Biology of Honey Bees. Social Organization of Bee Colony

Unit 2: Rearing of Bees
Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth. Bee Pasturage. Selection of Bee Species for Apiculture. Bee Keeping Equipment. Methods of Extraction of Honey (Indigenous and Modern)

Unit 3: Diseases and Enemies
Bee Diseases and Enemies. Control and Preventive measures.

Unit 4: Bee Economy
Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc

Unit 5: Entrepreneurship in Apiculture
Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial. Beehives for cross pollination in horticultural gardens

Suggested Readings:

- Prost, P. J. (1962). *Apiculture*. Oxford and IBH, New Delhi.
- Bisht D.S., *Apiculture*, ICAR Publication.
- Singh S., *Beekeeping in India*, Indian council of Agricultural Research, NewDelhi.

SEC - 2: Aquarium Fish Keeping **Credits: 02**

SEC2T: Aquarium Fish Keeping

Course Contents:

Unit1: Introduction to Aquarium Fish Keeping
The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes

Unit 2: Biology of Aquarium Fishes
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 3: Food and feeding of Aquarium fishes
Use of live fish feed organisms. Preparation and composition of formulated fish feeds

Unit 4: Fish Transportation
Live fish transport - Fish handling, packing and forwarding techniques.

Unit 5: Maintenance of Aquarium
General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry

SEC-3: Medical Diagnostics **Credits: 02**

SEC3T: Medical Diagnostics

Course Contents:

Unit 1: Introduction to Medical Diagnostics and its Importance

Unit 2: Diagnostics Methods Used for Analysis of Blood
Blood composition, Preparation of blood smear and Differential Count (D.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)

Unit 3: Diagnostic Methods Used for Urine Analysis
Urine Analysis: Physical characteristics; Abnormal constituents

Unit 4:Non-infectious Diseases
Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit

Unit 5: Infectious Diseases
Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis

Unit 6: Tumours
Types (Benign/Malignant), Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan (using photographs).

Suggested Readings:

- Park, K. (2007), *Preventive and Social Medicine*, B.B. Publishers
- Godkar P.B. and Godkar D.P. *Textbook of Medical Laboratory Technology*, II Edition, Bhalani Publishing House
- Cheesbrough M., *A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses*
- Guyton A.C. and Hall J.E. T*extbook of Medical Physiology*, Saunders
- Robbins and Cortan, *Pathologic Basis of Disease,* VIIIEdition, Saunders
- Prakash, G. (2012), *Lab Manual on Blood Analysis and Medical Diagnostics*, S. Chand and Co. Ltd.

Or

SEC- 3: Research Methodology **Credits: 02**

SEC3T: Research Methodology

Course Contents:

Unit 1: Foundations of Research
Meaning, Objectives, Motivation: Research Methods *vs* Methodology, Types of Research: Analytical *vs* Descriptive, Quantitative *vs* Qualitative, Basic *vs* Applied

Unit 2: Research Design
Need for research design: Features of good design, Important concepts related to good design- Observation and Facts, Prediction and Explanation, Development of Models. Developing a research plan: Problem identification, Experimentation,
Determining experimental and sample designs

Unit 3: Data Collection, Analysis and Report Writing
Observation and Collection of Data-Methods of data collection- Sampling Methods, Data Processing and Analysis Strategies, Technical Reports and Thesis writing, Preparation of Tables and Bibliography. Data Presentation using digital technology

Unit 4: Ethical Issues

Intellectual property Rights, Commercialization, Copy Right, Royalty, Patent law, Plagiarism, Citation, Acknowledgement

Suggested Readings:

- Anthony, M, Graziano, A.M. and Raulin, M.L. 2009. Research Methods: A Process of Inquiry, Allyn and Bacon.
- Walliman, N. 2011.Research Methods- The Basics. Taylor and Francis, London, New York.
- Wadhera, B.L.: Law Relating to Patents, Trade Marks, Copyright Designs and Geographical Indications, 2002, Universal Law publishing
- C.R.Kothari: Research Methodology, New Age International, 2009
- Coley, S.M. and Scheinberg, C.A. 1990, "Proposal writing". Stage Publications.

SEC - 4: Sericulture **Credits: 02**

SEC4T: Sericulture

Course Contents:

Unit 1: Introduction
Sericulture: Definition, history and present status; Silk route, Types of silkworms, Distribution and Races, Exotic and indigenous races, Mulberry and non-mulberry Sericulture

Unit 2: Biology of Silkworm
Life cycle of *Bombyx mori*, Structure of silk gland and secretion of silk

Unit 3: Rearing of Silkworms
Selection of mulberry variety and establishment of mulberry garden, Rearing house and rearing appliances, Disinfectants: Formalin, bleaching powder, RKO, Silkworm rearing technology: Early age and Late age rearing, Types of mountages, Spinning, harvesting and storage of cocoons

Unit 4: Pests and Diseases
Pests of silkworm: Uzi fly, dermestid beetles and vertebrates, Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial. Control and prevention of pests and diseases

Unit 5: Entrepreneurship in Sericulture
Prospectus of Sericulture in India: Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture. Visit to various, sericulture centres.

Suggested Readings:

- Handbook of Practical Sericulture: S.R. Ullal and M.N. Narasimhanna CSB, Bangalore
- Appropriate Sericultural Techniques; Ed. M. S. Jolly, Director, CSR & TI, Mysore.
- Handbook of Silkworm Rearing: Agriculture and Technical Manual-1, Fuzi Pub. Co. Ltd., Tokyo, Japan.
- Manual of Silkworm Egg Production; M. N. Narasimhanna, CSB, Bangalore.

- Silkworm Rearing; Wupang—Chun and Chen Da-Chung, Pub. By FAO, Rome.
- A Guide for Bivoltine Sericulture; K. Sengupta, Director, CSR & TI, Mysore.
- Improved Method of Rearing Young age silkworm; S. Krishnaswamy, reprinted CSB, Bangalore,

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year B. Sc (General)
in

Zoology

Under Choice Based Credit System (CBCS)
[w.e.f 2018-2019]

VIDYASAGAR UNIVERSITY

B Sc (General) in Zoology

[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
1	I	SEMESTER-I					CA	ESE	TOTAL
		Core-1 (DSC-1A)		Animal Diversity - **Lab**	6	4-0-4	15	60	75
		Core-2 (DSC-2A)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-3 (DSC-3A)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC-1 (Elective)		English/MIL	2	1-1-0	10	40	50
		Semester - I : Total			**20**				**275**
	II	SEMESTER-II							
		Core-4 (DSC-1B)		Comparative Anatomy and Development Biology of Vertebrates - **Lab**	6	4-0-4	15	60	75
		Core-5 (DSC-2B)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-6 (DSC-3B)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC-2 (Elective)		Environmental Studies	4		20	80	100
		Semester - 2 : Total			**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
2	**III**	**SEMESTER-III**					**CA**	**ESE**	**TOTAL**
		Core-7 (DSC-1C)		Physiology and Biochemistry - **Lab**	6	4-0-4	15	60	75
		Core-8 (DSC-2C)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-9 (DSC-3C)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-1		TBD	2	1-1-0	10	40	50
		Semester - 3 : Total			**20**				**275**
	IV	**SEMESTER-IV**							
		Core-10 (DSC-1D)		Genetics and Evolution Biology - **Lab**	6	4-0-4	15	60	75
		Core-11 (DSC-2D)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-12 (DSC-3D)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-2		TBD	2	1-1-0	10	40	50
		Semester - 4 : Total			**20**				**275**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
3	V	SEMESTER-V					CA	ESE	TOTAL
		DSE-1A		Discipline-1(Zoology)	6	4-0-4	15	60	75
		DSE-2A		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		DSE-3A		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-3		TBD	2	1-1-0	10	40	50
		Semester - 5 : Total			**20**				**275**
	VI	SEMESTER-VI							
		DSE-1B		Discipline-1(Zoology)	6	4-0-4	15	60	75
		DSE-2B		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		DSE-3B		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-4		TBD	2	1-1-0	10	40	50
		Semester - 6 : Total			**20**				**275**
	Total in all semester:				**122**				**1700**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **CP**=Core Practical , **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies ,

List of Core and Elective Courses

Core Courses (CC)

DSC-1A: **Animal Diversity**
DSC-1B: **Comparative Anatomy and Developmental Biology of Vertebrates**
DSC-1C: **Physiology and Biochemistry**
DSC-1D: **Genetics and Evolutionary Biology**

Discipline Specific Electives (DSE)

DSE-1: **Applied Zoology**
Or
DSE-1: **Aquatic Biology**
Or
DSE-1: **Immunology**
DSE-2: **Animal Biotechnology**
Or
DSE-2: **Reproductive Biology**
Or
DSE-2: **Insect, Vector and Diseases**
Or
DSE-2: **Project work**

Skill Enhancement Courses (SEC)

SEC-1: **Apiculture**
SEC-2: **Aquarium Fish Keeping**
SEC-3: **Medical Diagnostics**
Or
SEC-3: **Research Methodology**
SEC-4: **Sericulture**

List of the Core and Elective Courses

Core Courses

DSC-1A (CC-1): Animal diversity **Credits: 06**

DSC1AT: Animal diversity **Credits: 04**

Course Contents:

Unit 1: Kingdom Protista
General characters and classification up to classes; Locomotory Organelles and locomotion in Protozoa

Unit 2: Phylum Porifera
General characters and classification up to classes; Canal System in *Sycon*

Unit 3: Phylum Cnidaria
General characters and classification up to classes; Polymorphism in Hydrozoa

Unit 4: Phylum Platyhelminthes
General characters and classification up to classes; Life history of *Taenia solium*

Unit 5: Phylum Nemathelminthes
General characters and classification up to classes; Life history of *Ascaris lumbricoides* and its parasitic adaptations

Unit 6: Phylum Annelida
General characters and classification up to classes; Metamerism in Annelida

Unit 7: Phylum Arthropoda
General characters and classification up to classes; Vision in Arthropoda, Metamorphosis in Insects

Unit 8: Phylum Mollusca
General characters and classification up to classes; Torsion in gastropods

Unit 9: Phylum Echinodermata
General characters and classification up to classes; Water-vascular system in Asteroidea

Unit 10: Protochordates
General features and Phylogeny of Protochordata

Unit 11: Agnatha
General features of Agnatha and classification of cyclostomes up to classes

Unit 12: Pisces
General features and Classification up to orders; Osmoregulation in Fishes

Unit 13: Amphibia

General features and Classification up to orders; Parental care

Unit 14: Reptiles
General features and Classification up to orders; Poisonous and non-poisonous snakes, Biting mechanism in snakes

Unit 15: Aves
General features and Classification up to orders; Flight adaptations in birds

Unit 17: Mammals
Classification up to orders; Origin of mammals

Note: Classification of Unit 1-9 to be followed from "Barnes, R.D. (1982). *Invertebrate Zoology*, V Edition"

DSC1AP: Animal diversity (Practical) **Credits: 02**

1. Study of the following specimens:
Amoeba, *Euglena*, *Plasmodium*, *Paramecium*, *Sycon*, *Hyalonema*, and *Euplectella*, *Obelia*, *Physalia*, *Aurelia*, *Tubipora*, *Metridium*, *Taenia solium*, Male and female *Ascaris lumbricoides*, *Aphrodite*, *Nereis*, *Pheretima*, *Hirudinaria*, *Palaemon*, *Cancer*, *Limulus*, *Palamnaeus*, *Scolopendra*, *Julus*, *Periplaneta*, *Apis*, *Chiton*, *Dentalium*, *Pila*, *Unio*, *Loligo*, *Sepia*, *Octopus*, *Pentaceros*, *Ophiura*, *Echinus*, *Cucumaria* and *Antedon*, *Balanoglossus*, *Herdmania*, *Branchiostoma*, *Petromyzon*, *Sphyrna*, *Pristis*, *Torpedo*, *Labeo*, *Exocoetus*, *Anguilla*, *Ichthyophis/Ureotyphlus*, *Salamandra*, *Bufo*, *Hyla*, *Chelone*, *Hemidactylus*, *Chamaeleon*, *Draco*, *Vipera*, *Naja*, *Crocodylus*, *Gavialis*, Any six common birds from different orders, *Sorex*, Bat, *Funambulus*, *Loris*

2. Study of the following permanent slides:
1. T.S. and L.S. of *Sycon*,
2. Study of life history stages of *Taenia*,
3. T.S. of male and female *Ascaris*

3. Key for identification of poisonous and non-poisonous snakes
An "animal album" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

Suggested Readings:

- Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
- Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science
- Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.
- Pough H. *Vertebrate life*, VIII Edition, Pearson International.
- Hall B.K. and Hallgrimsson B. (2008). *Strickberger's Evolution*. IV Edition. Jones and Bartlett Publishers Inc.

DSC-1B (CC-2): Comparative Anatomy and Developmental Biology of Vertebrates
Credits: 06

DSC1BT: Comparative Anatomy and Developmental Biology of Vertebrates
Credits: 04

Course Contents:

Unit 1: Integumentary System
Derivatives of integument w.r.t. glands and digital tips

Unit 2: Skeletal System
Evolution of visceral arches

Unit 3: Digestive System
Brief account of alimentary canal and digestive glands

Unit 4: Respiratory System
Brief account of gills, lungs, air sacs and swim bladder

Unit 5: Circulatory System
Evolution of heart and aortic arches

Unit 6: Urinogenital System
Succession of kidney, Evolution of urinogenital ducts

Unit 7: Nervous System
Comparative account of brain

Unit 8: Sense Organs
Receptors and its types.

Unit 9: Early Embryonic Development
Gametogenesis: Spermatogenesis and oogenesis w.r.t. mammals, vitellogenesis in birds; Fertilization: external (amphibians), internal (mammals), blocks to polyspermy; Early development of frog and humans (structure of mature egg and its membranes, patterns of cleavage, fate map, up to formation of gastrula);types of morphogenetic movements; Fate of germ layers; Neurulation in frog embryo.

Unit 10: Late Embryonic Development
Implantation of embryo in humans, Formation of human placenta and functions, other types of placenta on the basis of histology; Metamorphic events in frog life cycle and its hormonal regulation.

Unit 11: Control of Development
Fundamental processes in development (brief idea) – Gene activation, determination, induction, Differentiation, morphogenesis, intercellular communication, cell movements and cell death

DSC1BP: Comparative Anatomy and Developmental Biology of Vertebrates (Practical) Credits: 02

1. Osteology:
    a) Disarticulated skeleton of fowl and rabbit
    b) Carapace and plastron of turtle /tortoise
    c) Mammalian skulls: One herbivorous and one carnivorous animal.
2. Frog - Study of developmental stages - whole mounts and sections through permanent slides – cleavage stages, blastula, gastrula neurula, tail bud stage, tadpole external and internal gill stages.
3. Study of the different types of placenta- histological sections through permanent slides or photomicrographs.
4. Study of placental development in humans by ultrasound scans.
5. Examination of gametes - frog/rat - sperm and ova through permanent slides or photomicrographs.

Suggested Readings:

- Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*. IV Edition. McGraw-Hill Higher Education.
- Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition. The McGraw-Hill Companies.
- Hilderbrand, M and Gaslow G.E. *Analysis of Vertebrate Structure*, John Wiley and Sons.
- Walter, H.E. and Sayles, L.P; *Biology of Vertebrates*, Khosla Publishing House.
- Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.
- Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.
- Carlson, Bruce M (1996). Patten's Foundations of Embryology, McGraw Hill, Inc.

DSC-1C (CC-3): Physiology and Biochemistry Credits: 06

DSC1CT: Physiology and Biochemistry Credits: 04

Course Contents:

Unit 1: Nerve and muscle
Structure of a neuron, Resting membrane potential, Graded potential, Origin of Action potential and its propagation in myelinated and non-myelinated nerve fibres, Ultra-structure of skeletal muscle, Molecular and chemical basis of muscle contraction

Unit 2: Digestion
Physiology of digestion in the alimentary canal; Absorption of carbohydrates, proteins, lipids

Unit 3: Respiration
Pulmonary ventilation, Respiratory volumes and capacities, Transport of oxygen and carbon dioxide in blood.

Unit 4: Excretion
Structure of nephron, Mechanism of Urine formation, Counter-current Mechanism

Unit 5: Cardiovascular system
Composition of blood, Hemostasis, Structure of Heart, Origin and conduction of the cardiac impulse,Cardiac cycle

Unit 6: Reproduction and Endocrine Glands
Physiology of male reproduction: Hormonal control of spermatogenesis; Physiology of female reproduction: hormonal control of menstrual cycle Structure and function of pituitary, thyroid, parathyroid, pancreas and adrenal

Unit 7: Carbohydrate Metabolism
Glycolysis, Krebs Cycle, Pentose phosphate pathway, Gluconeogenesis, Glycogen metabolism, Review of electron transport chain

Unit 8: Lipid Metabolism
Biosynthesis and β oxidation of palmitic acid

Unit 9: Protein metabolism
Transamination, Deamination and Urea cycle

Unit 10: Enzymes
Introduction, Mechanism of action, Enzyme kinetics, inhibition and regulation

DSC1CP: Physiology and Biochemistry (Practical): Credits: 02

1. Preparation of hemin and hemochromogen crystals.
2. Study of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland.
3. Study of permanent slides of spinal cord, duodenum, liver, lung, kidney, bone, cartilage.
4. Qualitative tests to identify functional groups of carbohydrates in given solutions (Glucose, Fructose, Sucrose, Lactose).
5. Estimation of total protein in given solutions by Lowry's method.
6. Study of activity of salivary amylase under optimum conditions

Suggested Readings:

- Tortora, G.J. and Derrickson, B.H. (2009). *Principles of Anatomy and Physiology*, XII Edition, John Wiley & Sons, Inc.
- Widmaier, E.P., Raff, H. and Strang, K.T. (2008) *Vander's Human Physiology*, XI Edition., McGraw Hill
- Guyton, A.C. and Hall, J.E. (2011). T*extbook of Medical Physiology*, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company
- Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). *Biochemistry*. VI 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). *Harper's Illustrated Biochemistry*. XXVIII Edition. Lange Medical Books/Mc Graw3Hill.

DSC-1D (CC-4): Genetics and Evolutionary Biology **Credits: 06**

DSC1DT: Genetics and Evolutionary Biology **Credits: 04**

Course Contents:

Unit 1: Introduction to Genetics
Mendel's work on transmission of traits, Genetic Variation, Molecular basis of genetic information

Unit 2: Mendelian Genetics and its Extension
Principles of Inheritance, Chromosome theory of inheritance, Incomplete dominance and codominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, sex linked inheritance, extra-chromosomal inheritance

Unit 3: Linkage, Crossing Over and Chromosomal Mapping
Linkage and crossing over, Recombination frequency as a measure of linkage intensity, two factor and three factor crosses, Interference and coincidence, Somatic cell genetics – an alternative approach to gene mapping

Unit 4: Mutations
Chromosomal Mutations: Deletion; Duplication; Inversion; Translocation; Aneuploidy and Polyploidy; Gene mutations: Induced versus Spontaneous mutations, Back versus Suppressor mutations,

Unit 5: Sex Determination
Chromosomal mechanisms, dosage compensation

Unit 6: History of Life
Major Events in History of Life

Unit 7: Introduction to Evolutionary Theories
Lamarckism, Darwinism, Neo-Darwinism

Unit 8: Direct Evidences of Evolution
Types of fossils, Incompleteness of fossil record, Dating of fossils, Phylogeny of horse

Unit 9: Processes of Evolutionary Change
Organic variations; Isolating Mechanisms; Natural selection (Example: Industrial melanism); Types of natural selection (Directional, Stabilizing, Disruptive), Artificial selection

Unit 10: Species Concept

Biological species concept (Advantages and Limitations); Modes of speciation (Allopatric, Sympatric)

Unit 11: Macro-evolution
Macro-evolutionary Principles (example: Darwin's Finches)

Unit 12: Extinction
Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail), Role of extinction in evolution

DSC1DP: Genetics and Evolutionary Biology (Practical) Credits: 02

1. Study of Mendelian inheritance and gene interactions (Non- Mendelian inheritance) using suitable examples. Verify the results using Chi-square test.
2. Study of Linkage, recombination, gene mapping using the data.
3. Study of Human Karyotypes (normal and abnormal).
4. Study of fossil evidences from plaster cast models and pictures
5. Study of homology and analogy from suitable specimens/ pictures
6. Charts:
    a. Phylogeny of horse with diagrams/ cut outs of limbs and teeth of horse ancestors
    b. Darwin's Finches with diagrams/ cut outs of beaks of different species
7. Visit to Natural History Museum and submission of report

Suggested Readings:

- Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). *Principles of Genetics*. VIII Edition. Wiley India.
- Snustad, D.P., Simmons, M.J. (2009). *Principles of Genetics*. V Edition. John Wiley and Sons Inc.
- Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). *Concepts of Genetics*. X Edition. Benjamin Cummings.
- Russell, P. J. (2009). *Genetics- A Molecular Approach.* III Edition. Benjamin Cummings.
- Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. *Introduction to Genetic Analysis*. IX Edition. W. H. Freeman and Co.
- Ridley, M. (2004). *Evolution*. III Edition. Blackwell Publishing
- Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007). *Evolution*. Cold Spring, Harbour Laboratory Press.
- Hall, B. K. and Hallgrimsson, B. (2008). *Evolution*. IV Edition. Jones and Bartlett Publishers
- Campbell, N. A. and Reece J. B. (2011). *Biology*. IX Edition, Pearson, Benjamin, Cummings.
- Douglas, J. Futuyma (1997). *Evolutionary Biology*. Sinauer Associates.

Discipline Specific Elective (DSE)

DSE - 1: Applied Zoology **Credits: 06**

DSE1T: Applied Zoology **Credits: 04**

Course Contents:

Unit 1: Introduction to Host-parasite Relationship
Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir, Zoonosis

Unit 2: Epidemiology of Diseases
Transmission, Prevention and control of diseases: Tuberculosis, typhoid

Unit 3: Rickettsiae and Spirochaetes
Brief account of *Rickettsia prowazekii*, *Borrelia recurrentis* and *Treponema pallidum*

Unit 4: Parasitic Protozoa
Life history and pathogenicity of *Entamoeba histolytica*, *Plasmodium vivax* and *Trypanosoma gambiense*

Unit 5: Parasitic Helminthes
Life history and pathogenicity of *Ancylostoma duodenale* and *Wuchereria bancrofti*

Unit 6: Insects of Economic Importance
Biology, Control and damage caused by *Helicoverpa armigera*, *Pyrilla perpusilla* and *Papilio demoleus*, *Callosobruchus chinensis*, *Sitophilus oryzae* and *Tribolium castaneum*

Unit 7: Insects of Medical Importance
Medical importance and control of *Pediculus humanus corporis*, *Anopheles*, *Culex*, *Aedes*, *Xenopsylla cheopis*

Unit 8: Animal Husbandry
Preservation and artificial insemination in cattle; Induction of early puberty and synchronization of estrus in cattle

Unit 9: Poultry Farming
Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs

Unit 10: Fish Technology
Genetic improvements in aquaculture industry; Induced- breeding and transportation of fish seed

DSE1P: Applied Zoology (Practical) **Credits: 02**

1. Study of *Plasmodium vivax, Entamoeba histolytica, Trypanosoma gambiense, Ancylostoma duodenale* and *Wuchereria bancrofti* and their life stages through permanent slides/photomicrographs or specimens.
2. Study of arthropod vectors associated with human diseases: *Pediculus, Culex, Anopheles, Aedes* and *Xenopsylla.*
3. Study of insect damage to different plant parts/stored grains through damaged products/photographs.
4. Identifying feature and economic importance of *Helicoverpa* (*Heliothis*) *armigera, Papilio demoleus, Pyrilla perpusilla, Callosobruchus chinensis, Sitophilus oryzae* and *Tribolium castaneum*
5. Visit to poultry farm or animal breeding centre. Submission of visit report
6. Maintenance of freshwater aquarium

Suggested Readings:

- Park, K. *Preventive and Social Medicine*. XVI Edition. B.B Publishers.
- Arora, D. R and Arora, B. (2001). *Medical Parasitology*. II Edition. CBS Publications and Distributors.
- Kumar and Cotran. *Pathological Basis of Diseases.*
- Atwal, A.S. (1986). *Agricultural Pests of India and South East Asia*, Kalyani Publishers.
- Dennis, H. (2009). *Agricultural Entomology.* Timber Press.
- Hafez, E. S. E. (1962). *Reproduction in Farm Animals*. Lea & Fabiger Publisher
- Dunham R.A. (2004). *Aquaculture and Fisheries Biotechnology Genetic Approache*s. CABI publications, U.K.
- Pedigo, L.P. (2002). *Entomology and Pest Management*, Prentice Hall.

Or

DSE- 1: Aquatic biology **Credits: 06**

DSE1T: Aquatic biology **Credits: 04**

Course Contents:

UNIT 1: Aquatic Biomes

Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs.

UNIT 2: Freshwater Biology

Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico–chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; Dissolved gases (oxygen, carbon dioxide). Nutrient Cycles in Lakes-Nitrogen, Sulphur and Phosphorous.

Streams: Different stages of stream development, Physico-chemical environment, Adaptation of hill-stream fishes.

UNIT 3: Marine Biology

Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds.

UNIT 4: Management of Aquatic Resources
Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD.

DSE1P: Aquatic Biology (Practical) **Credits: 02**

1. Determine the area of a lake using graphimetric and gravimetric method.
2. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.
3. Determine the amount of Turbidity/transparency, Dissolved oxygen, carbon dioxide, alkalinity (carbonates & bicarbonates) in water collected from a nearby lake/ water body.
4. Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.
5. A Project Report on a visit to a Sewage treatment plant/Marine bioreserve/ Fisheries Institutes.

Suggested Readings:

- Anathakrishnan : Bioresources Ecology 3rd Edition
- Goldman : Limnology, 2nd Edition
- Odum and Barrett : Fundamentals of Ecology, 5th Edition
- Pawlowski : Physicochemical Methods for Water and Wastewater Treatment, 1st Edition
- Wetzel : Limnology, 3rd edition
- Trivedi and Goyal : Chemical and biological methods for water pollution studies
- Welch : Limnology Vols. I-II

Or

DSE- 1: Immunology **Credits: 06**

DSE1T: Immunology **Credits: 04**

Course Contents:

Unit 1: **Overview of the Immune System**
Introduction to basic concepts in immunology, components of immune system, principles of innate and adaptive immune system

Unit 2: **Cells and Organs of the Immune System**
Haematopoeisis, Cells of immune system and organs (primary and secondary lymphoid organs) of the immune system

Unit 3: Antigens
Basic properties of antigens, B and T cell epitopes, haptens and adjuvants

Unit 4: **Antibodies**
Structure, classes and function of antibodies, monoclonal antibodies, antigen antibody interactions as tools for research and diagnosis

Unit 5: **Working of the immune system**
Structure and functions of MHC, exogenous and endogenous pathways of antigen presentation and processing, Basic properties and functions of cytokines, Complement system: Components and pathways.
Unit 6: **Immune system in health and disease**
Gell and Coombs' classification and brief description of various types of hypersensitivities, Introduction to concepts of autoimmunity and immunodeficiency,

Unit 7: Vaccines
General introduction to vaccines, Various types of vaccines

DSE1P: Immunology (Practical) **Credits: 02**

1. Demonstration of lymphoid organs
2. Histological study of spleen, thymus and lymph nodes through slides/ photographs
3. Preparation of stained blood film to study various types of blood cells.
4. Ouchterlony's double immuno-diffusion method.
5. ABO blood group determination.
6. Cell counting and viability test from splenocytes of farm bred animals/cell lines.
7. Demonstration of
    a. ELISA
    b. Immunoelectrophoresis

(*Subject to UGC guidelines)

Suggested Readings:

- Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2006). *Immunology*, VI Edition. W.H. Freeman and Company.
- David, M., Jonathan, B., David, R. B. and Ivan R. (2006). *Immunology*, VII Edition, Mosby, Elsevier Publication.
- Abbas, K. Abul and Lechtman H. Andrew (2003.) *Cellular and Molecular Immunology*. V Edition. Saunders Publication.

DSE - 2: Animal Biotechnology **Credits: 06**

DSE2T: Animal Biotechnology **Credits: 04**

Course Contents:

Unit 1: Introduction
Concept and scope of biotechnology

Unit 2: Molecular Techniques in Gene manipulation

Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors (characteristics) Restriction enzymes: nomenclature, detailed study of Type II. Transformation techniques: Calcium chloride method and electroporation. Construction of genomic and cDNA libraries and screening by colony and plaque hybridization Southern, Northern and Western blotting; DNA sequencing: Sanger method; Polymerase Chain Reaction, DNA Finger Printing and DNA micro array

Unit 3: Genetically Modified Organisms

Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection, Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knockout mice. Production of transgenic plants: *Agrobacterium* mediated transformation. Applications of transgenic plants: insect and herbicide resistant plants.

Unit 4: Culture Techniques and Applications

Animal cell culture, Expressing cloned genes in mammalian cells, Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia); Recombinant DNA in medicines: Recombinant insulin and human growth hormone, Gene therapy

DSE2P: Animal Biotechnology (Practical): Credits: 02

1. Genomic DNA isolation from *E. coli*
2. Plasmid DNA isolation (pUC 18/19) from *E. coli*
3. Restriction digestion of plasmid DNA.
4. Construction of circular and linear restriction map from the data provided.
5. Calculation of transformation efficiency from the data provided.
6. To study following techniques through photographs
    a. Southern Blotting
    b. Northern Blotting
    c. Western Blotting
    d. DNA Sequencing (Sanger's Method)
    e. PCR
    f. DNA fingerprinting

7. Project report on animal cell culture

Suggested Readings:

- Brown, T.A. (1998). *Molecular Biology Labfax II: Gene Cloning and DNA Analysis*. II Edition, Academic Press, California, USA.
- Glick, B.R. and Pasternak, J.J. (2009). *Molecular Biotechnology - Principles and Applications of Recombinant DNA*. IV Edition, ASM press, Washington, USA.
- Griffiths, A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart, W.M. (2009). *An Introduction to Genetic Analysis*. IX Edition. Freeman and Co., N.Y., USA.
- Snustad, D.P. and Simmons, M.J. (2009). *Principles of Genetics*. V Edition, John Wiley and Sons Inc.
- Watson, J.D., Myers, R.M., Caudy, A. and Witkowski, J.K. (2007). *Recombinant DNAGenes and Genomes- A Short Course*. III Edition, Freeman and Co., N.Y., USA.

- Beauchamp, T.I. and Childress, J.F. (2008). *Principles of Biomedical Ethics.* VI Edition, Oxford University Press. *CBCS Undergraduate Program in Zoology*

Or

DSE- 2: Reproductive Biology **Credits: 06**

DSE2T: Reproductive Biology **Credits: 04**

Course Contents:

Unit 1: Reproductive Endocrinology
Gonadal hormones and mechanism of hormone action, steroids, glycoprotein hormones, and prostaglandins, hypothalamo – hypophyseal – gonadal axis, regulation of gonadotrophin secretion in male and female; Reproductive System: Development and differentiation of gonads, genital ducts, external genitalia, mechanism of sex differentiation.

Unit 2: Functional anatomy of male reproduction
Outline and histological structure of male reproductive system in rat and human; Testis: Cellular functions, germ cell, system cell renewal; Spermatogenesis: kinetics and hormonal regulation; Androgen synthesis and metabolism; Epididymal function and sperm maturation;
Accessory glands functions; Sperm transportation in male tract

Unit 3: Functional anatomy of female reproduction
Outline and histological structure of female reproductive system in rat and human; Ovary: folliculogenesis, ovulation, corpus luteum formation and regression; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (rat and human) and their regulation, changes in the female tract; Ovum transport in the fallopian tubes; Sperm transport in the female tract, fertilization; Hormonal control of implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto – maternal relationship; Mechanism of parturition and its hormonal regulation; Lactation and its regulation

Unit 4: Reproductive Health
Infertility in male and female: causes, diagnosis and management; Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization, ET, EFT, IUT, ZIFT, GIFT, ICSI, PROST; Modern contraceptive technologies; Demographic terminology used in family planning

DSE2P: Reproductive Biology (Practical) **Credits: 02**

1. Study of animal house: set up and maintenance of animal house, breeding techniques, care of normal and experimental animals.
2. Examination of vaginal smear rats from live animals.
3. Surgical techniques: principles of surgery in endocrinology. Ovarectomy, hysterectomy, castration and vasectomy in rat.
4. Examination of histological sections from photomicrographs/ permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems;

Sections of ovary, fallopian tube, uterus (proliferative and secretory stages), cervix and vagina.

5. Human vaginal exfoliate cytology.
6. Sperm count and sperm motility in rat
7. Study of modern contraceptive devices

Suggested Readings:

- Austin, C.R. and Short, R.V. reproduction in Mammals. Cambridge University Press.
- Degroot, L.J. and Jameson, J.L. (eds). Endocrinology. W.B. Saunders and Company.
- Knobil, E. et al. (eds). The Physiology of Reproduction. Raven Press Ltd.
- Hatcher, R.A. et al. The Essentials of Contraceptive Technology. Population Information Programme.

Or

DSE- 2: Insect, Vector and Diseases **Credits: 06**

DSE2T: Insect, Vector and Diseases **Credits: 04**

Course Contents:

Unit I: Introduction to Insects

General Features of Insects, Morphological features, Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits

Unit II: Concept of Vectors

Brief introduction of Carrier and Vectors (mechanical and biological vector), Reservoirs, Host-vector relationship, Vectorial capacity, Adaptations as vectors, Host Specificity

Unit III: Insects as Vectors

Classification of insects up to orders, detailed features of orders with insects as vectors – Diptera, Siphonaptera, Siphunculata, Hemiptera

Unit IV: Dipteran as Disease Vectors

Dipterans as important insect vectors – Mosquitoes, Sand fly, Houseflies; Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis; Control of mosquitoes Study of sand fly-borne diseases – Visceral Leishmaniasis, Cutaneous Leishmaniasis, Phlebotomus fever; Control of Sand fly Study of house fly as important mechanical vector, Myiasis, Control of house fly

Unit IV: Siphonaptera as Disease Vectors

Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas

Unit V: Siphunculata as Disease Vectors

Human louse (Head, Body and Pubic louse) as important insect vectors; Study of louse-borne diseases –Typhus fever, Relapsing fever, Trench fever, Vagabond's disease, Phthiriasis; Control of human louse

Unit VI: Hempitera as Disease Vectors
Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures

DSE2P: Insect Vector and Diseases (Practical) **Credits: 02**

1. Study of different kinds of mouth parts of insects
2. Study of following insect vectors through permanent slides/ photographs: *Aedes, Culex, Anopheles*, *Pediculus humanus capitis, Pediculus humanus corporis, Phithirus pubis, Xenopsylla cheopis, Cimex lectularius, Phlebotomus argentipes, Musca domestica,* through permanent slides/ photographs
3. Study of different diseases transmitted by above insect vectors
4. Submission of a project report on any one of the insect vectors and disease transmitted

Suggested Readings:

- Imms, A.D. (1977). *A General Text Book of Entomology*. Chapman & Hall, UK
- Chapman, R.F. (1998). *The Insects: Structure and Function.* IV Edition, Cambridge University Press, UK
- Pedigo L.P. (2002). *Entomology and Pest Management.* Prentice Hall Publication
- Mathews, G. (2011). *Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases*. Wiley-Blackwell

Or

DSE- 2: Project Work **Credits: 06**

Skill Enhancement Courses (SEC)

SEC - 1: Apiculture **Credits: 02**

SECT: Apiculture

Course Contents:

Unit 1: Biology of Bees
History, Classification and Biology of Honey Bees. Social Organization of Bee Colony

Unit 2: Rearing of Bees
Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth. Bee Pasturage. Selection of Bee Species for Apiculture. Bee Keeping Equipment. Methods of Extraction of Honey (Indigenous and Modern)

Unit 3: Diseases and Enemies
Bee Diseases and Enemies. Control and Preventive measures.

Unit 4: Bee Economy
Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc

Unit 5: Entrepreneurship in Apiculture
Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial. Beehives for cross pollination in horticultural gardens

Suggested Readings:

- Prost, P. J. (1962). *Apiculture*. Oxford and IBH, New Delhi.
- Bisht D.S., *Apiculture*, ICAR Publication.
- Singh S., *Beekeeping in India*, Indian council of Agricultural Research, NewDelhi.

SEC - 2: Aquarium Fish Keeping **Credits: 02**

SEC2T: Aquarium Fish Keeping

Course Contents:

Unit1: Introduction to Aquarium Fish Keeping
The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes

Unit 2: Biology of Aquarium Fishes
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 3: Food and feeding of Aquarium fishes
Use of live fish feed organisms. Preparation and composition of formulated fish feeds

Unit 4: Fish Transportation
Live fish transport - Fish handling, packing and forwarding techniques.

Unit 5: Maintenance of Aquarium
General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry

SEC-3: Medical Diagnostics **Credits: 02**

SEC3T: Medical Diagnostics

Course Contents:

Unit 1: Introduction to Medical Diagnostics and its Importance

Unit 2: Diagnostics Methods Used for Analysis of Blood
Blood composition, Preparation of blood smear and Differential Count (D.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)

Unit 3: Diagnostic Methods Used for Urine Analysis
Urine Analysis: Physical characteristics; Abnormal constituents

Unit 4:Non-infectious Diseases
Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit

Unit 5: Infectious Diseases
Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis

Unit 6: Tumours
Types (Benign/Malignant), Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan (using photographs).

Suggested Readings:

- Park, K. (2007), *Preventive and Social Medicine*, B.B. Publishers
- Godkar P.B. and Godkar D.P. *Textbook of Medical Laboratory Technology*, II Edition, Bhalani Publishing House
- Cheesbrough M., *A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses*
- Guyton A.C. and Hall J.E. T*extbook of Medical Physiology*, Saunders
- Robbins and Cortan, *Pathologic Basis of Disease,* VIIIEdition, Saunders
- Prakash, G. (2012), *Lab Manual on Blood Analysis and Medical Diagnostics*, S. Chand and Co. Ltd.

Or

SEC- 3: Research Methodology **Credits: 02**

SEC3T: Research Methodology

Course Contents:

Unit 1: Foundations of Research
Meaning, Objectives, Motivation: Research Methods *vs* Methodology, Types of Research: Analytical *vs* Descriptive, Quantitative *vs* Qualitative, Basic *vs* Applied

Unit 2: Research Design
Need for research design: Features of good design, Important concepts related to good design- Observation and Facts, Prediction and Explanation, Development of Models. Developing a research plan: Problem identification, Experimentation,
Determining experimental and sample designs

Unit 3: Data Collection, Analysis and Report Writing
Observation and Collection of Data-Methods of data collection- Sampling Methods, Data Processing and Analysis Strategies, Technical Reports and Thesis writing, Preparation of Tables and Bibliography. Data Presentation using digital technology

Unit 4: Ethical Issues

Intellectual property Rights, Commercialization, Copy Right, Royalty, Patent law, Plagiarism, Citation, Acknowledgement

Suggested Readings:

- Anthony, M, Graziano, A.M. and Raulin, M.L. 2009. Research Methods: A Process of Inquiry, Allyn and Bacon.
- Walliman, N. 2011.Research Methods- The Basics. Taylor and Francis, London, New York.
- Wadhera, B.L.: Law Relating to Patents, Trade Marks, Copyright Designs and Geographical Indications, 2002, Universal Law publishing
- C.R.Kothari: Research Methodology, New Age International, 2009
- Coley, S.M. and Scheinberg, C.A. 1990, "Proposal writing". Stage Publications.

SEC - 4: Sericulture **Credits: 02**

SEC4T: Sericulture

Course Contents:

Unit 1: Introduction
Sericulture: Definition, history and present status; Silk route, Types of silkworms, Distribution and Races, Exotic and indigenous races, Mulberry and non-mulberry Sericulture

Unit 2: Biology of Silkworm
Life cycle of *Bombyx mori*, Structure of silk gland and secretion of silk

Unit 3: Rearing of Silkworms
Selection of mulberry variety and establishment of mulberry garden, Rearing house and rearing appliances, Disinfectants: Formalin, bleaching powder, RKO, Silkworm rearing technology: Early age and Late age rearing, Types of mountages, Spinning, harvesting and storage of cocoons

Unit 4: Pests and Diseases
Pests of silkworm: Uzi fly, dermestid beetles and vertebrates, Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial. Control and prevention of pests and diseases

Unit 5: Entrepreneurship in Sericulture
Prospectus of Sericulture in India: Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture. Visit to various, sericulture centres.

Suggested Readings:

- Handbook of Practical Sericulture: S.R. Ullal and M.N. Narasimhanna CSB, Bangalore
- Appropriate Sericultural Techniques; Ed. M. S. Jolly, Director, CSR & TI, Mysore.
- Handbook of Silkworm Rearing: Agriculture and Technical Manual-1, Fuzi Pub. Co. Ltd., Tokyo, Japan.
- Manual of Silkworm Egg Production; M. N. Narasimhanna, CSB, Bangalore.

- Silkworm Rearing; Wupang—Chun and Chen Da-Chung, Pub. By FAO, Rome.
- A Guide for Bivoltine Sericulture; K. Sengupta, Director, CSR & TI, Mysore.
- Improved Method of Rearing Young age silkworm; S. Krishnaswamy, reprinted CSB, Bangalore,

VIDYASAGAR UNIVERSITY

CHEMISTRY

(Honours & General)

Under Graduate Syllabus

(3 Tier Examination Pattern)

w.e.f. 2014-2015

REVISED

Vidyasagar University

Midnapore 721 102

West Bengal

Chemistry (Honours)
w.e.f. 2014-15

Distribution of Papers and Marks in B. Sc. (Hons) Chemistry Examination

Part -I: 1st Year

Theoretical Papers:			Marks
Paper -I	Group -A	: Organic Chemistry	50
	Group -B	: Inorganic Chemistry	50
Paper-II	Group-A	: Physical Chemistry	50
	Group-B	: Industrial Chemistry	50

Part -II: 2nd Year

Paper -III	Group -A	: Organic Chemistry	50
	Group -B	: Inorganic Chemistry	50
Paper-IV		: Physical Chemistry	50
Paper-V	Group-A	: Organic Practical	50
	Group-B	: Inorganic Practical	50
	Group-C	: Physical Practical	50

Part -III: 3rd Year

Paper -VI	Group -A	: Organic Chemistry	50
	Group -B	: Inorganic Chemistry	50
Paper-VII		: Physical Chemistry	50
Paper-VIII	Group-A	: Organic Practical	50
	Group-B	: Inorganic Practical	50
	Group-C	: Physical Practical	50

Part-I
Paper –I
Group A (Organic Chemistry)
Full Marks -50 (University Examination: 45, Internal assessment: 5)

Unit I:

Classification and nomenclature of organic compounds (trivial and IUPAC)

Molecular formula and the index of hydrogen deficiency (IHD)/Double bond equivalent (DBE) 2L

Bonding in organic compounds:

VB Theory: Hybridisation sp^3, sp^2, sp; orbital picture of bonding (C-C, C-N, C-O system), bond polarization and bond polarisability. Inductive effect, electromeric effect, conjugation, resonance, hyperconjugation, steric effect, steric inhibition of resonance. 2L

M.O. theory: sketch the π MOs (with HOMO and LUMO in ground state and excited state) of butadiene, hexatriene, allylic system, pentadienyl system, cyclobutadiene and benzene. Frost diagram, Huckel's rules for aromaticity and antiaromaticity and homoaromaticity. 2L

Physical properties: Bond length, bond strength (bond dissociation energy and bond energy) bond angle, inter and intra molecular forces-Vander Waals force and hydrogen bonding. Polar and nonpolar molecules, dipole moment of organic molecules. 2L

Organic acids and bases: Bronsted and Lewis concept. Acidity of hydrocarbons, alcohols, phenols and carboxylic acids. Basicity of amines. Effect of structure, subtituent and solvent on acidity and basicity. 4L

Unit II:

Stereochemistry of alicyclic compounds:

Representation of molecules in Fischer, Flying-Wedge, Sawhorse and Newman formulas and their interconversions. Chirality, elements of symmetry – simple axis of symmetry (C_n), plane of symmetry (σ_v, σ_d, σ_h), centre of symmetry (i), alternating axis of symmetry (S_n, $n \geq 2$). 4L

Configuration: Stereogenic centre; stereoisomerism (enantiomerism and diastereoisomerism). Stereoisomerism of the following; one stereogenic centre (chiral centre/asymmetric carbon, chiral nitrogen): two unlike and like stereocentres (AB, AA), meso form; ABA type, stereogenecity, chirotopicity, pseudoasymmetric atom. Configurational nomenclature /descriptor; D/L, R/S, threo/erythro. 6L

Stereogenic axis; stereoisomerism of C=C and C=N systems, cis/trans, syn/anti, E/Z system of nomenclature. Chiral axis in allene and biphenyls (atropisomerism), R/S descriptor. 2L

Unit III:

Optical activity of chiral compounds; specific rotation, optical purity (enantiomeric excess), recemic compounds, racemisation (through cationic, anionic and radical intermediates), resolution of acids, bases and alcohols via diastereomeric salt formation. 2L

Topicity of ligand and faces (elementary idea):

Homotopic, enatiotopic and diastereotopic ligands, Prochirality, Pro-R/Pro-S descriptors, homotopic ,enatiotopic and diastereotopic faces, Re/Si descriptors. 2L

Conformation: Staggered and eclipsed conformations, dihedral angle, torsion angle, energy barrier of rotation, relative stability of conformers on the basis of steric effect, dipole-dipole interaction, hydrogen bonding; conformational analysis of ethane, propane, n-butane, 1,2-dihaloethane, 1,2-glycols, 1,2-halohydrin, invertomerism of trialkyl amines. 4L

Stereochemistry of alicyclic compounds:

Static stereochemistry: Bayer strain theory; energy profile of ring inversion of cyclohexane, symmetry properties of chair, boat and twist-boat form. Conformational analysis of methyl cyclohexane 1,2-,1,3-,and 1,4 dimethyl cyclohexane. Conformational energy of substituents in cyclohexane. 5L

Preferred conformations of disubstituted derivatives of cyclohexane (1-methyl-1-phenyl cyclohexane, cis and trans-1,3- and -1,4- ditertiary butyl cyclohexane, cis and trans-1,2-dibromo cyclohexane, cis and trans cyclohexane-1,3-diol). Physical properties with respect to dipole moment and acid strength in cyclohexane system. 4L

Unit IV:

Reaction mechanism; General principles

Bond cleavage-Homolysis and heterolysis. Classification of regents-electrophiles and nucleophiles.

Reactive intermediates: Carbocations (cerbenium and carbonium ions). Carbanions, carbon radicals, carbenes-geometry, electrophilic/nucleophilic behaviour, stability, generation and fate (elementary idea). 2L

Reaction energetic: ΔG, ΔH and ΔS terms in relation to reaction equilibrium with particular reference to the following: halogenations of alkane and alkene, keto-enol tautomerism, intermolecular and intramolecular reactions. 4L

Reaction kinetics: Rate equation, TS theory-rate constant and free energy of activation, free energy profiles for one-step, two-step reactions. Hammond postulates, principle of microscopic reversibility, kinetic control vs thermodynamic control, catalysed reaction, isotope effect primary kinetic isotope effect (K_H/K_D). 2L

Nucleophilic substitution at saturated carbon

Mechanism ; SN^1, SN^2, SN^i,$SN^{2`}$ mechanisms, effect of solvent, substrate structure, leaving group, nucleophiles including ambident nucleophiles (cyanide & nitrite). Crown ether as phase transfer catalyst. Substitution involving NGP; relative rate and stereochemical features [systems, alkylhalides, allylhalides, benzyl halides, alcohols, ethers, epoxides]. 6L

Group B (Inorganic Chemistry)

Total Lectures : 50-60

Full Marks -50 (University Examination: 45, Internal assessment: 5)

Unit – I:

Atomic structure: (12 L)

Bohr's theory of atomic structure and its limitation, Sommerfild's modifications, application of Bohr's theory to Hydrogen and hydrogen like atoms and ions, Spectrum of hydrogen atom, quantum numbers and their significance.

Wave particle duality, Planks radiation law (without derivation), de Brogile equation, .Heisenberg's uncertainty principle and its significance, Schroendinger wave equation, radial and angular probability distribution. Quantum mechanical model of atom. Concept of atomic orbitals, Shapes of s, p, d and f orbitals. Many electron atoms, Pauli's exclusion principle and Hund’s rule, exchange energy. Aufbau (building up) principle and its limitations.

Electronic energy level diagram and electronic configurations of Hydrogen like and polyelectronic atoms and ions, variation of orbital energy with atomic number, term symbols of free atoms and ions.

Unit– II:
Chemical bonding – I: (10 L)

Ionic bonding: Size effects, radius ratio rules and their limitations. Packing of ions in crystals, lattice energy, Born-Lande equation and its applications, Born-Haber cycle and its applications. Solvation energy, polarizing power and polarizability, ionic potential, Fajan's rules. Defects in solids (elememementary idea).

Covalent bonding: Lewis structures, Octet rule and expanded octet, dative bond, retro-dative bond, hypervalence, formal charge. Valence Bond Theory, directional character of covalent bonds, hybridizations, hybrid orbitals [sp, ds, sp^2, sp^3, d^3s, dsp^2, d^2sp^3, sp^3d (qualitative approach)], equivalent and non-equivalent hybrid orbitals, Bent's rule, VSEPR theory, shapes of molecules and ions containing lone pairs and bond pairs (examples from main groups chemistry), partial ionic character of covalent bonds, bond moment, dipole moment and electronegativity differences. Concept of resonance, resonance energy, resonance structures (examples from main group chemistry).

Weak interactions : Van der Waals and London forces, ion-dipole and dipole-dipole interaction, hydrogen bonding.

Overlap (symmetry and energy permitted) of orbitals and bond formation, σ-bond, π-bond, μ-bond, δ-bond, banana bond (3c-2e), bond multiplicity and bond strength.

Unit– III:

(a) **Periodic Classification: (08 L)**

Modern periodic table (current IUPAC Version). General Characteristic of s, p, d and f block elements. Effective nuclear charge. Screening effect. Slaters Rules. Atomic radii. Ionic radii (Brag-Slater, Pauling's Univalent radii). Covalent radii (tetrahedral and octrahedral). Ionisation potential. Electron affinity. Electronegetivity. Pauling's, Muliken's and Allred Rechow's electronegetivity Scales. General trends of variation of elemental forms, oxidation states, catenation property, aqueous and redox chemistry. Properties of important classes of' compounds, complex formation and stereo chemistry relative to s, p, d and f block elements. Inert pair effect.

(b) Acid & bases: (07 L)

Arrhenius concept. Theory of solvent system. Bronsted Lowry's concept, relative strength of acids and bases, effect of substituents and solvents. Hydracids and oxyacids. Pauling's rules. Amphoterism. Lux-flood concept. Lewis concept. Usanovich's concept. Super acid. HSAB principle (Hard-soft acids and bases). Acid base neutralisation curves, indicators. Solvent properties of water, liquid ammonia, liquid sulpher-di-oxide, liquid HF and liquid H_2SO_4.

(c) Solubility equilibria: (03 L)

Solubility product principle, common ion effect and their application in Chemical analysis. Precipitation reactions.

Unit – IV:
Study of elements and their compounds: (12 L)

General trends of variation of electronic configuration, elemental forms, metallic nature, magnetic properties (if any), catenation and catalytic properties (if any), oxidation states, inert pair effect (if any), aqueous and redox chemistry in common oxidation states, properties and reactions of important compounds such as hydrides, halides, oxides, oxyacids (if any), complex chemistry (if any) in respect of the following elements:
(i) s-block elements: Li-Na-K (Group 1), Be-Mg-Ca-Sr-Ba (Group 2).
(ii) p-block elements: B-Al-Ga-In-Tl (Group 13).

Paper-II
Group A (Physical Chemistry)
Full Marks -50 (University Examination: 45, Internal assessment: 5)

Unit - I

Gas: Distribution of components of molecular speed and kinetic energy ($v, v_x, \epsilon, \epsilon_x$ etc). Maxwell molecular speed distribution, K.E. distribution, calculation of average quantities, different types of speeds, velocities. Barometric distribution. Principle of equipartition of energy, degree of freedom, calculation of C_p and C_v, variation with temperature. 8L

Collision of gases: collision diameter, collision cross-section, collision frequency, collision density, mean free path, viscosity of gases, effect of pressure and temperature. Wall collision and rate of effusion. 2L

Real gases: Compressibility factor, Andrew's and Amagat's curves, continuity of state.van der Waals' equation of state,virial equation, critical state, critical parameters in terms of van der Waals constants, determination of critical constants, law of corresponding states. 5L

Unit - II

Thermodynamics–I

Scope, definition of systems (isolated, closed, open), surroundings, boundary, different types of processes, variables (intensive and extensive), functions (state and path). Partial and total derivative, Euler's reciprocity, cycle rule, exact and inexact differentials, slopes. 3L

Zeroth and first laws of thermodynamics.Heat and work (reversible, irreversible, isothermal, adiabatic), Internal energy, enthalpy, Joule's experiment (ideal and van der Waals gas), different types of heat capacities. Second law of thermodynamics, Carnot and refrigeration cycles, entropy change, Clausius inequality, Gibbs and Helmholtz free energies, Gibbs–Helmholtz equation, equilibrium and spontaneity criteria.

Maxwell's relations and the thermodynamic equations of state, Combination of first and second law of thermodynamics. Joule–Thomson experiment (ideal and van der Waals gas). 8L

Thermochemistry: Thermochemical equation, Kirchoff's equations, different type of heats of reactions (entropy, enthalpy and Gibbs energy) and their standard state. Hess's law, Lavoisier and Laplace's law. 5L

Unit – III

Surface tension: Properties of liquid, vapour pressure equation, surface tension, surface energy, interface, effect of temperature (Eötvös equation, critical temperature), determination of surface tension (capillary rise, capillary depression, stalagmometer), excess pressure inside bubbleand drops (basic idea of the Young-Laplace equation), cohesion, adhesion, work of cohesion and adhesion, spreading of liquid over other surface. 4L

Adsorption: Physical and chemisorption, adsorption isotherms: Freundlich, Langmuir andGibbs absorption isotherms, surface excess, BET equation (no derivation). 3L

Colloidal state: Definition, colloids classification, properties, ultracentrifuge, electrokinetic phenomena, zeta potential, iso-electric point, Schulze-Hardy rule, protective colloids, gold number, Perrin method for determination of Avogadro number, colloidal electrolytes, CMC values, emulsions, gels, thixotropy. 5L

Viscosity: Definition, viscosity of gas and liquid and effect of temperature, laminar and turbulent flow, Newtonian, non-Newtonian fluid, Newton's law of viscosity, Poiseuille's law, viscosity coefficient, effect of temperature on viscosity coefficient, measurement (Ostwald viscometer, falling sphere method). 5L

Unit – IV

Chemical Kinetics: Rate law, integrated rate law, advancement of reaction, order, molecularity. Zero, first, second, higher and pseudo-first order reactions. Determination of order of reaction, temperature dependence of reaction rates, Arrhenius equation, activation energy. Elementary reactions;multi-step reactions: consecutive, opposing, and parallel reactions(all first order). 6L

Collision theory**:**unimolecular (Lindemann) and bimolecular reactions; transition state theory (TST), entropy of activation, Eyring equation, primary kinetic salt effect, relation between TST and hard sphere collision theory. 4L

Catalysis: Definition, catalyst and inhibitor, criteria of catalysis, types of catalysis (homogeneous and heterogeneous), auto-catalytic reaction. Theory of acid-base catalysis with examples. 3L

Enzyme catalysis:Properties of enzymes, Michaelis–Menten equation, Lineweaver–Burk equation, turnover frequency, catalytic efficiency, effect of temperature and pH. 3L

Group B (Industrial Chemistry)
Full Marks -50 (University Examination: 45, Internal assessment: 5)

Unit-I

(a) Errors, Precision and Statistics:

Introduction, Accuracy and Precision, Significant figures, Classification of Errors- determinate & indeterminate errors, Normal error curve, Ways of expressing accuracy- absolute and relative, Minimization of Errors, Rules for computations, Statistical treatment of experimental data- Mean, median and standard deviation, Reliability of results, Rejection of results. 6L

(b) Basic principles of chromatographic separation: Gas Liquid Chromatography (GLC), Thin Layer Chromatography (TLC), GPC, HPLC, paper chromatography, ion-chromatography. The application of TLC in identification and separation of products of nitration of benzene. 6L

Unit-II

Fuels: Solid, Liquid and gaseous fuels

a) Origin of coal, analysis of coal, high and low temperature carbonization coal. 3L
b) Petroleum and petrochemicals: petroleum hydrocarbons-classification, chemicals structure, crude oil, naptha, kerosene, diesel, lube oil, separation of crude oil, (distillation- atmospheric and vacuum), cracking, octane number, cetane number, flush point. 6L
c) Natural gas, LPG, coal gas, water gas. 3L

Unit-III

Some important industrial products (manufacture and application): Polymer (PVC, polyethylene, Bakelite, nylon-66, terylene, natural rubber, buna and neoprene rubber), vulcanization of rubber, Detergents (dodecylbenzene sulphonates), Pesticides (DDT, BHC and few others commonly used in agriculture), Dyes and Pigments (methyl orange, phenolphthalein, mercurochrome, ultramarine, zinc-white, litho phone, carbon black), Fertilizers (superphosphate of lime, urea, ammonium sulphate), Ceramics (only glass and cement). 15L

Unit-IV

(a) Oils and fats: types of oil and fats, analysis of oils, saponification, recovery of glycerin, hydrogenation of oils. 6 L
(b) Water: deionization of water, analysis of hardness of water, determination of DO, BOD, COD, TOC in water. 6 L

2nd Year
Part II

Paper –III
Group A (Organic Chemistry)
Full Marks -50 (University Examination: 45, Internal assessment: 5)

Unit I:

Elimination reactions

Alkyl halides and alcohols, 1,2-(β) elimination: E1, E2 and E1cB mechanism. Orientation in E2 elimination (Saytzeff and Hofmann)- effect of substrate structure, base and leaving group, stereochemistry of E2 elimination-stereospecific and stereoselective reactions. Substitution Vs elimination : E1/SN^1 and E2/SN^2. Syn elimination (Ei). Mechanism and stereochemistry of pyrolysis of esters and xanthates, α-elimination. 4L

Addition reactions

Addition to Carbon- Carbon multiple bond: electrophilic and free radical mechanism, stability of alkenes-heat of hydrogenation and heat of combustion.

Mechanism of the following reactions: Halogenation, hydrohalogenation (regioselectivity, peroxide effect), hydration of alkene (including oxymercuration-demercuration, hydraboration-oxidation), epoxidation, hydroxylation, ozonolysis (involving 1, 3-dipolar mechanism), hydration of alkyne, stereochemistry of bromination, hydroxylation and carbene addition. Electrophilic addition to allene and butadiene. Dissolving metal reduction of alkynes and benzenoid aromatics (Birch). 8L

Dynamic stereochemistry: Conformations and reactivity in cyclohexane system: E2 elimination, nucleophilic substitution (SN^1, SN^2, NGP), rearrangement (pinacol-pinacolone and related rearrangements, Favorski

rearrangement). Oxidation of cyclohexanol, esterification, saponification and lactonization. 3l

Unit II:

Carbonyl Chemistry

Nucleophilic addition to carbonyl group- Aldehydes and ketones: Addition to HCN, $NaHSO_3$, water, alcohol, thioalcohol (Umpolung), derivatives of ammonia, ylides (Wittig reaction), nucleophilic addition to α,β - unsaturated carbonyl compounds (general principles). Quinones, reactions of p-benzoquinone. Hydride addition ($LiAlH_4$, $NaBH_4$ reduction), MPV reduction, Wolff-Kishner, dissolving metal (Clemenson reduction, Bouveaultr-Blanc reduction). Acidity of α-H: reaction via enols and enolate ion (carbanions), aldol condensation, Knovenagel reaction, Claisen ester condensation, Perkin reactions, Darzen's reaction, halogenations of ketones, α-halogenation of acids (HVZ reaction). 8L

Nucleophilic substitution at the acyl carbon- carboxylic acids and their derivatives: Esterification and hydrolysis (B_{AC}^2, A_{AC}^2 , A_{AC}^1, A_{Al}^1 mechanism, non kinetic use of isotope labels), amides (formation and hydrolysis). Carbonyl compounds without α-H; Cannizaro reaction, Tischenko reaction, benzoin condensation. 3L

Stereoselectivity and asymmetric synthesis- enentoselectivity/ diastereoselectivity; asymmetric synthesis involving achiral and chiral reagent; chiral substrate and achiral reagent (Cram's rule and Felkin-Anh model). 2L

Unit lll:

Aromatic Substitution

Electrophilic aromatic substitution:- Mechanism orientation and reactivity (including free energy profiles) of halogenations, nitration, sulfonation, Friedel-Craft reactions, chloromethylation, formylation (Gatterman-Koch, Gatterman, Reimer- Tiemann and Vilsmeyer-Haack). Kolbe-Schmidt

reaction, Houben-Hoesch reaction. IPSO substitution. Synthesis of naphthalene, anthracene and their derivatives; Pthenenthrene (Bardhan-Sengupta synthesis), orientation and reactivity in polynuclear hydrocarbons (naphthalene and anthracene). 10L

Nucleophilic aromatic substitution: Addition-elimination mechanism, reactivity and orientation in activated aromatic substitutions. Elimination-Addition, mechanism, benzyne intermediate. SN^1 mechanism. 2L

Chemoselectivity: different reactivity of $–NH_2$ and –OH in aromatic system. 1L

Chemistry of nitrogen containing compounds:

Aliphatic and aromatic amines (preparation, separation and identification of primary, secondary and tertiary amines), alkylation including Hoffmann's exhaustive methylation, reactions of aliphatic and aromatic amines with nitrous acid, carbyl amine reaction, Mannich reaction, Eschweiler Clarke reaction, enamines, diazomethane, diazoacetic ester, aromatic nitrocompounds, aromatic diazonium salts, nitriles and isonitriles, Ritter reaction.

3L

Unit lV:

Organometallics:

Preparation of Grignard reagent and organolithium. Reactions: addition of Grignard and organolithium to carbonyl compounds, substitution on –COX, conjugate addition by Gilman cuprates, Reformatsky reaction. 2L

Molecular rearrangements:

Intramolecular Vs intermolecular rearrangements. Crossover experiment.

1,2-shift: Migration to electron deficient carbon;

Wagner-Meerwein, pinacol-pinacolon, dienenone-phenone, Wolff rearrangement in Arndt- Eistert synthesis, Benzil-benzillic acid rearrangement.

Migration to electron deficient nitrogen:

Beckmann, Schmidt (carbonyl compound), Hofmann, Lossen, Curtious, Schmidt (carboxylic acid).

Migration to electron deficient oxygen:

Baeyer-Villeger, Dakin, Hydroperoxide rearrangement.

Aromatic rearrangements;

Migration from oxygen to ring carbon: Fries, Claisen rearrangement

Migration from nitrogen to ring carbon: Hofmann-Mertious, Fischer-Hepp, N-azo to C-azo, Bamberger, Orton, Benzidine-Semidine rearrangement. 8L

Group B (Inorganic Chemistry)

Total Lectures : 50-60

Full Marks -50 (University Examination: 45, Internal assessment: 5)

Unit – I:

Radioactivity & nuclear chemistry: (10 L)

Radioactive decay, half life and average life of radio elements, units of radioactivity, natural radioactive disintegration series, radioactive equilibrium, group displacement law, isotope, isotone, isobars and nuclear isomerism. Application of isotope in medicine, agriculture, reactor mechanism (isotope as tracer), age of minerals, age of earth, radio carbon dating, nuclear particles, nuclear forces, nuclear models (elementary idea), nuclear stability, nuclear binding energy, nuclear reactions, magic numbers, mass defect, proton-neutron ratio, packing fraction, transmutation of elements, fission, fusion and spallation reaction. Nuclear energy, hazards of nuclear radiations.

Unit – II:

Redox chemistry: (10 L)

Oxidation and reduction, oxidation numbers, balancing of redox reaction by oxidation number and ion electron method.

Standard redox potential, Sign conventions. Nernst equation, influence of complex formation, precipitation and change of pH on redox potential, formal potential, feasibility of a redox titration, redox potential at the equivalence point, redox indicators, redox potential diagram (Latimer, Frost and Pourbaix diagrams) of common elements and their applications. Dis-proportionation and com-proportionation reactions (Typical examples). Redox titration using $KMnO_4$ and $K_2Cr_2O_7$.

Unit– III:

(a) Chemical bonding - II: (10 L)

Types of bonding. Overlap of atomic orbitals. VB and MO concepts, LCAO method. Bonding of homo- and hetero-nuclear diatomic molecules (H_2, H_2^+, H_2^-, He_2^+, B_2, C_2, N_2, O_2, NO, CO, CN^-, HF), bond order, bond length.

Metallic bonding: Qualitative idea of band theory, conducting, semi-conducting and insulating properties with examples from main group elements.

Close-packing: hcp (ABAB…. type), ccp (ABCABC…..type); holes: cubic, tetrahedral and octahedral; radius ratio principle and different polyhedra; structures of MX (NaCl, CsCl and ZnS) , MX_2 (CaF_2, SiO_2, TiO_2) / M_2X (Na_2O), MX_3 (AlF_3). Structure of simple silicates, metallic structure, alloy structure.

(b) Chemistry of coordination compounds - I: (08 L)

Double salts and complex salts, detection of complexes in solution, ligands, ambidentate and polydentate ligands, coordination number, Werner's coordination theory. IUPAC nomenclature. Factors affecting the stability of complexes in solution. Overall and stepwise formation constants, determination of stability constants by Job's method, perfect and

imperfect complexes, chelate complexes, flexidentate behavior of ligand, inner-metalic complexes, their properties and applications in analytical chemistry. Complexones, masking and demasking interactions, metallochrome indicators, titration of metal ions and their mixtures with EDTA, hardness of water and its determination.

Unit – IV:

Study of elements and their compounds: (14 L)

Comparative study of p-block elements: Group trends in electronic configuration, modification of pure elements, common oxidation states, inert pair effect, catenation and catalytic properties (if any), and their important compounds in respect of the following groups of elements:

i) Group-14 (C, Si, Ge, Sn, Pb)
ii) Group-15 (N, P, As, Sb, Bi)
iii) Group-16 (O, S, Se, Te)
iv) Group-17 (F, Cl, Br, I)
v) Group- 18 (He, Ne, Ar, Kr, Xe)

Paper-IV
Physical Chemistry
Full Marks -50 (University Examination: 45, Internal assessment: 5)

Unit – I

Thermodynamics-II

Clapeyron equation, Clausius–Clapeyron equation, Trouton's rule. Open systems, activity, fugacity, activity coefficients,partial molar quantities, chemical potential, thermodynamics of mixing ($\Delta_{mix}G$, $\Delta_{mix}S$, $\Delta_{mix}H$), Gibbs–Duhem equation. 5L

Colligative properties: Ideal solutions, thermodynamic properties of binary solution, colligative properties. Raoult's laws. Colligative properties (relative lowering of vapour pressure, elevation of boiling point, depression of freezing point, vant Hoff's law for osmotic pressure) statement, derivation (using chemical potential), application, critical comment on limitation. Abnormal colligative properties, van't Hoff's factor, deviation from ideality (negative, positive). Duhem–Margules relation, Konowaloff's rule, non-ideal and ideally dilute solutions. 10L

Unit – II

Chemical equilibrium: Extent of reaction, law of mass action, thermodynamic equilibrium constant, K_p, K_c and K_x and relationship between them, effect of temperature, pressure and addition of inert gas on equilibrium and equilibrium constant, Le Chatelier principle,van't Hoff isotherm and equation. Examples of equilibria in homogenous and heterogeneous systems. 8L

Ionic Equilibrium: Debye-Huckel limiting law (no derivation), solubility and solubility product, ionic product of water, *pH*, Henderson equation, concept of buffer solution, buffer capacity, hydrolysis, indicators (acid-base, adsorption, redox, metal ion). 7L

Unit - III

Quantum mechanics–1: Drawback of classical mechanics, stability of atom, black body radiation, photoelectric effect; Compton effect, wave-particle duality, de Broglie hypothesis, Heisenberg's uncertainty principle. Concept of operators, different types of operators, properties and interpretation of wavefunctions (normalization, orthogonality, probability distribution) eigen function, eigen values. Commutation of operators, commutators, theorem, postulates of quantum mechanics, time-dependent, time-independent Schrodinger equation, stationary state, stationary state wavefunction, applications, free particle, boundary condition. 15L

Unit - IV

Electrolytic conduction: Conductance, conductivity, molar and equivalent conductivities, limiting molar conductivity, measurement, variation with dilution, Ostwald's dilution law, ionic mobility, Kohlrausch law, asymmetry effect, electrophoretic effect, temperature dependence of ion conductivity. Stoke's law, Hittorf's rule, conductivity of ions in aqueous and non-aqueous solvent, Debye-Huckell-Onsagar equation (no derivation), Debye-Falkenhagen effect and Wien effect, application of conductance measurement, conductometric titration, Transport number, abnormal transport number, solvation of ions, measurement of transport numbers (moving boundary method) 8L

Electromotive Force: Electrochemical cell, reversible and irreversible, EMF and electrical work, measurement of EMF, temperacture co-efficient of EMF, standard cell, different type of electrodes, electrodepotential, Nernst's equation, standard electrode potential, reference electrode, (hydrogen, quinhydrone, glass, calomel), chemical and concentration cells, liquid junction potential, salt bridge, applications of potentiometric measurement. 7L

Paper-V
Group A (Organic Chemistry Practical)
Full Marks -50 Time: 6 Hrs

(A) Identification of a solid unknown organic compound (40)

i) Physical characteristics

ii) Solubility test with preliminary conclusion

iii) Detection of elements (N,S and Cl) in a given solid sample

iv) Determination of melting point of the organic sample

v) Detection of the following functional groups in organic samples

Carbonyl- keto, aldehyde, carboxylic acid, phenolic hydroxyl, unsaturation, aromatic (nitro, amino), amido

vi) Preparation of a suitable derivative of the supplied organic sample and determine the Melting point of derivative

vii) Literature survey

viii) Naming of the compound with structure

(B) Laboratory note book (5)

(C) Viva-voce: (5)

Group B (Inorganic Chemistry Practical)
Full Marks -50 Time: 6 Hrs

Inorganic Qualitative Analysis:

(A) Qualitative analysis of inorganic sample containing not more than four radicals (Basic and acid) selected from the list given below: (40)

Basic radicals: Cu(II), Sb(III), Bi(III), Fe(II/III), Cr(III), Al(III), Zn(II), Mn(II), Co(II), Ni(II), Ca(II), Ba(II), Sr(II), Mg(II), Na(I), K(I), NH_4^+.

Acid radicals: Cl^-, F^-, Br^-, I^-, $[Fe(CN)_6]^{3-}$, $[Fe(CN)_6]^{4-}$, SO_3^{2-}, SO_4^{2-}, S^{2-}, PO_4^{3-}, CrO_4^{2-}, BO_3^{3-}, H_3BO_3, NO_3^-, NO_2^-, $Cr_2O_7^{2-}$, SCN^-.
(also oxides, hydroxides and carbonates may be given which should not be counted as radicals)

Less common ions not to be set in examinations. Tests should be recorded in laboratory note book.
Less common ion (Special test only): Ti(III/IV), Zr(IV), V(IV/V), Mo(VI).
Insoluble compound: Al_2O_3, Fe_2O_3, Cr_2O_3, SnO_2, $SrSO_4$, $BaSO_4$, CaF_2.

Reporting of the systematic analysis of the samples for qualitative analysis should be presented in the following scheme:

1. Physical characteristics and solubility of the sample.
2. Preliminary tests for basic and acid radicals: only the positive test should be mentioned.
3. Systematic analysis of the sample: (a) the group present should be clearly analyzed, (b) the confirmatory tests should be reported.
4. Tests for acid radicals: only the positive tests for acid radicals present, including spot tests, tests for acid radicals in presence of other interfering radicals.
5. Probable composition with proper justification.

(B) Laboratory note book (5)
(C) Viva-voce: (5)

Group C (Physical Chemistry Practical)

Full Marks -50 Time: 6 Hrs

Students have to carry out all the listed experiments in their practical classes and have to report those with properly singed in their laboratory note book during examination. One experiment will be assigned to a candidate through single draw lottery during examination.

(A) Students have to perform one experiment to be set among the followings (40)

1. Determination of pH of an unknown solution by colour matching method.
2. Determination of surface tension of a liquid by stalagmometer.
3. Determination of viscosity of a liquid by Ostwald's method.
4. Determination of distribution co-efficients: I_2 in water-organic solvent (CCl_4/$CHCl_3$)
5. Adsorption isotherm study of acetic acid on charcoal.
6. Study of the kinetics of acid catalyzed hydrolysis of methyl acetate.
7. Study of the decomposition kinetics of hydrogen peroxide ($FeCl_3$ catalysed).
8. Solubility product study (by titration) of (i) Silver acetate and (ii) strontium oxalate (iii) KHTa in the presence and absence of common ions (any one of the three).

(B) Laboratory note book (5)

(C) Viva-voce: (5)

3rd Year
Part III
Paper –VI
Group A (Organic Chemistry)
Full Marks -50 (University Examination: 45, Internal assessment: 5)

Unit I:

Spectroscopy

UV: Electronic transitions ($\sigma \longrightarrow \sigma^*$, $n \longrightarrow \sigma^*$, $\pi \longrightarrow \pi^*$, $n \longrightarrow \pi^*$), absorption maximum and absorption intensity considering conjugative effect, steric effect, solvent effect, red shift (bathocromic shift), blue shift (hypsochromic shift), hyperchromic effect, hypochromic effect (typical examples). Woodward rule with reference to conjugate dienes, trienens and α,β- unsaturated carbonyls including cyclic systems. 4L

IR: Stretching and bending vibrations, Hooke's law, characteristics stretching frequencies of O-H, N-H, C-H, C-D, C=C, C=N, C=O functions, factors affecting stretching frequencies (H-bonding, mass effect, electronic factors, bond multiplicity, ring size). 4L

^{1}HNMR: Nuclear spin, NMR-active nuclei, principle of proton magnetic resonance, chemically equivalent and non-equivalent protons, chemical shift, upfield and downfield shifts, shielding/deshielding of protons (systems involving C = C, C = O, $C \equiv C$, benzene) NMR peak area (integration). First order coupling, (spilliting of the signals; ordinary ethanol, bromoethane, dibromoethanes), coupling constants, relative peak positions of different kinds of protons of substituted benzenes (toluene, nitrobenzene, halobenzene, dinitrobenzenes, chloronitrobenzenes). 7L.

Unit II:

Synthesis

General synthetic strategy: Disconnection approach- Target molecule, retrosynthetic analysis, function group interconversion (FGI), disconnection, synthon, electrophilic and nuclephilic synthons, synthetic equivalent, latent polarity. 2L

Ring synthesis: Methidologies: i) C-C disconnection involving carbanion chemistry (Ethyl acetoacetate, diethyl malonate). ii) carbonyl condensation – two group disconnection: α,β- unsaturated carbonyl compounds, 1,3- dicarbonyl compounds, 1,5- dicarbonyl compounds, Robinson annelation. Iii) Large ring synthesis: high dilution technique, Acyloin condensation (use of trimethyl silyl chloride). 8L

Unit III

Carbohydrate Chemistry

Monosaccharides- classification, configuration of D-glucose and D-fructose and their ring structures, mutarotation, anomeric effect.

Reactions: Osazone formation, bromine-water oxidation, epimerization, stepping-up (Killani method) and stepping-down (Ruff & Wohl's degradation method) of aldose.

Disaccharides – glycosidic linkages, structure of sucrose, inversion of sucrose. 5L

Amino acids, peptides and nucleic acids

Amino acids: Synthesis of α-amino acids (Gabriel, Strecker, azolactone, acetamidomalonic ester methodologies), isoelectronic point, ninhydrin reaction.

Peptides: peptide linkage, peptide synthesis including Merrifield resin, C-terminal, N-terminal and their determination (Edmann, Sanger and dansyl chloride).

Nucleic acids: structure of nucleosides and nucleotides, pyrimidine and purine bases (structure and nomenclature only), elementary idea of RNA and DNA; Watson-Crick model, complimentary base-pairing in DNA. 8L

Unit IV

Heterocyclic Compounds

Reactivity, orientation and important reactions of furan, pyrrole, thiophene, pyridine, indole.

Synthesis (including retrosynthetic approach)

Furan: Paal-Knoor synthesis, Feist-Benary synthesis

Pyrrole: Knoor synthesis, Hantzsch synthesis

Thiophene: Hinsberg synthesis

Pyridine: Hantzsch synthesis

Indole: Fischer, Madelung, Reissert synthesis

Quinoline: Skaurp, Friedlander synthesis

Isoquinoline: Bischler-Napieralski synthesis 8L

Pericyclic reaction

Definition and classification of pericyclic reactions, thermal and photochemical electrocyclic reactions of neutral species involving 4 and 6 electrons- FMO approach. Cycloaddition reactions [2+2] and [4+2], Diels-Alder reaction-FMO approach. 5L

Group B (Inorganic Chemistry),

Total Lectures : 50-60

Full Marks -50 (University Examination: 45, Internal assessment: 5)

Unit – I:

Chemistry of coordination compounds - II: (13 L)

(a) **Stability of Coordination Complexes:** Thermodynamic and kinetic stability of complexes, substitution reactions in square planar complexes, trans effect, and labile and inert complexes.

(b) **Types of Isomerism in Coordination Compounds:** Types of isomerism in coordination compounds : Constitutional, geometrical and optical isomerism in respect of coordination numbers 4 and 6. Determination of configuration of cis-, trans-isomers by chemical methods. Resolution of optical isomers.

(c) **Nature of bonding in coordination compounds (including colour and spectra):** Nature of coordinate linkage, EAN rule, electro-neutrality principle, VB theory, its limitations. Crystal field and Ligand field theory, d-orbital splitting in octahedral, tetrahedral and square planar fields, crystal field stabilization energy in weak and strong field complexes, pairing energy, explanation of magnetic behavior and spectral features including charge transfer spectra of transition metal complexes, selection rules for electronic spectral transitions, qualitative Orgel diagram for $3d^1$ – $3d^9$ systems, spectrochemical series, Jahn-Teller distortion. Metal - Ligands bonding (MO concept - elementary idea) sigma & pi-bonding in octahedral complexes (qualitative approach) and stabilization of unusual oxidation states due to complex formation.

Unit – II:

(a) **Magneto chemistry:** (7L)

Diamagnetic and paramagnetic susceptibility, Curie equation (without derivation), magnetic moment and its determination by Guoy method, L-S coupling, term symbol, orbital and spin moment (qualitative treatment), quenching of magnetic moment, super-exchange, anti-ferromagnetic interaction (elementary idea with examples only), application of spin only values of magnetic moments to determine valency and stereochemistry of coordination compounds (based on VBT and CFT).

(b) Chemistry of d-block elements: (10 L)

Comparative study of the metals of first transition series with reference to electronic configuration, atomic and ionic radii, ionization potential oxidation states, aqueous and redox chemistry, complex chemistry, magnetic properties, metallic nature and catalytic properties. Trends in physical and chemical properties in passing from 3d through 4d to 5d block elements.

Extraction and purification scheme (omitting technical details) and technical uses of the following metals: Ti, V, Cr, Mn, Co, Ni, Pt, Ag, Au, Cd, Hg and U.

Unit– III:

(a) Organometallic compounds: (12 L)

Definition, acid ligands, hapticity (s) of ligands, 18-electron rule, application of 18-electron rule to carbonyl, nitrosyl, cyanide and hydrido complexes. Preparation, Properties and bonding of carbonyl, nitrosyl and cyanide complexes, metal carbonylates, carbonyl hydrides, metal olefin, alkynes and cyclopentadienyl complexes, Ziese's salt (preparation, structure and bonding), Ferrocene (preparation, Structure, bonding and reactions). Metal-metal bonded compounds and metal culsters (simple examples).

Simple examples of fluxtional molecules, coordinative unsaturation, oxidative addition and insertion reactions, homogeneous catalysis by organometallic compounds: hydrogenation, hydroformylation and polymerization of alkenes (Ziegler Natta Catalyst).

(b) Chemistry of f-block elements: (03 L)

f-block elements: electronic configuration, ionization energies, oxidation states, variation in atomic and ionic (3+) radii, magnetic and spectral properties of lanthanides, comparison between lanthanide and actinides, separation of lanthanides (by ion-exchange method).

Unit – IV:

(a) Bioinorganic chemistry: (08 L)

Essentials and trace elements of life, basic reactions in the biological systems and the role of metal ions specially Na^{+}, K^{+}, Mg^{2+}, $Fe^{3+/2+}$, Cu^{2+} & Zn^{2+}. Transport across biological membrane-Na^{+} ion pump, ionophores.

Bio-function of hemoglobin and myoglobin, cytochromes and ferridoxins, photosynthesis: photo system I and II, Carbonate-bicarbonate buffering system and carbonic anhydrase. Biological nitrogen fixation. Toxic metal ions and their effects, chelation Therapy, metal dependent diseases and Pt and Au complexes as drugs (examples only).

(b) Instrumental analysis: (05 L)

Basic Principles, Instrumentations and simple applications of conductometry, potentiometry, polarography, UV-Visible and IR spectrophotometry. Analysis of water (BOD, COD, DO, TDS), air & soil samples. Principles for determination of BOD, COD, DO, TDS in water samples. Detection and estimation of As, Hg, Cd, Pb in water sample.

Paper-VII

Physical Chemistry
Full Marks -50 (University Examination: 45, Internal assessment: 5)

Unit - I

Quantum mechanics–2: Particle in one dimensional box, wavefunction, normalized wavefuction, probability of finding of particle, expectation values ($\langle x \rangle$, $\langle x^2 \rangle$, $\langle p_x \rangle$, $\langle p_x^2 \rangle$ etc.), uncertainty, particle in one dimensional box, degeneracy, tunneling effect. 5L

Simple harmonic oscillator, Schrodinger equation, energy (no derivation) wavefunction (no derivation), probability density, expectation values, uncertaninty.Rigid rotator, Schrodinger equation, energy (no derivation) wavefunction (no derivation). 5L

Hydrogen atom: Hydrogen-like system, Schrodinger equation in polar coordinates, radial solution, radial wavefunction, real hydrogen-like wavefunction, probability density, probability of finding of electron, radial distribution function, quantum numbers, energy expression (no derivation), degeneracy, concept of orbitals (s,p,d) and shapes. 5L

Unit - II

Photochemistry:Thermal versus photochemical reactions, Grotthüs-Draper law, Lambert-Beer's law, Einstein's law of photochemical equivalence, quantum yield, actinometer, effect of adsorption of light, phosphorescence, fluorescence, photochemical reactions(decomposition of HI and combination of H_2 and Br_2), photo-stationary state, Jabolonsky diagram. 5L

Molecular geometry: Polarization, dipole moment, permittivity, relative permittivity, Debye-Langevin equation (No derivation), Clausius-Massoti equation (No derivation), application towards explanation of structure. Spectroscopy, microwave and I.R spectra energy expressions (no derivation) selection rule applications, potential energy diagram, Franck-Condon principle, Raman spectra, comparison with fluorescence. 10L

Unit - III

Crystalline state: Laws of Crystallography, unit cell, lattice, different crystalline systems with characteristics, Bragg's equation, application towards structure of NaCl and KCl. Specific heats of solid elements, Dulong-Petit'slaw,limitations, Einstein's equation, success and limitations, Debye's T^3 law (no derivation 5L

Thermodynamics–III

Third law of thermodynamics, Nernst heat theorem, Lewis-Randall statement Plank statement.

Macrostates and microstates, Ensemble, mathematical probability versus thermodynamic probability,thermodynamic probability and the concept of entropy, Partition function and representation of the thermodynamic functions; Boltzmann distribution, non-degenerate and degenerate cases. 10L

Unit - IV

Phase Equilibrium: Phase, phase stability, first-order phase transition, transition temperature, phase boundary, slope of phase boundary, vapour pressure, critical point, boiling point and melting point (normal and standard). Henry's law, Nernst's distribution law, solvent extraction, phase, component, degree of freedom, phase rule, derivation from

thermodynamics. One component system, (water, CO_2 and sulphur), triple point. Two component system liquid-liquid and solid-liquid systems (phenol-water, triethylamine-water, nicotine-water) isopleths, tie-line, lever rule, critical solution temperature, simple eutectic compound with congruent and incongruent melting points, peritectic line. 12L

Paper-VIII

Group A
(Organic Chemistry Practical)
Full Marks -50 Time: 6 Hrs

(A) Organic preparation: (25 marks)

m-dinitrobenzene, Aspirin, Methyl orange, p-bromo acetanilide, p-bromo aniline from p-bromo acetanilide, phthalimide from phthalic anhydride, benzanilide, anthranillic acid from phthalimide, benzilic acid from benzil, benzil from benzoin, benzoic acid by oxidation of benzene derivative(ph-CHO/ph-CH_2OH/ph-CH_3).

(B) Spectroscopic analysis of organic compounds: (15 marks)

Assignment of labelled peaks in the ^1H NMR spectrum of the known organic compounds explaining the relative δ values and splitting pattern and also assignment of labelled peaks in the IR spectrum of the same compound.

p-nitro aniline, p-nitro benzaldehyde, p-bromo acetanilide, p-amino benzoic acid, p-methyl α-bromo acetophenone, o-hydroxy acetophenone, o-hydroxy benzaldehyde, salicylamide, vanillin, cinamic acid, benzal acetone, diethyl maleiate, diethyl fumarate, glucose, fructose.

Laboratory note book:(5 marks)

Viva-voce: (5 marks)

Group B (Inorganic Chemistry Practical)

Full Marks -50 Time: 6 Hrs

A. Quantitative analysis:(30 marks)

(i) Acidimetry and alkalimetry.

a. Titration of Na_2CO_3 + $NaHCO_3$ mixture vs HCl using phenolphthalein and methyl orange indicators.

b. Titration of HCl + CH_3COOH mixture vs NaOH using two different indicators to find the composition.

(ii) Volumetric analysis with potassium permanganate and potassium dichromate solutions.

(iii) Iodometry and complexometry

(iv) Estimation of mixtures of Fe(III)-Ca(II), Fe(III)-Cu(II), Fe(III)-Cr (VI), Fe(III)-Mn(II), Ca(II)-Mg(II), Cu(II)-Zn(II).

(vi) Gravimetric estimation of chloride, sulphate and nickel as dimethyl glyoxime complex.

(vii) Determination of total hardness of water by EDTA titration.

(viii) Estimation of available (a) chlorine in bleaching powder (b) oxygen in pyrolusite.

B. Preparation of inorganic compounds: (10 marks)

i) Ammonium manganous sulphate, $(NH_4)_2SO_4$, $MnSO_4 .6H_2O$

ii) Ammonium ferrous sulphate hexa hydrate (Mohr's salt), $(NH_4)_2SO_4$, $FeSO_4 .6\ H_2O$

iii) Ammonium ferric sulphate (Ferric alum), $(NH_4)_2SO_4$, $Fe_2(SO_4)_3.24H_2O$ or $(NH_4)_2Fe(SO_4)_2.12H_2O$

iv) Potash alum, K_2SO_4, $Al_2(SO_4)_3.24H_2O$

v) Tetra ammine carbonato cobalt(II) nitrate hemi hydrates, $[Co(NH_3)_4(CO_3)](NO_3)$. $½H_2O$.

vi) Bis-acetylacetonato copper(II), $[Cu(acac)_2]$

C. Laboratory note book:(5 marks)*

D. Viva-voce: (5 marks)

* All type of quantitative analysis (acidimetry, alkalimetry, permanganometry, dichromatometry, idometry, complexometry, gravimetry) and preparation should be recorded in laboratory note book. Each carries marks.

Group C (Physical Chemistry Practical)
Full Marks -50 Time: 6 Hrs

Students have to carry out all the listed experiments in their practical classes and have to report those with properly singed in their laboratory note book during examination. One experiment will be assigned to a candidate through single draw lottery during examination.

(A) Students have to perform one experiment to be set among the followings (40 marks)

1. Conductometric titration of HCl vs NaOH; acetic acid & oxalic acid vs NaOH; mixed acid (HCl +CH_3COOH) vs NaOH.
2. Determination of ionization constant of weak electrolyte and its conductance at infinite dilution using conductometer (verification of Ostwald dilution law).
3. Determination of solubility and solubility product of AgCl by EMF measurement.
4. Potentiometric estimation of Mohr salt solution with standard $K_2Cr_2O_7$ and the determination of formal potential of Fe^{3+}/Fe^{2+} system.
5. Determination of pK_a values of weak monobasic acid and pK_2 of dibasic acid using *pH*-meter.

6. Verification of the Lambet-Beer's law and determination of the concentration of a solution.
7. Determination of pK_{in} of Bromochresol green using colorimeter.
8. Determination of optical rotation of cane sugar by polarimeter.
9. Determination of critical solution temperature of phenol-water system and effect of impurities on CST.

(B) Laboratory note book:(5 marks)
(C) Viva-voce: (5 marks)

Recommended list of books
Organic Chemistry:

1. D. Nasipuri: Stereochemistry of organic compounds: Principles and Applications
2. P. Sykes: A Guide to Mechanism in Organic Chemistry
3. J. March: Advanced Organic Chemistry
4. I. L. Finar: Organic Chemistry (Vol. I)
5. R. T. Morrison and R. N. Boyd: Organic Chemistry
6. W. Kemp: Organic spectroscopy
7. R. O. C. Norman and J. M. Coxon: Principle of organic synthesis
8. S. Warren: Organic synthesis: The disconnection approach
9. J. Clayden, N. Greeves, S. Warren and P. Wothers: Organic chemistry
10. J. A. Joule and K. Mills: Heterocyclic Chemistry (4 th Edition)
11. W. Carruthers: Modern methods of organic synthesis

Inorganic Chemistry:

1. Inorganic Chemistry: Principles of Structure and Reactivity by Huheey/Medhi, Pearson.
2. Inorganic Chemistry by Meissler/Tarr, Pearson.

3. 10. Advanced Inorganic Chemistry – F. A. Cotton & G. Wilkinson
4. Inorganic Chemistry – J. E. Huheey, E. A. Keiter & R. L. Keiter
5. Chemistry of The Elements – N. N. Greenwood & A. Earnshaw
6. Concept and Model in Inorganic Chemistry – Douglass, McDanniel & Alexander
7. Coordination Chemistry – S. F. A. Kettle
8. Theoretical Inorganic Chemistry M. C. Dey and I. Selbin
9. Inorganic Electronic Spectroscopy – A. B. P. Lever
10. Principles and Application of Organo-transition Metal Chemistry – J. P. Collman, L. S. Hegedus, Borton & R. G. Finke
11. Organometallic Chemistry – An Introduction – R. C. Mahrotra & A. Singh
12. Principles of Organometallic Chemistry _ G. E. Coats, H. L. H. Green, P.Powell & K. Wade
13. Basic Organomtallic Chemistry – J. J. Zuckerman and I. Haiduc
14. The Organometallic Chemistry of Transition Metals – R. H. Carbtree
15. Bioinorganic Chemistry – R. W. Hay
16. Introduction to Bioinorganic Chemistry - D.R. Williams
17. Elements of Bioinorganic Chemistry – G. N. Mukherjee & A. Das
18. Instrumental Methods Analysis – Williiard, merit, Dean & Sett
19. Inorganic Chemistry – A. G. Sharpe
20. General and Inorganic Chemistry- R. Sarkar
21. Elementary Inorganic Chemistry- R. L. Dutta
22. Inorganic Chemistry – J. D. Lee
23. Nuclear and Radiochemistry – G. Friedlander, J. W. Kennedy, E. S. Macias, J. M. Miller.
24. Essentials of nuclear chemistry – H. J. Arnikar.
25. Inorganic chemistry – W. W. Porterfield
26. Inorganic chemistry – Gary Wulfsberg
27. Inorganic chemistry – Seriver, Atkins

28. Essential trends in Inorganic chemistry – D. M. P. Mingos.
29. Fundamental concepts of Inorganic chemistry – A. K. Das.

Physical Chemistry

1. D. A. Mcquarrie and J. D. Simon: Physical Chemistry – A Molecular Approach
2. I. N. Levine: Physical Chemistry
3. G. W. Castellan: Physical Chemistry
4. P. W. Atkins: Physical Chemistry
5. K. Denbigh: The Principles of Chemical Equilibrium
6. C. N. Banwell and E.M. McCash: Fundamentals of Molecular Spectroscopy
7. R. S. Berry, S. A. Rice and J. Ross: Physical Chemistry
8. T. Engel and P. Reid: Physical Chemistry
9. W. J. Moore: Physical Chemistry
10. K. J. Laidler: Chemical Kinetics

Practical Chemistry books

1. G. Svehla: Vogel's Qualitative Inorganic Analysis.
2. J. Mendham, R. C. Denny, J. D. Barnes, M. J. K. Thomas: Vogel's Text Book of
Quantitative Chemical Analysis.
3. G. N. Mukherjee: Semi-Micro Qualitative Inorganic Analysis (CU Publications)
4. Vogel's Text Book of Practical Organic Chemistry (5th Edition)
5. N. G. Mukherjee: Selected Experiments in Physical Chemistry
6. Subhas C. Das: Advanced Practical Chemistry
7. Nad, Mahaparta, Ghoshal: Advanced Course in Practical Chemistry.
8. Quantitative analysis – Vladimir Alexeyev.

CHEMISTRY
(GENERAL)

Distribution of Papers and Marks in B. Sc. (General) Chemistry Examination

Category A: For students with honours in subjects other than chemistry
Total Marks: 200 (theoretical) + 100 (Practical) = 300
Category B: For pass course students only
Total Marks: 250 (theoretical) + 150 (Practical) = 400

Part -I: 1st Year

Theoretical Papers:			Marks
Paper -I	Group -A	: Organic Chemistry	50
	Group -B	: Inorganic Chemistry	50

Part -II: 2nd Year

Paper -II	Group -A	: General Chemistry	50
	Group -B	: Physical Chemistry	50

Practical:

Paper -III

(a) Inorganic Qualitative analysis	30
(b) Inorganic .Quantitative Estimation	20
(c) Organic Chemistry Experiments:	
(i) Qualitative analysis	20
(ii) Preparation	10
(d) Laboratory Note Book	10
(e) Viva Voce	10

Part -III: 3rd Year
For pass course (Category B) students only

Group-A	: Applied Chemistry	50
Group -B	: Practical	50

Note: (i) Each theoretical paper shall be of three hours duration.
(ii) The Practical Examination shall have duration of six hours in one day only.

B. Sc. (General), Part -I, 1st year
Paper-I

Group -A: Organic Chemistry **50 Marks**
(University Examination: 45, Internal assessment: 5)

1. Inductive effect, electromeric effect, conjugation, resonance and resonance energy, hyperconjugation, homolytic and heterolytic bond breaking, electrophiles and nucleophiles; carbocations, carbanions and radicals (stability and reactivity of).

2. Aliphatic compound: a) General as well as IUPAC nomenclature is to be known (aliphatic compounds up to eight carbon atoms are included).

b) Stereochemistry of carbon compounds: Different types of isomerism, geometrical and optical isomerism, optical activity, asymmetric carbon atom, elements of symmetry (plane and centre), chirality, enantiomers and diastereomers, R and S nomenclature, E and Z nomenclature, D and L nomenclature, Fischer projection formula of simple molecules containing one and two asymmetric carbon atoms.

c) Alkanes, alkyl halides.

e) Unsaturated hydrocarbons (alkenes, alkynes): general methods of synthesis of alkenes, electrophilic addition reaction, mechanism of

bromination and hydrohalogenation, Markownikoff's addition, peroxide effect, hydroboration, ozonide formation, polymerization reaction of alkenes (definition and examples only), general methods of synthesis, acidity, hydration and substitution reactions of alkynes.

f) Monohydric alcohols: Primary, secondary & tertiary, polyhydric alcohols; pinacol-pinacolone rearrangement reaction; glycols, glycerine.

g) Ethers: Williamson synthesis, dimethyl ether, diethyl ether.

h) Aldehydes and ketones: formaldehyde, acetaldehyde, acetone, chloral, haloform reactions. Cannizzaro's reaction, Reformatsky's reaction, Relative reactivities and distinction of aldehydes and ketones, formation and reactions of enolates-aldol condensation (with mechanism), Perkin reaction, Knoevenagel reaction, Benzoin Condensation, Claisen Condensation, Oxidation and

Reducation reactions.

i) Fatty acids, acid chlorides, amides, anhydrides, esters, mechanism of esterification of carboxylic acids and hydrolysis of ester (BAc2 and AAc2 only).

j) Nitrogen containing compound: Amines: primary, secondary, tertiary and their comparative studies, quaternary ammonium compounds. Cyanides and isocyanides. Hoffman degradation reaction.

k) Oxalic, malonic, succinic, lactic, malic, tartaric, citric, maleic and fumaric acids.

3. Carbohydrates: Classification, Elementary idea of monosaccharaides, disaccharides and polysaccharides highlighting glucose, fructose, sucrose, starch & cellulose.

4. Preparation and synthetic uses of

i) Grignard reagents

ii) Ethyl malonate

iii) Ethyl aceto acetate

5. Aromatic Chemistry:

i) Aromaticity, Huckel's rule, Benzene and its structure, M.O. treatment, resonance. Reactions and synthesis of benzene, toluene, xylenes including Friedel. Craft's alkylation and acylation reactions, orientation.

ii) Study of the preparation, properties and reactions of the following aromatic compounds.

a) Halogen derivatives: chlorobenzene, benzylchloride and benzotrichloride.

b) Nitrobenzene, m-dinitrobenzene, s-trinitrobenzene, trinitrotoluene (TNT)

c) Aniline, toluidine, methyl and dimethylaniline, benzylamine, phenylhydrazine, sulphanilic acid.

d) Benzene diazonium salts and its reactions. Sandmeyer reaction.

e) Benzyl alcohol, benzaldehyde, acetophenone, benzophenone.

f) Phenols: synthesis, acidic character and chemical reactions of phenols, Kolbe reactions, Reimer-Tiemann reaction, Fries rearrangement, Claisen rearrangement. salicylaldehyde, salicylic acid, picric acid.

Group -B: General Chemistry 50 Marks

(University Examination: 45, Internal assessment: 5)

Section-I: *Extra-nuclear Structure of atoms*

Bohr's theory for hydrogen atom (simple mathematical treatment), atomic spectra of hydrogen and Bohr's model, quantum numbers and their significance, Pauli's exclusion principle, Hund's rule, electronic configuration of many electron atoms, *Aufbau* principle and its limitations. Qualitative introduction to orbitals : shapes of s, p and d orbitals. Electronic configuration of atoms of elements. 6L

Section-II: *Radioactivity*

Natural radioactivity, units, radioactive disintegration series, group displacement law, law of radioactive decay, half-life and average life of radio elements. Stability of atomic nucleus: n/p ratio, nuclear binding energy, mass defect. Nuclear reactions: fission, fusion, transmutation of elements, artificial radioactivity, measurement of radioactivity (simple idea). Isobars, Isotopes, Isotones and their uses. 6L

Section-III: *Chemical Periodicity:*

Classification of elements on the basis of electronic configuration: general characteristics of s-, p-, d- and f-block elements. Positions of hydrogen and noble gases. Atomic and ionic radii, ionization potential, electron affinity, and electronegativity; periodic and group-wise variation of above properties in respect of s- and p- block elements, Diagonal relationship. Periodicity in ionic radii, atomic radii, electronegativity, and ionisation potential. 6L

Section-IV: Chemical bonding

Ionic bonding

General characteristics of ionic compounds, sizes of ions, radius ratio rule and its limitation. Lattice energy, Born Haber cycle, Fajan's Rule.

Covalent bonding

General characteristics of covalent compounds, valence-bond approach, hybridization involving s-, p-, d-orbitals, Valence Shell Electron Pair Repulsion (VSEPR) concept, shapes of simple molecules and ions of main group elements, bond moment and dipole moment, partial ionic character of covalent bonds, hydrogen bonding and its effect on physical and chemical properties.

Coordinate bonds and Coordination compounds

Complex salts and double salts, Warner's theory of coordination, IUPAC nomenclature of coordination complexes (mononuclear complexes only), chelate complexes, stereochemistry of coordination numbers 4 and 6. 18L

Part II, 2nd year

Paper-II

Group -A: Inorganic Chemistry 50 Marks

(University Examination: 45, Internal assessment: 5)

1. Comparative study of p-block elements

Group trends in electronic configuration, common oxidation states, inert pair effect, and their important compounds in respect of the following groups of elements: (i) B-Al-Ga-In-Tl (ii) C-Si-Ge-Sn-Pb (iii) N-P-As (iv) O-S (v) F-Cl-Br-I. 24L

2. Acid-Base concept

Arrhenius and Bronsted-Lowry's concept, relative strength of acids bases, amphoterism, Lux-Flood concept, Lewis concept. pH, Buffer and its application, acid base-indicator. HSAB principle (qualitative idea). 6L

3. Redox chemistry

Balancing of equations by ion-electron methods, elementary idea on standard redox potentials with sign convention, Nernst equation (without derivation). Influence of complex formation and change of pH on redox potentials, formal potential, feasibility of a redox titration, redox indicators, disproportionation and comproportionation reactions (typical examples). 6L

4. Chemical Equilibrium: Reversible and irreversible reactions, Law of mass action, equilibrium constants (Kp, Kc), Equilibrium in homogenous gaseous and liquid system. Dependence of equilibrium constants on pressure & temperature and on addition of foreign substances. Le chatelier principle.Common ion effect and solubility product: their application in analytical chemistry. 8L

Group -B: Physical Chemistry **50 Marks**

(University Examination: 45, Internal assessment: 5)

1. Gaseous State of Matters: Gas Laws, Kinetic theory of gas, derivation of gas laws from kinetic theory, average kinetic energy of translation, Boltzman constant and absolute scale of temperature, Maxwell's distribution law of molecular speeds (without derivation), most probable, average and root mean square speeds of gas molecules, principle of equipartition of energy (without derivation), Mean free path and collision frequencies, Real gases, compressibility factor, deviation from ideality, van der Waals' equation of state.

2. Liquid State: Physical properties of liquids and their measurements, Vapour pressure, surface tension, viscosity.

3. Thermodynamics: The First Law, reversible and irreversible work. Concepts of internal energy and enthalpy, Isothermal and adiabatic expansion of gases and work involved. Thermochemical laws and heats of different types of reactions. Criteria of a perfect gas. The second law and its mathematical form, the Carnot's cycle. Qualitative ideas of entropy and of free energy (G). The condition for spontaneity of a chemical process. Joule-Thomson effect (derivation excluded).

4. Dilute Solutions: The colligative properties. Lowering of vapour pressure, elevation of boiling point, depression of freezing point and osmotic pressure. Experimental methods of their determination. Molecular weight determination. Abnormal behavior of electrolyte solutions and the Van't Hoff factor.

5. Chemical Kinetics: order and molecularity of reactions. First and second order reactions and their rate constants. Half life periods.

6. Catalysis: (i) The phenomenon of catalysis and the characteristics of catalyzed reactions. The mechanism of homogeneously catalyzed reactions. (ii) Elementary idea of absorption of heterogeneous catalysis. (iii) Meaning and examples of autocatalysis, catalytic poisons, promoters, enzyme catalysis, acid-base catalysis.

7. Electrochemistry (Conductance): Anhenius· theory of electrolytic dissociation. Specific, equivalent and molecular conductivities and their measurement. Transport number & its measurement Velocity of ions, ionic mobility, kohlrausch's Law, conductometric titration.

8. Colloidal state: Different types of colloids. Methods of preparation of lyophobic colloids. Characteristic properties of colloids. Ideas of coagulation, peptisation. Gold number, electrophoresis and endosmosis, isoelectric point, Tyndall effect Brovvnian motion.

Paper -III

Practical Syllabus in Chemistry for General Course 100 Marks

1) Inorganic qualitative analysis

Qualitative analysis of inorganic mixture containing not more three radicals (Basic and acid) selected from the list given below:

Basic Radicals: Cu(II), Bi(III), Sb(III), Fe(II/III), Cr(III), Al(III), Zn(II), Mn(II), Co(II), Ni(II), Ca(II), Ba(II), Sr(II), Mg(II), Na(I), K(I), NH_4^+.

Acid radicals: Cl^-, F^-, Br^-, I^-, SO_3^{2-}, SO_4^{2-}, S^{2-}, PO_4^{3-}, CrO_4^{2-}, BO_3^{3-}, H_3BO_3, NO_3^-, NO_2^-.

Reporting of the systematic analysis of the samples for qualitative analysis should be presented in the following scheme:

1. Physical characteristics and solubility of the sample.
2. Preliminary tests for basic and acid radicals: only positive test should be mentioned.
3. Wet tests for acid and basic radicals.
4. Confirmatory tests of radicals.
5. Name and symbol of detected radicals.

2) Inorganic Quantitative analysis: Volumetric analysis by acidimetry-alkalimetry and oxidation-reduction methods (using Potassium permanganate and potassium dichromate).

(i) Titration of Na_2CO_3 + $NaHCO_3$ mixture vs HCl using phenolphthalein and methyl orange indicators.

(ii) Standardization of $KMnO_4$ solution by standard oxalic acid solution (supplied) and estimation of Fe^{2+} in Mohr's salt solution by $KMnO_4$ solution.

(iii) Standardization of $KMnO_4$ solution by standard oxalic acid solution (supplied) and estimation of Fe^{2+} and Fe^{3+} in a mixture by $KMnO_4$ solution.

(iv) Estimation of (i) Fe^{2+} in Mohr's salt solution, (ii) Fe^{3+} in a solution by standard $K_2Cr_2O_7$ solution (supplied).

(v) Estimation of Fe^{2+} and Fe^{3+} in a mixture by standard $K_2Cr_2O_7$ solution (supplied).

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3) Qualitative Analysis of Single Organic Compound(s)

Experiment A: Detection of special elements (N, Cl, and S) in organic compounds.

Experiment B: Solubility and Classification (solvents: H_2O, dil. HCl, dil. NaOH)

Experiment C: Detection of functional groups -NO_2, -NH_2, -COOH, carbonyl
(-CHO, >C=O), -OH (phenolic) in solid organic compounds.
Experiments A - C with unknown (at least 6) solid samples containing not more than two of the above types of functional groups should be done.

4) Organic Preparations:

a) Benzil from benzoin
b) Phthalimide from urea
c) m-dinitrobenzene from nitrobenzene

Part III: 3rd year
Paper: IV

Group -A: Applied Chemistry **50 Marks**

(University Examination: 45, Internal assessment: 5)

1. Chemical separation process: chromatographic separation TLC, GLC column, HPLC.

2. Manufacturing of some important Industrial Products: Polymers (PVC, Polyethylene, Nylon-66, Rubber). Detergents (Dodecyl benzene sulphonate), Pigments (Zinc white, Carbon black), Fertilisers (Superphosphate of lime, Urea, Ammonium Sulphate), glass, Cement.

3. Petroleum distillation process, LPG, Octane number, Cetane number, Flash point.

4. Amino acids, peptide and proteins: definition, classification and uses.

5. Nucleic acids: Structures of nucleosides, nucleotides, elementary ideas of RNA and DNA.

6. Drug: Synthesis and use of paracetamol (antipyretic), aspirin (analgesic) sulphanilamide (sulpha drug) and Chloroquinone (antimalarial).

7. Synthesis of dye and use: methyl orange, methylene blue, congo red, malachite green.

8. Pesticides: Common pesticides: Production, applications and residual toxicity of gammaxane, aldrin, parathion, malathion, DDT.

9. Food Additives: Food flavour, food colour, food preservatives, artificial sweeteners, acidulants, alkalies, edible emulsifiers and edible foaming agents, sequesterants-uses and abuses of these substances in food beverages.

10. Hydrogenation of oil.

11. Error analysis: Accuracy and precision of quantitative analysis, determinate-, indeterminate-, systematic- and random-errors. Methods of least squares and standard deviations.

Group -B: Practical Chemistry **50 Marks**

1. Estimation of total hardness of water.
2. Estimation of available oxygen in pyrolusite.
3. Cement analysis.
4. Separation of Chemicals by TLC
5. Determination of the strength of the H_2O_2 sample.
6. To find the P^H of an unknown solution by comparing colour of a series of HCl solutions
+ 1 drop of methyl orange, and a similar series of NaOH solutions + 1 drop of phenolphthalein.
7. Analysis of Brass.
8. Determination of intrinsic viscosity of a polymer.
9. Titration of HCl + CH_3COOH mixture vs. NaOH using two different indicators to find the composition.

Recommended list of Books:

Textbooks

1. General and Inorganic Chemistry (Vol-I + Vol-II) : P. K. Dutt
2. Organic Chemistry : S. Sengupta
3. Elementary Physical Chemistry : S. R. Palit
4. General and Inorganic chemistry – Poddar, Ghosh.
5. Advance Inorganic Chemistry – S. P. Banerjee.
6. Inorganic Chemistry- Malik, Tuli, Madan.

Practical Chemistry book

1. A. K. Nad, B. Mahapatra and A. Ghoshal: An Advanced Course in Practical Chemistry

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year B Sc (General)
in

Chemistry

Under Choice Based Credit System (CBCS)
w.e.f 2018-2019

VIDYASAGAR UNIVERSITY

B Sc (General) in Chemistry

[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
1	I	SEMESTER-I					CA	ESE	TOTAL
		Core-1 (DSC-1A)		Atomic structure, Bonding, General organic chemistry & Aliphatic Hydrocarbons - **Lab**	6	4-0-4	15	60	75
		Core-2 (DSC-2A)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-3 (DSC-3A)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC-1 (Elective)		English/MIL	2	1-1-0	10	40	50
		Semester - I : Total			**20**				**275**
	II	SEMESTER-II							
		Core-4 (DSC-1B)		Chemical Energetics, Equilibria & Functional Organic Chemistry - **Lab**	6	4-0-4	15	60	75
		Core-5 (DSC-2B)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-6 (DSC-3B)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC-2 (Elective)		Environmental Studies	4		20	80	100
		Semester - 2 : Total			**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
2	III	SEMESTER-III					CA	ESE	TOTAL
		Core-7 (DSC-1C)		Conductance, Electrochemistry & Functional Organic Chemistry - **Lab**	6	4-0-4	15	60	75
		Core-8 (DSC-2C)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-9 (DSC-3C)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-1		TBD	2	1-1-0/ 1-0-2	10	40	50
		Semester - 3 : Total			**20**				**275**
	IV	SEMESTER-IV							
		Core-10 (DSC-1D)		Coordination chemistry, State of Matter and Chemical Kinetics - **Lab**	6	4-0-4	15	60	75
		Core-11 (DSC-2D)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-12 (DSC-3D)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-2		TBD	2	1-1-0/ 1-0-2	10	40	50
				Semester - 4 : Total	**20**				**275**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
3	V	SEMESTER-V					CA	ESE	TOTAL
		DSE-1A		Discipline-1(Chemistry)	6	4-0-4/ 5-1-0	15	60	75
		DSE-2A		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		DSE-3A		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-3		TBD	2	1-1-0/ 1-0-2	10	40	50
		Semester - 5 : Total			**20**				**275**
	VI	SEMESTER-VI							
		DSE-1B		Discipline-1(Chemistry)	6	4-0-4/ 5-1-0	15	60	75
		DSE-2B		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		DSE-3B		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-4		TBD	2	1-1-0/ 1-0-2	10	40	50
		Semester - 6 : Total			**20**				**275**
	Total in all semester:				**122**				**1700**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **CP**=Core Practical , **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies .

List of Core and Elective Courses

Core Courses (CC)

DSC-1A: Atomic Structure, Bonding, general organic chemistry & aliphatic hydrocarbons
DSC-1B: Chemical Energetics, Equilibria &Functional Organic Chemistry
DSC-1C: Solutions, Phase equilibrium, Conductance, Electrochemistry & Functional Organic Chemistry
DSC-1D: Coordination Chemistry, States of matter Chemical Kinetics

Discipline Specific Electives (DSE)

DSE-1: Analytical Methods in Chemistry
Or
DSE-1: Polymer Chemistry
Or
DSE-1: Instrumental Methods of Chemical Analysis
Or
DSE-1: Organometallics, Bioinorganic Chemistry, Polynuclear hydrocarbons and **UV,** IR Spectroscopy
DSE-2: Applications of Computers in Chemistry.
Or
DSE-2: Green Chemistry
Or
DSE-2: Industrial Chemicals and Environment
Or
DSE-2: Quantum Chemistry, Spectroscopy & Photochemistry
Or
DSE-2: Molecular Modelling & Drug design

Skill Enhancement Course (SEC)

SEC-1: Basic Analytical Chemistry
Or
SEC-1: Chemo informatics
SEC-2: Analytical Clinical Biochemistry
Or
SEC-2: Intellectual Property Rights (IPR)
SEC-3: Pharmaceutical Chemistry
Or
SEC-3: Chemistry of Cosmetics & Perfumes
SEC-4: Pesticide Chemistry
Or
SEC-4: Fuel Chemistry

Core Courses (CC)

DSC-1A(CC-1): Atomic Structure, Bonding, general organic chemistry & aliphatic hydrocarbons Credits 06

DSC1AT: Atomic Structure, Bonding, general organic chemistry & aliphatic hydrocarbons Credits 04

Course Contents:

Section A: Inorganic Chemistry-1

Atomic Structure:

Review of Bohr's theory and its limitations, dual behaviour of matter and radiation, de Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure. 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 hydogenic wavefunctions (atomic orbitals) and their variations for 1*s*, 2*s*, 2*p*, 3*s*, 3*p* and 3*d* orbitals (Only graphical representation). Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1*s* and 2*s* atomic orbitals. 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.

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-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's 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 haracteristics or *s-s*, *s-p* and *p-p* combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules of 1st and 2nd periods (including idea of *s-p* mixing) and heteronuclear diatomic molecules such as CO, NO and NO^+. Comparison of VB and MO approaches.

Section B: Organic Chemistry-1

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: Benzenoids and Hückel's rule.

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). Threo and erythro; D and L; *cis – trans* nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).

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, Kolbe's synthesis, from Grignard reagent. *Reactions:* Free radical Substitution: Halogenation.

Alkenes: (Upto 5 Carbons) *Preparation:* Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). *Reactions:* cis-addition (alk. KMnO4) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymecuration-demercuration, Hydroboration-oxidation.

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 and oxidation with hot alk. $KMnO_4$.

Suggested Readings:

- Lee, J.D. *Concise Inorganic Chemistry* ELBS, 1991.
- Cotton, F.A., Wilkinson, G. & Gaus, P.L. *Basic Inorganic Chemistry*, 3rd ed., Wiley.
- Douglas, B.E., McDaniel, D.H. & Alexander, J.J. *Concepts and Models in Inorganic Chemistry*, John Wiley & Sons.
- Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. *Inorganic Chemistry: Principles of Structure and Reactivity*, Pearson Education India, 2006.
- Graham Solomon, T.W., Fryhle, C.B. & Dnyder, S.A. *Organic Chemistry*, John Wiley & Sons (2014).
- McMurry, J.E. *Fundamentals of Organic Chemistry*, 7th Ed. Cengage Learning India Edition, 2013.
- Sykes, P. *A Guidebook to Mechanism in Organic Chemistry*, Orient Longman, New Delhi (1988).
- Eliel, E.L. *Stereochemistry of Carbon Compounds*, Tata McGraw Hill education, 2000.
- Finar, I.L. *Organic Chemistry* (Vol. I & II), E.L.B.S.
- Morrison, R.T. & Boyd, R.N. *Organic Chemistry*, Pearson, 2010.
- Bahl, A. & Bahl, B.S. *Advanced Organic Chemistry*, S. Chand, 2010.

DSC1AP: Atomic structure, Bonding, general organic chemistry & aliphatic hydrocarbons (Practical) Credits 02

Practical:

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 Mohr's 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.

Suggested Readings:

- Svehla, G. *Vogel's Qualitative Inorganic Analysis*, Pearson Education, 2012.
- Mendham, J. *Vogel's Quantitative Chemical Analysis*, Pearson, 2009.
- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.

DSC-1B (CC-2): Chemical Energetics, Equilibria & Functional Organic Chemistry Credits 06

DSC1BT: Chemical Energetics, Equilibria &Functional Organic Chemistry
Credits 04

Course Contents:

Section A: Physical Chemistry-1

Chemical Energetic

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 – Kirchhoff's equation. Statement of Third Law of thermodynamics and calculation of absolute entropies of substances.

Chemical Equilibrium:
Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between ΔG and ΔG_o, Le Chatelier's principle. Relationships between K_p, K_c and K_x for reactions involving ideal gases.

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.

Section B: Organic Chemistry-2

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-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene).

Alkyl and Aryl Halides

Alkyl Halides (Upto 5 Carbons) Types of Nucleophilic Substitution (S_N1, S_N2 and S_Ni) reactions. *Preparation:* from alkenes *and* alcohols. *Reactions:* hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamson's 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 $NaNH_2/NH_3$). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.

Alcohols, Phenols and Ethers (Upto 5 Carbons)

Alcohols: *Preparation:* Preparation of 1^o, 2^o and 3^o alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, 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, Houben–Hoesch Condensation, Schotten – Baumann Reaction.

Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

Aldehydes and ketones (aliphatic and aromatic): (Formaldehye, 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, Wittig reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. Meerwein-Pondorff Verley reduction.

Suggested Readings:

- Graham Solomon, T.W., Fryhle, C.B. & Dnyder, S.A. *Organic Chemistry,* John Wiley & Sons (2014).
- McMurry, J.E. *Fundamentals of Organic Chemistry*, 7th Ed. Cengage Learning India Edition, 2013.
- Sykes, P. *A Guidebook to Mechanism in Organic Chemistry,* Orient Longman, New Delhi (1988).
- Finar, I.L. *Organic Chemistry* (Vol. I & II), E.L.B.S.
- Morrison, R.T. & Boyd, R.N. *Organic Chemistry*, Pearson, 2010.
- Bahl, A. & Bahl, B.S. *Advanced Organic Chemistry,* S. Chand, 2010.
- Barrow, G.M. *Physical Chemistry* Tata McGraw-Hill (2007).
- Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
- Kotz, J.C., Treichel, P.M. & Townsend, J.R. *General Chemistry* Cengage Learning India Pvt. Ltd., New Delhi (2009).
- Mahan, B.H. *University Chemistry* 3rd Ed. Narosa (1998).
- Petrucci, R.H. *General Chemistry* 5th Ed. Macmillan Publishing Co.: New York (1985).

DSC1BP: Chemical Energetics, Equilibria & Functional Organic Chemistry (Practical)

Credits 02

Section A: Physical Chemistry

Thermo chemistry:

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 (KNO_3, NH_4Cl).
5. Determination of enthalpy of hydration of copper sulphate.
6. Study of the solubility of benzoic acid in water and determination of ΔH.

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

Suggested Readings:

- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.
- Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry*, R. Chand & Co.: New Delhi (2011).

DSC-1C(CC-3): Solutions, Phase equilibrium, Conductance, Electrochemistry & Functional Organic Chemistry Credits 06

DSC1CT: Solutions, Phase equilibrium, Conductance, Electrochemistry & Functional Organic Chemistry Credits 04

Course Contents:

Section A: Physical Chemistry-2

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.

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).

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 obility. 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 acidbase).

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: ΔG, ΔH and ΔS 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).

Section B: Organic Chemistry-3

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 inter-conversion. *Reactions:* Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation.

Amines and Diazonium Salts

Amines (Aliphatic and Aromatic): (Upto 5 carbons)

Preparation: from alkyl halides, Gabriel's 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.

Amino Acids, Peptides and Proteins:

Preparation of Amino Acids: Strecker synthesis using Gabriel's 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 C–terminal (thiohydantoin and with carboxypeptidase enzyme). Synthesis of simple peptides (upto dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) & Cactivating groups and Merrifield solid-phase synthesis.

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 disacharrides (sucrose, cellobiose, maltose, lactose) and polysacharrides (starch and cellulose) excluding their structure elucidation.

Suggested Readings:

- Barrow, G.M. *Physical Chemistry* Tata McGraw-Hill (2007).
- Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
- Kotz, J.C., Treichel, P.M. & Townsend, J.R. *General Chemistry*, Cengage Learning India Pvt. Ltd.: New Delhi (2009).
- Mahan, B.H. *University Chemistry*, 3rd Ed. Narosa (1998).
- Petrucci, R.H. *General Chemistry*, 5th Ed., 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. *Lehninger's Principles of Bioch*emistry *7th Ed.*, W. H. Freeman.
- Berg, J.M., Tymoczko, J.L. & Stryer, L. *Biochemistry*, W.H. Freeman, 2002.

DSC-1CP: Solutions, Phase Equilibrium, Conductance, Electrochemistry & Functional Organic Chemistry (Practical) Credits 02

Practical:

Section A: Physical Chemistry

Distribution

Study of the equilibrium of one of the following reactions by the distribution method:

$I_2(aq) + I^-(aq) \rightleftharpoons I_3^-(aq)$
$Cu^{2+}(aq) + xNH_2(aq) \rightleftharpoons [Cu(NH_3)_x]^{2+}$

Phase equilibria

a) Construction of the phase diagram of a binary system (simple eutectic) using cooling curves.
b) Determination of the critical solution temperature and composition of the phenol water system and study of the effect of impurities on it.
c) Study of the variation of mutual solubility temperature with concentration for the phenol water system and determination of the critical solubility temperature.

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

1. 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 and a nonreducing sugar.

Suggested Readings:

- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry,* Prentice-Hall, 5th edition, 1996.
- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.
- Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry*, R. Chand & Co.: New Delhi (2011).
- Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry*, Universities Press.

DSC-1D(CC-4):Coordination Chemistry, States of matter Chemical Kinetics Credits 06

DSC1DT: Coordination Chemistry, States of matter Chemical Kinetics Credits 04

Course Contents:

Transition Elements (3d series)

General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states (Latimer diagrams) for Mn, Fe and Cu. Lanthanoids and actinoids: Electronic configurations, oxidation states, colour, magnetic properties, lanthanide contraction, separation of lanthanides (ion exchange method only).

Coordination Chemistry

Valence Bond Theory (VBT): Inner and outer orbital complexes of Cr, Fe, Co, Ni and Cu (coordination numbers 4 and 6). Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Drawbacks of VBT. IUPAC system of nomenclature.

Crystal Field Theory

Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry. Factors affecting the magnitude of D. Spectrochemical series. Comparison of CFSE for O_h and T_d complexes, Tetragonal distortion of octahedral geometry. Jahn-Teller distortion, Square planar coordination.

Section B: Physical Chemistry-3

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. Andrews isotherms of CO_2. 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).

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).

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. X–Ray diffraction by crystals, Bragg's law. Structures of NaCl, KCl and CsCl (qualitative treatment only). Defects in crystals. Glasses and liquid crystals.

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).

Suggested Readings:

- Barrow, G.M. *Physical Chemistry* Tata McGraw-Hill (2007).
- Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
- Kotz, J.C., Treichel, P.M. & Townsend, J.R. *General Chemistry* Cengage Learning India Pvt. Ltd., New Delhi (2009).
- Mahan, B.H. *University Chemistry* 3rd Ed. Narosa (1998).
- Petrucci, R.H. *General Chemistry* 5th Ed. Macmillan Publishing Co.: New York (1985).
- Cotton, F.A. & Wilkinson, G. *Basic Inorganic Chemistry*, Wiley.
- Shriver, D.F. & Atkins, P.W. *Inorganic Chemistry*, Oxford University Press.
- Wulfsberg, G. *Inorganic Chemistry*, Viva Books Pvt. Ltd.
- Rodgers, G.E. *Inorganic & Solid State Chemistry*, Cengage Learning India Ltd., 2008.

DSC1DP: Coordination Chemistry, States of matter & Chemical Kinetics (Practical)

Credits 02

Practical:

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^{2+}, Bi^{3+}, Cu^{2+}, Cd^{2+}, Sn^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Cr^{3+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, K^{+}

Anions : CO_3^{2-}, S^{2-}, SO^{2-}, $S_2O_3^{2-}$, NO_3^{-}, CH_3COO^{-}, Cl^{-}, Br^{-}, I^{-}, NO_3^{-},SO_4^{2-}, PO_4^{3-}, BO_3^{3-}, $C_2O_4^{2-}$, F^{-}

(Spot tests should be carried out wherever feasible)

1. Estimate the amount of nickel present in a given solution as bis (dimethylglyoximato) nickel(II) or aluminium as oximate in a given solution gravimetrically.
2. Draw calibration curve (absorbance at λ_{max} vs. concentration) for various concentrations of a given coloured compound ($KMnO_4$/ $CuSO_4$) and estimate the concentration of the same in a given solution.
3. Determine the composition of the Fe^{3+}-salicylic acid complex solution by Job's method.
4. Estimation of (i) Mg^{2+} or (ii) Zn^{2+} by complexometric titrations using EDTA.
5. Estimation of total hardness of a given sample of water by complexometric titration.
6. Determination of concentration of Na^+ and K^+ using Flame Photometry.

Section B: Physical Chemistry

(I) Surface tension measurement (use of organic solvents excluded).

a) Determination of the surface tension of a liquid or a dilute solution using a stalagmometer.
c) Study of the variation of surface tension of a detergent solution with concentration.

(II) Viscosity measurement (use of organic solvents excluded).
a) Determination of the relative and absolute viscosity of a liquid or dilute solution using an Ostwald's viscometer.
b) Study of the variation of viscosity of an aqueous solution with concentration of solute.

(III) Chemical Kinetics

Study the kinetics of the following reactions.
1. Initial rate method: Iodide-persulphate reaction
2. 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

Suggested Readings:

- Svehla, G. *Vogel's Qualitative Inorganic Analysis*, Pearson Education, 2012.
- Mendham, J. *Vogel's Quantitative Chemical Analysis*, Pearson, 2009.
- Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry*, R.
- Chand & Co.: New Delhi (2011).

Discipline Specific Electives (DSE)

DSE-1: Analytical Methods in Chemistry — Credits 06

DSE1T: Analytical Methods in Chemistry — Credits 04

Course Contents:

Qualitative and quantitative aspects of analysis:

Sampling, evaluation of analytical data, errors, accuracy and precision, methods of their expression, normal law of distribution if indeterminate errors, statistical test of data; F, Q and t test, rejection of data, and confidence intervals.

Optical methods of analysis:

Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection rules, validity of Beer-Lambert's law.

UV-Visible Spectrometry: Basic principles of instrumentation (choice of source, monochromator and detector) for single and double beam instrument; *Basic principles of quantitative analysis:* estimation of metal ions from aqueous solution, geometrical isomers, keto -enol tautomers. Determination of composition of metal complexes using Job's method of continuous variation and mole ratio method.

Infrared Spectrometry: Basic principles of instrumentation (choice of source, monochromator & detector) for single and double beam instrument; sampling techniques. Structural illustration through interpretation of data, Effect and importance of isotope substitution.

Flame Atomic Absorption and Emission Spectrometry: Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples.

Thermal methods of analysis:

Theory of thermogravimetry (TG), basic principle of instrumentation. Techniques for quantitative estimation of Ca and Mg from their mixture.

Electro-analytical methods:

Classification of electroanalytical methods, basic principle of pH metric, potentiometric and conductometric titrations. Techniques used for the determination of equivalence points. Techniques used for the determination of pK_a values.

Separation techniques:

Solvent extraction: Classification, principle and efficiency of the technique. Mechanism of extraction: extraction by solvation and chelation. **Technique of extraction:** batch, continuous and counter current extractions. **Qualitative and quantitative aspects of solvent extraction:** extraction of metal ions from aqueous solution, extraction of organic species from the aqueous and nonaqueous media. **Chromatography:** Classification, principle and efficiency of the technique. Mechanism of separation: adsorption, partition & ion exchange. **Development of chromatograms:** frontal, elution and displacement methods. Qualitative and quantitative aspects of chromatographic methods of analysis: IC, GLC, GPC, TLC and HPLC. **Stereoisomeric separation and analysis:** Measurement of optical rotation, calculation of Enantiomeric excess (ee)/ diastereomeric excess (de) ratios and determination of enantiomeric composition using NMR, Chiral solvents and chiral shift reagents.

Chiral chromatographic techniques using chiral columns (GC and HPLC). Role of computers in instrumental methods of analysis.

Suggested Readings:

- Jeffery, G.H., Bassett, J., Mendham, J. & Denney, R.C. *Vogel's Textbook of Quantitative Chemical Analysis*, John Wiley & Sons.
- Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. *Instrumental Methods of Analysis*, 7th Ed. Wadsworth Publishing Company Ltd., Belmont, California, USA,
- Christian, G.D; *Analytical Chemistry*, 6th Ed. John Wiley & Sons, New York.
- Harris, D. C. *Exploring Chemical Analysis*, Ed. New York, W.H. Freeman.
- Khopkar, S.M. *Basic Concepts of Analytical Chemistry*. New Age, International Publisher.
- Skoog, D.A. Holler F.J. & Nieman, T.A. *Principles of Instrumental Analysis*, Cengage Learning India Ed.
- Mikes, O. *Laboratory Hand Book of Chromatographic & Allied Methods*, Elles Harwood Series on Analytical Chemistry, John Wiley & Sons.
- Ditts, R.V. *Analytical Chemistry; Methods of Separation*, van Nostrand.

DSE1P: Analytical methods in Chemistry (Lab) **Credits 02**

I. Separation Techniques

1. Chromatography:
   (a) Separation of mixtures
      (i) Paper chromatographic separation of Fe^{3+} Al^{3+}, and Cr^{3+} .
      (ii) Separation and identification of the monosaccharide present in the given mixture (glucose & fructose) by paper chromatography. Reporting the R_f values.
   (b) Separate a mixture of Sudan yellow and Sudan Red by TLC technique and identify them on the basis of their R_f values.
   (c) Chromatographic separation of the active ingredients of plants, flowers and juices by TLC

II. Solvent Extractions:

1. To separate a mixture of Ni^{2+} & Fe^{2+} by complexation with DMG and extracting the Ni^{2+}-DMG complex in chloroform, and determine its concentration by spectrophotometry.
2. Solvent extraction of zisconium with amberliti LA-1, separation from a mixture of irons and gallium.
3. Determine the pH of the given aerated drinks fruit juices, shampoos and soaps.
4. Determination of Na, Ca, Li in cola drinks and fruit juices using flame photometric techniques.
5. Analysis of soil:
   1. Determination of pH of soil.
   2. Total soluble salt
   3. Estimation of calcium, magnesium, phosphate, nitrate
6. Ion exchange:
   i. Determination of exchange capacity of cation exchange resins and anion exchange resins.
   ii. Separation of metal ions from their binary mixture.

iii. Separation of amino acids from organic acids by ion exchange chromatography.

III Spectrophotometry

1. Determination of pK_a values of indicator using spectrophotometry.
2 Structural characterization of compounds by infrared spectroscopy.
3 Determination of dissolved oxygen in water.
4 Determination of chemical oxygen demand (COD).
5 Determination of Biological oxygen demand (BOD).
6 Determine the composition of the Ferric-salicylate / Ferric-thiocyanate complex by Job's method.

Suggested Readings:

- Jeffery, G.H., Bassett, J., Mendham, J. & Denney, R.C. *Vogel's Textbook of Quantitative Chemical Analysis*, John Wiley & Sons.
- Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. *Instrumental Methods of Analysis*, 7th Ed. Wadsworth Publishing Company Ltd., Belmont, California, USA.
- Christian, Gary D; Analytical Chemistry, 6th Ed. John Wiley & Sons, New York.
- Harris, Daniel C: Exploring Chemical Analysis, Ed. New York, W.H. Freeman.
- Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age, International Publisher.
- Skoog, D.A. Holler F.J. & Nieman, T.A. *Principles of Instrumental Analysis*, Cengage Learning India Ed.
- Mikes, O. *Laboratory Hand Book of Chromatographic & Allied Methods*, Elles Harwood Series on Analytical Chemistry, John Wiley & Sons.
- Ditts, R.V. *Analytical Chemistry; Methods of Separation*, van Nostrand.

Or

DSE-1: Polymer Chemistry — Credits 06

DSE1T: Polymer Chemistry — Credits 04

Course Contents:

Introduction and history of polymeric materials:

Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers.

Functionality and its importance:

Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bifunctional systems, Poly-functional systems.

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.

Crystallization and crystallinity:

Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting point.

Nature and structure of polymers - Structure Property relationships.

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.

Glass transition temperature (Tg) and determination of Tg, Free volume theory, WLF equation, Factors affecting glass transition temperature (Tg).

Polymer Solution – Criteria for polymer solubility, Solubility parameter, Thermodynamics of polymer solutions, entropy, enthalpy, and free energy change of mixing of polymers olutions, Flory-Huggins theory, Lower and Upper critical solution temperatures.

Properties of Polymers (Physical, thermal, Flow & Mechanical Properties).

Brief introduction to preparation, structure, properties and application of the following polymers: polyolefins, polystyrene and styrene copolymers, poly(vinyl chloride) and related polymers, poly(vinyl acetate) and related polymers, acrylic polymers, fluoro polymers, polyamides and related polymers. Phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, silicone polymers, polydienes, Polycarbonates, Conducting Polymers, [polyacetylene, polyaniline, poly(p-phenylene sulphide polypyrrole, polythiophene)].

Suggested Readings:

- Seymour, R.B. & Carraher, C.E. *Polymer Chemistry: An Introduction,* Marcel Dekker, Inc. New York, 1981.
- Odian, G. *Principles of Polymerization*, 4th Ed. Wiley, 2004.
- Billmeyer, F.W. *Textbook of Polymer Science*, 2nd Ed. Wiley Interscience, 1971.
- Ghosh, P. *Polymer Science & Technology*, Tata McGraw-Hill Education, 1991.
- Lenz, R.W. *Organic Chemistry of Synthetic High Polymers.* Interscience Publishers, New York, 1967.

DSE1P: Polymer Chemistry (Lab) **Credits 02**

Practical:

1. **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-isobutylonitrile (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 proplylidine (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 weight by end group analysis: Polyethylene glycol (PEG)(OH group).
4. Testing of mechanical properties of polymers.
5. 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
4. DSC analysis of polymers
5. Preparation of polyacrylamide and its electrophoresis

*at least 7 experiments to be carried out.

Suggested Readings:

- M.P. Stevens, *Polymer Chemistry: An Introduction*, 3rd Ed., Oxford University Press, 1999.
- H.R. Allcock, F.W. Lampe & J.E. Mark, *Contemporary Polymer Chemistry*, 3rd ed. Prentice-Hall (2003)
- F.W. Billmeyer, *Textbook of Polymer Science*, 3rd ed. Wiley-Interscience (1984)
- J.R. Fried, *Polymer Science and Technology*, 2nd ed. Prentice-Hall (2003)
- P. Munk & T.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)
- M.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).

Or

DSE-1: Instrumental Methods of Chemical Analysis Credits 06

DSE1T: Instrumental Methods of Chemical Analysis Credits 04

Course Contents:

Introduction to spectroscopic methods of analysis:

Recap of the spectroscopic methods covered in detail in the core chemistry syllabus: Treatment of analytical data, including error analysis. Classification of analytical methods and the types of instrumental methods. Consideration of electromagnetic radiation.

Molecular spectroscopy:

Infrared spectroscopy:

Interactions with molecules: absorption and scattering. Means of excitation (light sources), separation of spectrum (wavelength dispersion, time resolution), detection of the signal (heat, differential detection), interpretation of spectrum (qualitative, mixtures, resolution),advantages of Fourier Transform (FTIR). Samples and results expected. Applications: Issues of quality assurance and quality control, Special problems for portable instrumentation and rapid detection.

UV-Visible/ Near IR – emission, absorption, fluorescence and photoaccoustic. Excitation sources (lasers, time resolution), wavelength dispersion (gratings, prisms, interference filters, laser, placement of sample relative to dispersion, resolution), Detection of signal (photocells, photomultipliers, diode arrays, sensitivity and S/N), Single and Double Beam instruments, Interpretation (quantification, mixtures, absorption vs. fluorescence and the use of time, photoaccoustic, fluorescent tags).

Separation techniques

Chromatography: Gas chromatography, liquid chromatography, supercritical fluids, Importance of column technology (packing, capillaries), Separation based on increasing number of factors (volatility, solubility, interactions with stationary phase, size, electrical field), Detection: simple vs. specific (gas and liquid), Detection as a means of further analysis (use of tags and coupling to IR and MS), Electrophoresis (plates and capillary) and use with DNA analysis. Immunoassays and DNA techniques

Mass spectroscopy: Making the gaseous molecule into an ion (electron impact, chemical ionization), Making liquids and solids into ions (electrospray, electrical discharge, laser desorption, fast atom bombardment), Separation of ions on basis of mass to charge ratio, Magnetic, Time of flight, Electric quadrupole. Resolution, time and multiple separations, Detection and interpretation (how this is linked to excitation).

Elemental analysis:

Mass spectrometry (electrical discharges).
Atomic spectroscopy: Atomic absorption, Atomic emission, and Atomic fluorescence. Excitation and getting sample into gas phase (flames, electrical discharges, plasmas), Wavelength separation and resolution (dependence on technique), Detection of radiation (simultaneous/scanning, signal noise), Interpretation (errors due to molecular and ionic species, matrix effects, other interferences).

NMR spectroscopy: **P**rinciple, Instrumentation, Factors affecting chemical shift, Spin coupling, Applications.

Electro analytical Methods: Potentiometry & Voltammetry

Radiochemical Methods.

X-ray analysis and electron spectroscopy (surface analysis).

Suggested Readings:

- Skoog, D.A. Holler F.J. & Nieman, T.A. *Principles of Instrumental Analysis*, Cengage Learning India Ed.
- Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. *Instrumental Methods of Analysis*, 7th Ed. Wadsworth Publishing Company Ltd., Belmont, California, USA, 1988.
- P.W. Atkins: Physical Chemistry.
- G.W. Castellan: Physical Chemistry.
- C.N. Banwell: Fundamentals of Molecular Spectroscopy.
- Brian Smith: Infrared Spectral Interpretations: A Systematic Approach.
- W.J. Moore: Physical Chemistry.

DSE1P: Instrumental Methods of Chemical Analysis (Lab) Credits 02

Practical:

1. Safety Practices in the Chemistry Laboratory
2. Determination of the isoelectric pH of a protein.
3. Titration curve of an amino acid.
4. Determination of the void volume of a gel filtration column.
5. Determination of a Mixture of Cobalt and Nickel (UV/Vis spec.)
6. Study of Electronic Transitions in Organic Molecules (i.e., acetone in water)
7. IR Absorption Spectra (Study of Aldehydes and Ketones)
8. Determination of Calcium, Iron, and Copper in Food by Atomic Absorption
9. Quantitative Analysis of Mixtures by Gas Chromatography (i.e., chloroform and carbon tetrachloride)
10. Separation of Carbohydrates by HPLC
11. Determination of Caffeine in Beverages by HPLC
12. Potentiometric Titration of a Chloride-Iodide Mixture
13. Cyclic Voltammetry of the Ferrocyanide/Ferricyanide Couple
14. Nuclear Magnetic Resonance
15. Use of fluorescence to do “presumptive tests” to identify blood or other body fluids.
16. Use of “presumptive tests” for anthrax or cocaine
17. Collection, preservation, and control of blood evidence being used for DNA testing
18. Use of capillary electrophoresis with laser fluorescence detection for nuclear DNA (Y chromosome only or multiple chromosomes)
19. Use of sequencing for the analysis of mitochondrial DNA
20. Laboratory analysis to confirm anthrax or cocaine
21. Detection in the field and confirmation in the laboratory of flammable accelerants or explosives
22. Detection of illegal drugs or steroids in athletes
23. Detection of pollutants or illegal dumping
24. Fibre analysis

At least 10 experiments to be performed.

Suggested Readings:

- Skoog, D.A. Holler F.J. & Nieman, T.A. *Principles of Instrumental Analysis*, Cengage Learning India Ed.

- Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. *Instrumental Methods of Analysis*, 7th Ed. Wadsworth Publishing Company Ltd., Belmont, California, USA, 1988.

Or

DSE-1: Organometallics, Bioinorganic Chemistry, Polynuclear hydrocarbons and UV, IR Spectroscopy

Credits 06

DSE1T: Organometallics, Bioinorganic Chemistry, Polynuclear hydrocarbons and UV, IR Spectroscopy **Credits 04**

Course Contents:

Section A: Inorganic Chemistry-4

Chemistry of 3d metals

Oxidation states displayed by Cr, Fe, Co, Ni and Co. 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 $[Co(NH_3)_6]Cl_3$, $Na_3[Co(NO_2)_6]$.

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. AN rule as applied to carbonyls. Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals. p-acceptor behaviour of carbon monoxide. Synergic effects (VB approach)-(MO diagram of CO can be referred to for synergic effect to IR frequencies).

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).

Section B: Organic Chemistry - 4

Polynuclear and heteronuclear aromatic compounds:

Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Naphthalene, Anthracene , Furan, Pyrrole, Thiophene, and Pyridine.

Active methylene compounds:

Preparation: Claisen ester condensation. Keto-enol tautomerism. *Reactions:* Synthetic uses of ethylacetoacetate (preparation of non-heteromolecules having upto 6 carbon).

Application of Spectroscopy to Simple Organic Molecules

Application of visible, ultraviolet and Infrared spectroscopy in organic molecules. Electromagnetic radiations, electronic transitions, λ_{max} & ε_{max}, chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating l 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).

Suggested Readings:

- 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.

DSE-1P: Practical **Credits 02**

Practical:

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+}, $A1^{3+}$ and Cr^{3+} or Paper chromatographic separation of Ni^{2+}, Co^{2+}, Mn^{2+} and Zn^{2+}
2. Preparation of any two of the following complexes and measurement of their conductivity:
   (i) tetraamminecarbonatocobalt (III) nitrate
   (ii) tetraamminecopper (II) sulphate
   (iii) potassium trioxalatoferrate (III) trihydrate

Compare the conductance of the complexes with that of M/1000 solution of NaCl, $MgCl_2$ and

$LiCl_3$.

Section B: Organic Chemistry

Systematic Qualitative Organic Analysis of Organic Compounds possessing monofunctional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of one derivative.

Suggested Readings:

- A.I. Vogel: Qualitative Inorganic Analysis, Prentice Hall, 7th Edn.
- A.I. Vogel: Quantitative Chemical Analysis, Prentice Hall, 6th Edn.
- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.

DSE-2: Applications of computers in chemistry Credits 06

DSE2T: Applications of computers in chemistry Credits 04

Course Contents:

Basics:

Constants, variables, bits, bytes, binary and ASCII formats, arithmetic expressions, hierarchy of operations, inbuilt functions. Elements of the BASIC language. BASIC keywords and commands. Logical and relative operators. Strings and graphics. Compiled versus interpreted languages. Debugging. Simple programs using these concepts. Matrix addition and multiplication. Statistical analysis.

Numerical methods:

Roots of equations: Numerical methods for roots of equations: Quadratic formula, iterative method, Newton-Raphson method, Binary bisection and Regula-Falsi. *Differential calculus:* Numerical differentiation. *Integral calculus:* Numerical integration (Trapezoidal and Simpson's rule), probability distributions and mean values. *Simultaneous equations:* Matrix manipulation: addition, multiplication. Gauss-Siedal method. *Interpolation, extrapolation and curve fitting:* Handling of experimental data. *Conceptual background of molecular modelling:* Potential energy surfaces. Elementary idea of molecular mechanics and practical MO methods.

Suggested Readings:

- Harris, D. C. *Quantitative Chemical Analysis*. 6th Ed., Freeman (2007) Chapters 3-5.
- Levie, R. de, *How to use Excel in analytical chemistry and in general scientific data analysis*, Cambridge Univ. Press (2001) 487 pages.
- Noggle, J. H. *Physical chemistry on a Microcomputer*. Little Brown & Co. (1985).
- Venit, S.M. *Programming in BASIC: Problem solving with structure and style.* Jaico Publishing House: Delhi (1996).

DSE1P: Applications of computers in chemistry (Lab) **Credits 02**

Computer programs based on numerical methods for

1. Roots of equations: (e.g. volume of *van der Waals* gas and comparison with ideal gas, pH of a weak acid).
2. Numerical differentiation (e.g., change in pressure for small change in volume of a van der Waals gas, potentiometric titrations).
3. Numerical integration (e.g. entropy/ enthalpy change from heat capacity data), probability distributions (gas kinetic theory) and mean values.
4. Matrix operations. Application of Gauss-Siedel method in colourimetry.
5. Simple exercises using molecular visualization software.

Suggested Readings:

- McQuarrie, D. A. *Mathematics for Physical Chemistry* University Science Books (2008).
- Mortimer, R. *Mathematics for Physical Chemistry*. 3rd Ed. Elsevier (2005).
- Steiner, E. *The Chemical Maths Book* Oxford University Press (1996).
- Yates, P. *Chemical Calculations.* 2nd Ed. CRC Press (2007).
- Harris, D. C. *Quantitative Chemical Analysis*. 6th Ed., Freeman (2007) Chapters 3-5.
- Levie, R. de, *How to use Excel in analytical chemistry and in general scientific data analysis*, Cambridge Univ. Press (2001) 487 pages.
- Noggle, J. H. *Physical Chemistry on a Microcomputer.* Little Brown & Co. (1985).
- Venit, S.M. *Programming in BASIC: Problem solving with structure and style.* Jaico Publishing House: Delhi (1996).

Or

DSE-2: Green Chemistry **Credits 06**

DSE2T: Green Chemistry **Credits 04**

Course Contents:

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

Principles of Green Chemistry and Designing a Chemical synthesis

Twelve principles of Green Chemistry with their explanations and examples and special emphasis on the following:

- 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. Risk = (function) hazard × exposure; waste or pollution prevention hierarchy.

- Green solvents – supercritical fluids, water as a solvent for organic reactions, ionic liquids, fluorous biphasic solvent, PEG, solvent less processes, immobilized solvents and how to compare greenness of solvents.
- 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 don't 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.

Green Synthesis/ Reactions and some real world cases:

1. Green Synthesis of the following compounds: adipic acid, catechol, disodium iminodiacetate (alternative to Strecker synthesis)
2. 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
3. Ultrasound assisted reactions: sonochemical Simmons-Smith Reaction (Ultrasonic alternative to iodine)
4 Surfactants for carbon dioxide – replacing smog producing and ozone depleting solvents with CO_2 for precision cleaning and dry cleaning of garments.
5 Designing of Environmentally safe marine antifoulant.
6 Rightfit pigment: synthetic azopigments to replace toxic organic and inorganic pigments.
7 n efficient, green synthesis of a compostable and widely applicable plastic (poly lactic acid) made from corn.
8 Healthier fats and oil by Green Chemistry: Enzymatic interesterification for production of no Trans-Fats and Oils
9 Development of Fully Recyclable Carpet: Cradle to Cradle Carpeting

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 (C_2S_3); Green chemistry in sustainable development.

Suggested Readings:

- Ahluwalia, V.K. & Kidwai, M.R. *New Trends in Green Chemistry*, Anamalaya Publishers (2005).
- Anastas, P.T. & Warner, J.K.: *Green Chemistry - Theory and Practical*, Oxford University Press (1998).
- Matlack, A.S. *Introduction to Green Chemistry*, Marcel Dekker (2001).
- Cann, M.C. & Connely, M.E. *Real-World cases in Green Chemistry*, American Chemical Society, Washington (2000).

- Ryan, M.A. & Tinnesand, M. *Introduction to Green Chemistry*, American Chemical Society, Washington (2002).
- Lancaster, M. *Green Chemistry: An Introductory Text* RSC Publishing, 2nd Edition, 2010.

DSE2P: Green Chemistry (Lab) **Credits 02**

Practical:

1. Safer starting materials

Preparation and characterization of nanoparticles of gold using tea leaves.

2. Using renewable resources

Preparation of biodiesel from vegetable/ waste cooking 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 + OH^- → propene + trimethylpropene + water
  (II) 1-propanol $\xrightarrow{H_2SO_4/\Delta}$ propane + water

- 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

Extraction of D-limonene from orange peel using liquid CO_2 prepared form dry ice.

Mechanochemical solvent free synthesis of azomethines

6. Alternative sources of energy

- Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).
- Photoreduction of benzophenone to benzopinacol in the presence of sunlight.

Suggested Readings:

- 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).
- Lancaster, M. *Green Chemistry: An Introductory Text* RSC Publishing, 2nd Edition, 2010.
- Pavia, D.L., Lampman, G.M., Kriz, G.S. & Engel, R.G. *Introduction to Organic Laboratory Techniques: A Microscale and Macro Scale Approach,* W.B.Saunders, 1995.

Or

DSE-2: Industrial Chemicals and Environment — Credits 06

DSE2T: Industrial Chemicals and Environment — Credits 04

Course Contents:

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, fluorine, sulphur dioxide and phosgene.

Inorganic Chemicals: Manufacture, application, analysis and hazards in handling the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, borax, bleaching powder, sodium thiosulphate, hydrogen peroxide, potash alum, chrome alum, potassium dichromate and potassium permanganate.

Industrial Metallurgy

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, Ti, Fe, Cu, Ni, Zn): electrolytic, oxidative refining, Kroll process, Parting process, van Arkel-de Boer process and Mond's process. Preparation of metals (ferrous and nonferrous) and ultrapure metals for semiconductor technology.

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, H_2S and other foul smelling gases. Methods of estimation of CO, NO_x, SO_x 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. Control of particulates.

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: lectroplating, textile, tannery, dairy, petroleum and petrochemicals, agro, fertilizer, etc. Sludge disposal. Industrial waste management, incineration of waste. Water treatment and purification (reverse osmosis, electro dialysis, ion exchange). Water quality parameters for waste water, industrial water and domestic water.

Energy & Environment

Sources of energy: Coal, petrol and natural gas. Nuclear Fusion / Fission, Solar energy, Hydrogen, geothermal, Tidal and Hydel, etc.
Nuclear Pollution: Disposal of nuclear waste, nuclear disaster and its management.

Biocatalysis

Introduction to biocatalysis: Importance in "Green Chemistry" and Chemical Industry.

Suggested Readings:

- 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.
- J. A. Kent: *Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.*
- *S. S. Dara: A Textbook of Engineering Chemistry*, S. Chand & Company Ltd. New Delhi.
- K. 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).

DSE2P: Industrial Chemicals & Environment **Credits 02**

Practical:

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.

Suggested Readings:

- 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.
- J. A. Kent: Riegel's *Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
- S. S. Dara: *A Textbook of Engineering Chemistry*, S. Chand & Company Ltd. New Delhi.
- K. De, *Environmental Chemistry*: New Age International Pvt. Ltd, New Delhi.
- S. M. Khopkar, *Environmental Pollution Analysis*: Wiley Eastern Ltd, New Delhi.

Or

DSE-2: Quantum Chemistry, Spectroscopy & Photochemistry Credits 06

DSE2T: Quantum Chemistry, Spectroscopy & Photochemistry Credits 04

Course Contents:

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; wavefunctions, probability distribution functions, nodal properties, Extension to two and 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. Spherical harmonics. Discussion of solution.

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. Setting up of Schrödinger equation for many-electron atoms (He, Li). Need for approximation methods. Statement of variation theorem and application to simple systems (particle-in-a-box, harmonic oscillator, hydrogen atom).

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 wave functions, detailed solution not required) and their limitations. Refinements of the two approaches (Configuration Interaction for MO, ionic terms in VB). 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.

Molecular Spectroscopy:

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, concept of group frequencies. 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.

Electronic spectroscopy: Franck-Condon principle, electronic transitions, singlet and triplet states, fluorescence and phosphorescence, dissociation and predissociation, calculation of electronic transitions of polyenes using free electron model.

Nuclear Magnetic Resonance (NMR) spectroscopy: Principles of NMR spectroscopy, Larmor precession, chemical shift and low resolution spectra, different scales, spin-spin coupling and high resolution spectra, interpretation of PMR spectra of organic molecules.

Electron Spin Resonance (ESR) spectroscopy: Its principle, hyperfine structure, ESR of simple radicals.

Photochemistry

Characteristics of electromagnetic radiation, Lambert-Beer's 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.

Suggested Readings:

- 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*: *Concepts & Applications*, Cambridge University Press (2015).

DSE2P: Practical **Credits 02**

UV/Visible spectroscopy

I. Study the 200-500 nm absorbance spectra of $KMnO_4$ and $K_2Cr_2O_7$ (in 0.1 M H_2SO_4) and determine the λ_{max} values. Calculate the energies of the two transitions in different units (J molecule^{-1}, kJ mol^{-1} , cm^{-1} , eV).
II. Study the pH-dependence of the UV-Vis spectrum (200-500 nm) of $K_2Cr_2O_7$.
III. Record the 200-350 nm UV spectra of the given compounds (acetone, acetaldehyde, 2-propanol, acetic acid) in water. Comment on the effect of structure on the UV spectra of organic compounds.

Colourimetry

I. Verify Lambert-Beer's law and determine the concentration of $CuSO_4$/$KMnO_4$/$K_2Cr_2O_7$ in a solution of unknown concentration
II. Determine the concentrations of $KMnO_4$ and $K_2Cr_2O_7$ in a mixture.
III. Study the kinetics of iodination of propanone in acidic medium.
IV. Determine the amount of iron present in a sample using 1,10-phenathroline.
V. Determine the dissociation constant of an indicator (phenolphthalein).
VI. Study the kinetics of interaction of crystal violet/ phenolphthalein with sodium hydroxide.
VII. Analyse the given vibration-rotation spectrum of HCl (g)

Suggested Readings:

- Mendham, J. *Vogel's Quantitative Chemical Analysis*, Pearson, 2009.
- 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).

Or

DSE-2: Molecular Modelling & Drug design — Credits 06

DSE2T: Molecular Modelling & Drug design — Credits 04

Course Contents:

Introduction to Molecular Modelling:

Introduction. Useful Concepts in Molecular Modelling: Coordinate Systems. Potential Energy Surfaces. Molecular Graphics. Surfaces. Computer Hardware and Software. The Molecular Modelling Literature.

Force Fields:

Fields. Bond Stretching. Angle Bending. Introduction to non-bonded interactions. Electrostatic interactions. *van der Waals* Interactions. Hydrogen bonding in Molecular Mechanics. Force Field Models for the Simulation of Liquid Water.

Energy Minimization and Computer Simulation:

Minimization and related methods for exploring the energy surface. Non-derivative method, First and second order minimization methods. Computer simulation methods. Simple thermodynamic properties and Phase Space. Boundaries. Analyzing the results of a simulation and estimating Errors.

Molecular Dynamics & Monte Carlo Simulation:

Molecular Dynamics Simulation Methods. Molecular Dynamics using simple models. Molecular Dynamics with continuous potentials. Molecular Dynamics at constant temperature and pressure. Metropolis method. Monte Carlo simulation of molecules. Models used in Monte Carlo simulations of polymers.

Structure Prediction and Drug Design:

Structure prediction - Introduction to comparative Modelling. Sequence alignment. Constructing and evaluating a comparative model. Predicting protein structures by 'Threading', Molecular docking. Structure based de novo ligand design, Drug Discovery – Chemo informatics – QSAR.

Suggested Readings:

- Leach, A.R. *Molecular Modelling Principles and Application*, Longman, 2001.
- Haile, J.M. *Molecular Dynamics Simulation Elementary Methods*, John Wiley and Sons, 1997.
- Gupta, S.P. *QSAR and Molecular Modeling*, Springer - Anamaya Publishers, 2008.

DSE2P: Molecular Modelling & Drug design (Lab) Credits 02

Practical:

i. Compare the optimized C-C bond lengths in ethane, ethene, ethyne and benzene. Visualize the molecular orbitals of the ethane σ bonds and ethene, ethyne, benzene and pyridine π bonds.

ii. (a) Perform a conformational analysis of butane.
(b) Determine the enthalpy of isomerization of *cis* and *trans* 2-butene.

iii. Visualize the electron density and electrostatic potential maps for LiH, HF, N_2, NO and CO and comment. Relate to the dipole moments. Animate the vibrations of these molecules.

iv. (a) Relate the charge on the hydrogen atom in hydrogen halides with their acid character.
(b) Compare the basicities of the nitrogen atoms in ammonia, methylamine, dimethylamine and trimethylamine.

v. (a) Compare the shapes of the molecules: 1-butanol, 2-butanol, 2-methyl-1-propanol, and 2-methyl-2-propanol. Note the dipole moment of each molecule.
(b) Show how the shapes affect the trend in boiling points: (118 ºC, 100 ºC, 108 ºC, 82 ºC, respectively).

vi. Build and minimize organic compounds of your choice containing the following functional groups. Note the dipole moment of each compound:
(a) alkyl halide (b) aldehyde (c) ketone (d) amine (e) ether (f) nitrile (g) thiol (h) carboxylic acid (i) ester (j) amide.

vii. (a) Determine the heat of hydration of ethylene.
(b) Compute the resonance energy of benzene by comparison of its enthalpy of hydrogenation with that of cyclohexene.

viii. Arrange 1-hexene, 2-methyl-2-pentene, (*E*)-3-methyl-2-pentene, (*Z*)-3-methyl-2-pentene, and 2,3-dimethyl-2-butene in order of increasing stability.

ix. (a) Compare the optimized bond angles H_2O, H_2S, H_2Se.
(b) Compare the HAH bond angles for the second row dihydrides and compare with the results from qualitative MO theory.

Note: Software: ChemSketch, ArgusLab (www.planaria-software.com), TINKER 6.2 (dasher.wustl.edu/ffe), WebLab Viewer, Hyperchem, or any similar software.

Suggested Readings:

- Leach, A.R. *Molecular Modelling Principles and Application*, Longman, 2001.
- Haile, J.M. *Molecular Dynamics Simulation Elementary Methods*, John Wiley and Sons, 1997.
- Gupta, S.P. *QSAR and Molecular Modeling*, Springer - Anamaya Publishers, 2008.

Skill Enhancement Course (SEC)

SEC-1: Basic Analytical Chemistry — Credits 02

SEC1T: Basic Analytical Chemistry — Credits 01

Course Contents:

Introduction: Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling. Importance of accuracy, precision and sources of error in analytical measurements. Presentation of experimental data and results, from the point of view of significant figures.

Analysis of soil: Composition of soil, Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents, use of indicators.

Analysis of water: Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods.

Analysis of food products: Nutritional value of foods, idea about food processing and food preservations and adulteration.

Chromatography: Definition, general introduction on principles of chromatography, paper chromatography, TLC etc.

Ion-exchange: Column, ion-exchange chromatography etc. Determination of ion exchange capacity of anion / cation exchange resin (using batch procedure if use of column is not feasible).

Analysis of cosmetics: Major and minor constituents and their function.

SEC1P: Practical — Credits 01

A:

1. Determination of pH of soil samples.

2. Estimation of Calcium and Magnesium ions as Calcium carbonate by complexometric titration.
3. Determination of pH, acidity and alkalinity of a water sample.
4. Determination of dissolved oxygen (DO) of a water sample.
5. Identification of adulterants in some common food items like coffee powder, asafoetida,chilli powder, turmeric powder, coriander powder and pulses, etc.
6. Analysis of preservatives and colouring matter.
7. Paper chromatographic separation of mixture of metal ion (Fe^{3+} and Al^{3+}).
8. To compare paint samples by TLC method.
9. Determination of ion exchange capacity of anion / cation exchange resin (using batch procedure if use of column is not feasible).
10. Analysis of deodorants and antiperspirants, Al, Zn, boric acid, chloride, sulphate.
11. Determination of constituents of talcum powder: Magnesium oxide, Calcium oxide, Zinc oxide and Calcium carbonate by complexometric titration.

B:

Suggested Applications (Any one):

1. To study the use of phenolphthalein in trap cases.
2. To analyze arson accelerants.
3. To carry out analysis of gasoline.

C:

Suggested Instrumental demonstrations:

1. Estimation of macro nutrients: Potassium, Calcium, Magnesium in soil samples by flame photometry.
2. Spectrophotometric determination of Iron in Vitamin / Dietary Tablets.
3. Spectrophotometric Identification and Determination of Caffeine and Benzoic Acid in Soft Drink.

Suggested Readings:

- Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. *Instrumental Methods of Analysis*. 7th Ed. Wadsworth Publishing Co. Ltd., Belmont, California, USA.
- Skoog, D.A. Holler F.J. & Nieman, T.A. *Principles of Instrumental Analysis*, Cengage Learning India Ed.
- Skoog, D.A.; West, D.M. & Holler, F.J. *Fundamentals of Analytical Chemistry 6th Ed.*, Saunders College Publishing, Fort Worth.
- Harris, D. C. *Quantitative Chemical Analysis*, W. H. Freeman.
- Dean, J. A. *Analytical Chemistry Notebook*, McGraw Hill.
- Day, R. A. & Underwood, A. L. *Quantitative Analysis*, Prentice Hall of India.
- Freifelder, D. *Physical Biochemistry 2nd Ed.*, W.H. Freeman and Co., N.Y. USA.
- Cooper, T.G. *The Tools of Biochemistry*, John Wiley and Sons, N.Y. USA.
- Vogel, A. I. *Vogel's Qualitative Inorganic Analysis 7th Ed.*, Prentice Hall.
- Vogel, A. I. Vogel's *Quantitative Chemical Analysis 6th Ed.*, Prentice Hall.
- Robinson, J.W. *Undergraduate Instrumental Analysis 5th Ed.*, Marcel Dekker, Inc., New York.

Or

SEC-1: Chemo informatics Credits 02

SEC1T: Chemo informatics

Course Contents:

Introduction to Chemo informatics:

History and evolution of chemo informatics, Use of chemo informatics, Prospects of chemo informatics, Molecular Modelling and Structure elucidation.

Representation of molecules and chemical reactions:

Nomenclature, Different types of notations, SMILES coding, Matrix representations, Structure of Molfiles and Sdfiles, Libraries and toolkits, Different electronic effects, Reaction classification.

Searching chemical structures:
Full structure search, sub-structure search, basic ideas, similarity search, three dimensional search methods, basics of computation of physical and chemical data and structure descriptors, data visualization.

Applications:

Prediction of Properties of Compounds; Linear Free Energy Relations; Quantitative Structure-Property Relations; Descriptor Analysis; Model Building; Modeling Toxicity; Structure-Spectra correlations; Prediction of NMR, IR and Mass spectra; Computer Assisted Structure elucidations; Computer Assisted Synthesis Design, Introduction to drug design; Target Identification and Validation; Lead Finding and Optimization; Analysis of HTS data; Virtual Screening; Design of Combinatorial Libraries; Ligand-Based and Structure Based Drug design; Application of Chemoinformatics in Drug Design.

Suggested Readings:

- Andrew R. Leach & Valerie, J. Gillet (2007) *An introduction to Chemoinformatics.* Springer: The Netherlands.
- Gasteiger, J. & Engel, T. (2003) *Chemoinformatics: A text-book.* Wiley-VCH.
- Gupta, S. P. (2011) *QSAR & Molecular Modeling.* Anamaya Pub.: New Delhi.

SEC-2: Intellectual Property Rights (IPR) Credits 02

SEC2T: Intellectual Property Rights (IPR)

Course Contents:

Introduction to Intellectual Property: Historical Perspective, Different Types of IP, Importance of protecting IP.

Copyrights: Introduction, How to obtain, Differences from Patents.

Trade Marks: Introduction, How to obtain, Different types of marks – Collective marks, certification marks, service marks, Trade names, etc. Differences from Designs.

Patents: Historical Perspective, Basic and associated right, WIPO, PCT system, Traditional Knowledge, Patents and Healthcare – balancing promoting innovation with public health, Software patents and their importance for India.

Geographical indications: Definition, rules for registration, prevention of illegal exploitation, importance to India.

Industrial Designs: Definition, How to obtain, features, International design registration.

Layout design of integrated circuits: Circuit Boards, Integrated Chips, Importance for electronic industry.

Trade Secrets: Introduction and Historical Perspectives, Scope of Protection, Risks involved and legal aspects of Trade Secret Protection.

Different International agreements

(a) Word Trade Organization (WTO):

(i) General Agreement on Tariffs & Trade (GATT), Trade Related Intellectual Property Rights (TRIPS) agreement
(ii) General Agreement on Trade related Services (GATS)
(iii) Madrid Protocol
(iv) Berne Convention
(v) Budapest Treaty

(b) Paris Convention

WIPO and **TRIPS, IPR** and Plant Breeders Rights, IPR and Biodiversity

IP Infringement issue and enforcement – Role of Judiciary, Role of law enforcement agencies – Police, Customs etc. Economic Value of Intellectual Property – Intangible assets and their valuation, Intellectual Property in the Indian Context – Various laws in India Licensing and technology transfer.

Suggested Readings:

- N.K. Acharya: *Textbook on intellectual property rights*, Asia Law House .
- Manjula Guru & M.B. Rao, *Understanding Trips: Managing Knowledge in Developing Countries*, Sage Publications.
- P. Ganguli, Intellectual Property Rights: *Unleashing the Knowledge Economy*, Tata McGraw-Hill.
- Arthur Raphael Miller, Micheal H.Davis; *Intellectual Property: Patents, Trademarks and Copyright in a Nutshell*, West Group Publishers (2000).
- Jayashree Watal, *Intellectual property rights in the WTO and developing countries*, Oxford University Press, Oxford.

Or

SEC-2: Analytical Clinical Biochemistry Credits 02

SEC2T: Analytical Clinical Biochemistry Credits 01

Course Contents:

Basic understanding of the structures, properties and functions of carbohydrates, lipids and proteins:

Review of concepts studied in the core course:

Carbohydrates: Biological importance of carbohydrates, Metabolism, Cellular currency of energy (ATP), Glycolysis, Alcoholic and Lactic acid fermentations, Krebs cycle. Isolation and characterization of polysachharides.

Proteins: Classification, biological importance; Primary and secondary and tertiary structures of proteins: α-helix and β- pleated sheets, Isolation, characterization, denaturation of proteins.

Enzymes: Nomenclature, Characteristics (mention of Ribozymes), Classification; Active site, Mechanism of enzyme action, Stereospecificity of enzymes, Coenzymes and cofactors, Enzyme inhibitors, Introduction to Biocatalysis: Importance in "Green Chemistry" and Chemical Industry.

Lipids: Classification. Biological importance of triglycerides and phosphoglycerides and cholesterol; Lipid membrane, Liposomes and their biological functions and underlying applications. Lipoproteins.

Hormone : Properties, functions and biochemical functions of steroid hormones. Biochemistry of peptide hormones.

Structure of DNA (Watson-Crick model) and RNA, Genetic Code, Biological roles of DNA and RNA: Replication, Transcription and Translation, Introduction to Gene therapy.

Enzymes: Nomenclature, classification, effect of pH, temperature on enzyme activity, enzyme inhibition.

Biochemistry of disease: A diagnostic approach by blood/ urine analysis.

Blood: Composition and functions of blood, blood coagulation. Blood collection and preservation of samples. Anaemia, Regulation, estimation and interpretation of data for blood sugar, urea, creatinine, cholesterol and bilirubin.
Urine: Collection and preservation of samples. Formation of urine. Composition an estimation of constituents of normal and pathological urine.

SEC2P: Practical Credit 01

Practical
Identification and estimation of the following:

1. Carbohydrates – qualitative and quantitative.

2. Lipids – qualitative.
3. Determination of the iodine number of oil.
4. Determination of the saponification number of oil.
5. Determination of cholesterol using Liebermann- Burchard reaction.
6. Proteins – qualitative.
7. Isolation of protein.
8. Determination of protein by the Biuret reaction.
9. Determination of nucleic acids

Suggested Readings:

- T.G. Cooper: Tool of Biochemistry.
- Keith Wilson and John Walker: Practical Biochemistry.
- Alan H Gowenlock: Varley's Practical Clinical Biochemistry.
- Thomas M. Devlin: Textbook of Biochemistry.
- Berg, J.M., Tymoczko, J.L. & Stryer, L. *Biochemistry*, W.H. Freeman, 2002.
- Talwar, G.P. & Srivastava, M. *Textbook of Biochemistry and Human Biology*, 3rd Ed. PHI Learning.
- Nelson, D. L. & Cox, M. M. *Lehninger's Principles of Biochemistry 7th Ed.*, W. H. Freeman.
- Mikes, O. *Laboratory Hand Book of Chromatographic & Allied Methods*, Elles Harwood Series on Analytical Chemistry, John Wiley & Sons, 1979.

SEC-3: Pharmaceutical Chemistry — Credits 02

SEC3T: Pharmaceutical Chemistry — Credits 01

Course Contents:

Drugs & Pharmaceuticals:

Drug discovery, design and development; Basic Retrosynthetic approach. Synthesis of the representative drugs of the following classes: analgesics agents, antipyretic agents, antiinflammatory agents (Aspirin, paracetamol, lbuprofen); antibiotics (Chloramphenicol); antibacterial and antifungal agents (Sulphonamides; Sulphanethoxazol, Sulphacetamide, Trimethoprim); antiviral agents (Acyclovir), Central Nervous System agents (Phenobarbital, Diazepam),Cardiovascular (Glyceryl trinitrate), antilaprosy (Dapsone), HIV-AIDS related drugs (AZT- Zidovudine).

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.

SEC3P: Practical — Credit 01

Practical:

1. Preparation of Aspirin and its analysis.
2. Preparation of magnesium bisilicate (Antacid).

Suggested Readings:

- 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.

Or

SEC-3: Chemistry of Cosmetics & Perfumes — Credits 02

SEC3T: Chemistry of Cosmetics & Perfumes — Credits 01

Course Contents:

A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, suntan lotions, face powder, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours. Essential oils and their importance in cosmetic industries with reference to Eugenol, Geraniol, sandalwood oil, eucalyptus, rose oil, 2-phenyl ethyl alcohol, Jasmone, Civetone, Muscone.

SEC3P: Practical — Credit 01

1. Preparation of talcum powder.
2. Preparation of shampoo.
3. Preparation of enamels.
4. Preparation of hair remover.
5. Preparation of face cream.
6. Preparation of nail polish and nail polish remover.

Suggested Readings:

- E. Stocchi: *Industrial Chemistry*, Vol -I, Ellis Horwood Ltd. UK.
- P.C. Jain, M. Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.
- Sharma, B.K. & Gaur, H. *Industrial Chemistry,* Goel Publishing House, Meerut (1996).

SEC-4: Pesticide Chemistry — Credits 02

SEC4T: Pesticide Chemistry — Credits 01

Course Contents:

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).

SEC4P: Practical **Credit 01**

1 To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications.
2 Preparation of simple organophosphates, phosphonates and thiophosphates

Suggested Readings:

- Cremlyn, R. *Pesticides. Preparation and Modes of Action*, John Wiley & Sons, New York, 1978.

Or

SEC- 4: Fuel Chemistry Credits 02

SEC4T: Fuel Chemistry

Course Contents:

Introduction: 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. 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.

Suggested Readings:

- Stocchi, E. *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK (1990).
- Jain, P.C. & Jain, M. *Engineering Chemistry* Dhanpat Rai & Sons, Delhi.
- Sharma, B.K. & Gaur, H. *Industrial Chemistry*, Goel Publishing House, Meerut (1996).

VIDYASAGAR UNIVERSITY

PHYSIOLOGY

(Honours & General)

Under Graduate Syllabus

(3 Tier Examination Pattern)

w.e.f. 2014-2015

REVISED

Vidyasagar University

Midnapore 721 102

West Bengal

PHYSIOLOGY

(HONOURS)

PART-I
(One year course)

Paper- I (Theory): 100 Marks.

Unit- 01: 50 Marks	**Lectures**
i) Cell Biology and Structural Units of Human Systems	20
ii) Tissue Organization and Basic Anatomy of Human Body	10
iii) Biophysical and Biochemical Principles	15
iv) Blood and Body Fluids.	30

Unit-02: 50 Marks

i) Chemistry of Bio-molecules	30
ii) Enzymology	25
iii) Techniques in Studying Physiology	20

Paper II (Theory): 100 Marks

Unit-03: 50 Marks

i) Nerve-Muscle Physiology	35
ii) Cardio-Vascular Physiology and Circulation	40

Unit-04: 50 Marks

i) Respiratory System	30
ii) Digestive System	25
iii) Renal Physiology	20

PART-II

(One year course)

Paper-III (Theory): 100 Marks	**Lectures**
Unit-05: 50 Marks	
i) Nervous System	45
ii) Skin and Body Temperature Regulation	15
iii) Pharmacological Physiology	15
Unit 06: 50 Marks	
i) Sensory Physiology	45
ii) Work Physiology, Sports Physiology and Ergonomics	30

Paper-IV (Theory): 100 Marks	**Lectures**
Unit-07: 50 Marks	
i) Metabolism of Bio-molecules	30
ii) Nutrition and Dietetics	25
iii) Social Physiology and Community Health	20
Unit-08: 50 Marks	
i) Microbiology	25
ii) Immunology	35
iii) Environmental Physiology	15

Paper -V (Practical): Full Marks 100	**Distribution of Marks**
A. Histology	45
i) Staining and examination of fresh tissues	10
ii) Staining and identification of supplied paraffin sections	15
iii) Identification of stained permanent slides	10
iv) Haematology	10

B. Biochemistry	35
i) Qualitative identification (one sample)	10
ii) Quantitative analysis	10
iii) Analytical biochemistry	15
C. Laboratory Note Books	10
D. Viva-Voce	10

PART-III
(One year course)

Paper-VI (Theory) 100 Marks — **Lectures**

Unit-09: 50 Marks

i) The Endocrine System and Chronobiology	40
ii) Reproductive Physiology	25
iii) Embryology	10

Unit-10: 50 Marks

i) Genetics and Molecular Biology	30
ii) Applied Biotechnology	25
iii) Bio-Statistics and Concept of Computer	20

Paper-VII (Practical): 100 Marks — **Distribution of Marks**

A. Experimental Physiology	15
B. Human Experiment and Anthropometric Measurements	20
C. Computer Application	10
D. Project Work / Field Survey (Preparation 15 + Viva-Voce 10)	25
E. Educational Excursion	10
F. Laboratory Note Books	10
G. Viva-Voce	10

Paper-VIII (Practical): 100 Marks

A. Environmental Physiology	10
B. Microbiology	10
C. Clinical Physiology	10
D. Blood Biochemistry	20
E. Biostatistics	10
F. Biotechnology	10
G. Diet Survey	10
H. Laboratory Note Books	10
I. Viva-Voce	10

PHYSIOLOGY
(HONOURS)

PART-I

(One year course)

PAPER-I

UNIT - 01: **50 Marks**

i) Cell Biology and Structural Units of Human Systems:

Electron microscopic structure and functions of the organelles of eukaryotic cells: Structure of plasma membrane - Bio-chemical components, their arrangement, membrane asymmetry and fluidity; Functions; Fluid mosaic model. Membrane transport: active and carrier mediated transport; Mechanism of exocytosis and endocytosis. Structure functions and control of ion channels. Artificial membrane: liposome and its functions. Endoplasmic reticulum: EM structure and functions (Molecular basis) of smooth and rough ER. Microsomes: basic functional aspects. Golgi complex: structure, its storage and processing functions (Molecular basis). Lysosomes and its functions. EM structure and functions of nucleus. Peroxisomes and its function. Mitochondria: EM structure and its functions. EM structure of nucleus-structure of nuclear membrane and nucleolus. Ribosomes – cytoribosomes and mitoribosomes; their structure and functions. Cytoskeleton: structure and its role in stabilization of cell shape. Microtubules and their role in cellular movements and secretions. Events of Cell cycle; Cell differentiation; Gap junction, Tight junction (structure and functions); Cell adhesion molecule (brief).

(20 lectures)

ii) Tissue Organization and Basic Anatomy of Human Body:

Structure, classification, distribution and functions of different tissues. Organization of different organs and systems of the human body. **(10 lectures)**

iii) Biophysical and Biochemical Principles:

Law of mass action, orders of reactions, properties of water. Significance and physiological application of the following phenomena: diffusion, osmosis, dialysis,

surface tension, viscosity, adsorption, absorption. Colloids: properties and significances, sol and gel, lyophilic and lyophobic sol, electrokinetic properties; Isoelectric pH and isoelectric precipitation. Gibbs-Donnan membrane equilibrium and its biological importance. Acids and bases as proton donors and acceptors. Conjugate acid-base pairs; pH: definition, explanation, determination and significance; Buffers: definition, types; functions of buffers. Role of kidney, erythrocyte and lungs for maintaining body pH. Indicators and its applications. First and second laws of thermodynamis, closed and open system, living body as a thermodynamic system, entropy, enthalpy, maintenance of physiological steady state. Gibbs concept of free energy. **(15 lectures)**

iv) Blood and Body Fluids:

Basic idea of intracellular and extracellular compartments of body fluid. Water: intake and excretion. Volumes of body water in different compartments and their estimation. Water balance and its regulation. Dehydration and oedema.

Composition and function of Blood. Plasma proteins: Classification, normal value, origin and functions, Plasmapheresis. Erythrocytes: Morphology, fate and functions; Steps of erythropoiesis, role of different factors on erythropoiesis. Hemoglobin: chemistry, biosynthesis, functions, catabolism; derivatives like oxyhemoglobin, methemoglobin, carboxyhemoglobin and hemin. Abnormal hemoglobin: thalassemia, sickle cell anemia. Normal value and clinical significane of ESR, TC, DC, PCV, MCH, MCHC, MCV. Anemia: megaloblastic and microcytic, pernicious, aplastic, hypo-chromic. Polycythemia. Blood groups: ABO system; Rh-antigens, blood transfusion and its hazards. Blood group incompatibility- erythoblastosis fetalis. Leucocytes: Morphology, classification, life cycles, functions. Significance of Arneth count, Schilling index, reticulocyte count. Platelet- Morphology, life cycles, functions. Significance of platelet count. Haemostasis Coagulation factors, mechanism of blood coagulation:, disorders of coagulation; anticoagulants (natural and artificial) and their mode of action, coagulation time, bleeding time, prothrombin time, hemolysis.

Blood volume: Normal values, determination by dye method and isotope method and factors influencing blood volume. Regulation of blood volume.

Lymph and tissue fluid: Anatomical organization of lymphatic system. Formation, composition, circulation, functions and fate of lymph and tissue fluid. **(30 lectures)**

UNIT - 02: **50 Marks**

i) Chemistry of Bio-molecules:

Carbohydrates: Definition and classification.

Monosaccharides - Classification, structure, stereoisomerism, optical isomerism, optical activity, epimerism. Cyclic structures - Pyranose and furanose forms, anomerism, mutarotation and its mechanism. Chemical reactions of monosaccharides (Glucose & Fructose) - Reactions with concentrated mineral acids, alkali, phenylhydrazine and their biochemical importance. Derivatives of monosaccharides: Amino sugars, deoxy sugars, sugar alcohols, sugar acids, sugar esters, their biochemical and physiological importance.

Disaccharides - Maltose, Lactose and Sucrose: Occurrence, Structure, bio-chemical properties and Physiological importance.

Polysaccharides - Starch, Glycogen, Dextrin, Cellulose, Glycosaminoglycans, Glycoproteins, Sialic acids, Lectins, Blood group polysaccharides.

Lipids: Definition and classification. Fatty acids: Classification, systemic nomenclature and structure. Mono, Di- and Triglycerides. Properties of Fat and Fatty acids -Hydrolysis, Saponification, Saponification number, Iodine number. Acetylation - Acetyl number. Hydrogenation, Rancidity - Acid number, Reichert-Meissl number. Cis-trans isomerism. Eicosanoids, Phospholipids, Glycolipids, Sphingolipids, Cholesterol & its ester - their structure and physiological importance. Lipoproteins - Structure, classification and physiological importance.

Amino acids and Proteins:

Amino acids: Classification, Structure, Nomenclature and Optical properties. Protonic equilibrium of amino acids - amphoteric nature, Zwitterions, Isoelectric point, titration curve of amino acids. Reactions with ninhydrin and formaldehyde.

Peptides and Proteins: Structure and properties of peptide bonds - Phi and Psi angles. Reactions with Sanger's and Edman's reagent. Biuret reaction. Different levels of protein structure - Primary, Secondary (α-helix and β- pleated sheet), Tertiary and Quarternary. Forces stabilizing the structures (Covalent bonds, Ionic and hydrogen bonds, Van-der-Waals forces and hydrophobic interactions). Denaturation and Renaturation reactions.

Purine and Pyrimidine: Structure, nomenclature and tautomerism.

Nucleic acids: Nucleosides and Nucleotides - structure. Polynucleotides. DNA double helix - Primary, Secondary and Tertiary structure. A-DNA, B-DNA and Z-DNA. RNA - Structure and types. Denaturation and annealing of DNA. Hyperchromicity, melting temperature and half $C_o t$ value. **(30 lectures)**

ii) **Enzymology** –

Definition, chemical nature, classification and nomenclature. Mechanism of enzyme action - active site, specificity and enzyme-substrate complex formation. Enzyme kinetics: Hyperbolic kinetics and linear transformation (Lineweaver-Burk Plot; *Eisenthal Cornish-Bowden Plot*). Michaelis - Menten constant. Effect of temperature, pH and metal ions on enzyme activity. Allosteric enzyme- Definition, properties, and types; Sigmoid kinetics. Regulation of enzyme activity - Allosteric modulation; Feedback and feed forward regulations; Covalent modification; Inhibition: Reversible- competitive, non-competitive and uncompetitive inhibition; Irreversible inhibition. Coenzyme and prosthetic groups; Activation of pro enzymes. Isoenzymes. Rate limiting enzymes. Ribozymes, Abzymes, Antizymes, Synzymes. Fundamental ideas about immobilized enzyme. Enzymes in clinical diagnosis (amylase, acid and alkaline phosphatase, SGOT, SGPT, LDH and CPK). **(25 lectures)**

iii) Techniques in Studying Physiology:

Basic principle and use of light, phase contrast, electron microscopy, atomic force microscopy and fluorescence microscopy. Spectrophotometer. Principle of chromatography, ion exchange, gel filtratiom, GLC, TLC and immune-affmity chromatography. Electrophoresis: SDS-PAGE and agarose gel. Cell fractionation: Homogenization and ultrasonication, Ultracentrifugation, Differential and density gradient centrifugation for separation of cell fractions. Radio activity - use of radio isotopes in physiological studies.

Principle and uses of biomedical instruments - USG, Endoscopy, X-ray, MRI, CT-scan, Hemodialysis, Artificial pacemaker. **(20 lectures)**

PAPER-II

UNIT - 03: **50 Marks**

i) Nerve-Muscle Physiology:

Histo-anatomical structures of striated, smooth and cardiac muscles. Properties of muscles: Excitability and contractility, all or none law, summation of stimuli and contractions, genesis of tetanus, onset of fatigue, refractory period, tonicity, conductivity, extensibility and elasticity. Muscle proteins and Sarcotubular system of Human Skeletal and Cardiac Muscle. Mechanism of skeletal muscle contraction and relaxation. Isometric and isotonic contractions. Red and white muscles. Fast and slow twitch muscle fibers. Muscle length, Tension and Velocity relationships of skeletal muscle. Muscle groups: antagonists and agonists. Mechanical, chemical, thermal and electrical changes in striated muscle during contraction and relaxation. Motor unit and motor point. EM structure of Neuromuscular junctions, Neuro-Muscular transmission of impulse, end-plate potential. Electromyography. Single and multi-unit smooth muscle and mechanism of smooth muscle contraction and relaxation. Factors affecting smooth muscle contraction.

The resting membrane potential and its origin. The Action Potential - components and its ionic basis. Compound action potentials. Concept of Chronaxie and Rheobase. Saltatory

conduction. Myelinated and Unmyelinated nerve fibers and process of Myelinogenesis. Propagation of nerve impulse in different types of nerve fibers. Conduction velocity of nerve impulse in relation to myelination and diameter of nerve fibers. Properties of nerve fibers: Excitability, Conductivity, All-or-none law, Accommodation, Adaptation, Summation, Refractory period, Indefatigability. Synapses: Types and EM Structure-Function. Mechanism of Synaptic Transmission of the impulse, Synaptic Potentials (EPSP, IPSP) and neurotransmitters. Structure and distribution of accetylcholine and adrenaline receptors. Injury to peripheral nerves- Degeneration and Regeneration of peripheral nerve fibers: Changes in the nerve cell body, reaction of degeneration and mechanism of regeneration. Effect of different Neurotrophins on nerve growth.

(35 lectures)

ii) Cardio-Vascular Physiology and Circulation:

Basic properties of cardiac muscle: rhythmicity, refractory period, all or none law, and stair case phenomenon. Transmembrane potential, pacemaker potential and electro-physiology of cardiac tissue. Specialized junctional tissue of the heart and origin and propagation of cardiac impulse. Understanding of cardiac muscle as mechanical, electrical and functional syncytium. Heart block and basic idea about artificial pacemaker. Electrocardiography- Origin and significance of different components of normal ECG; Different types of ECG leads; Einthoven triangle. Principle of Echo-cardiography. Cardiac valves: Location and functions. Heart rate and its regulation. Cardiac cycle: Different phases and pressure changes in cardiac chambers. Frank – Starling's law of heart. Heart sounds: Their origin and significance. Cardiac output: Definition, normal values and factors regulating it, Determination by Fick method, dye dilution method and isotope method. Nerve supply of the heart and its role in the regulation of the function of the heart.

Blood pressure: Definition, normal values and factors regulating it, systolic, diastolic, mean arterial and pulse pressure. Measurement of blood pressure by sphygmomanometer - principle, method. Central pulse and peripheral pulse and their patterns. Venous pulse, Regulation of blood pressure: Innervations of blood vessels and vasomotor control, vasomotor reflex; role of baroreceptors and chemoreceptors, neural and humoral control. Role of renin-angiotensin system. Vasopressin or ADH in BP regulation. Anatomical

organization, peculiarities and significance of coronary, pulmonary, cerebral, cutaneous, hepatic and renal circulation. **(40 lectures)**

UNIT-04: **50 Marks**

i) Respiratory System:

Basic concepts about respiratory tract, histology of lungs, respiratory muscles and their innervations. Mechanism of respiration and the role of different respiratory and accessory muscles. Compliance, elasticity and elastic recoil of the lung. Role of lung surfactants. Intra-thoracic and intra-pleural pressures. Tidal volume, inspiratory and expiratory reserve volumes, residual volume, vital capacity, functional residual capacity, maximum breathing capacity. Partial pressures and percentage of respiratory gases in inspired, expired, alveolar airs and in blood. Respiratory gases and their exchange between the lung alveoli and blood and between the blood and the tissues. Transport of O_2 and CO_2 in blood. O_2 dissociation curve, CO_2 dissociation curve and factors affecting. Modern concept of regulation of respiration: Role of respiratory centers, central and peripheral chemoreceptors. Respiratory failure, artificial respiration and its different techniques (mouth to mouth, tank respirator method). Hypoxia, asphyxia, dyspnea, asthma, cardiac and bronchial emphysema, cyanosis, dysbarism, coughing and sneezing. Lung function tests. Non respiratory functions of lung - Airway defence, Immune system defence and biosynthetic functions. **(30 lectures)**

ii) Digestive System:

Histology and functions of digestive organs - tongue, pharynx, esophagus, stomach, small intestine, large intestine, pancreas, liver, gall bladder and salivary glands. Nerve supply to the alimentary system. Mechanism, functions and regulation of mastication, deglutition, movement of the alimentary canal. Composition, functions, mechanism of secretion and control of saliva, gastric juice, pancreatic juice, bile and intestinal juice. Mechanism and control of gastric HCl secretion. Functions of gall bladder and large intestine. Mechanism and importance of Enterohepatic circulation of bile. Brief idea about gall stones, achlorhydria, hyperchlorhydria, peptic ulcer, Pavlov's pouch, defecation reflex, vomiting reflex. **(25 lectures)**

iii) Renal Physiology:

Gross structure of kidney. Microanatomy (including electron microscopy) of a nephron and structural differences between cortical and Juxtamedullary nephrons. Juxtaglomerular apparatus. Mechanism of urine formation: Concept of ultrafiltration, glomerular filtration rate, reabsorption by passive and active tubular transport. Concept of counter current system, countercurrent multiplier, exchanger and mechanism of concentrated urine formation. Non-excretory functions of kidney. Normal and abnormal constituents of urine and their clinical significance. Concept of renal threshold. Renal function tests (inulin, urea clearance tests). Renal stone formation. Dialysis and artificial kidney. Innervations of urinary bladder and micturition, micturition reflexes and its regulation by higher centers. **(20 lectures)**

PART-II
(One- year course)

PAPER-III

UNIT-05: **50 Marks**

i) The Nervous System:

Organization: A brief outline of the organization and basic functions of the nervous system – central and peripheral. Structural organization of the different parts of brain and spinal cord. Receptors: Definition, Structure, Classification, Mode of action. Role of blockers and stimulators (Drugs included in pharmacology). Reflex action: Definition, classification, properties. Structure and functions of the spinal cord with special reference to functional changes after hemi section and complete section of spinal cord, Brown-Sequard syndrome. Ascending and descending tract: Origin, courses, termination and functions. Lower motor neuron and upper motor neuron. Structure and function of vestibular apparatus. Postural reflexes, Muscle spindle, muscle tone and its regulation. Decerebrate and decorticate rigidity. Structure, connections and functions of cerebellum. Nuclei, connections and functions of thalamus and hypothalamus. Basal ganglia: structure, connections and functions. Cerebral cortex: histological structure, connections and functions. Organization of limbic system and its functions. Emotion. Origin and components of EEG. Physiological basis of different types of sleep. Sleep-wakefulness cycle. Higher functions of nervous system: memory, conditioning and learning. Speech and aphasias. Physiology of pain. CSF: formation, circulation and functions.

Autonomic nervous system: Organization, outflow, ganglia, centers and functions. Chemical transmission in autonomic nervous system; Nicotinic and muscarnic acetyl choline receptors, alpha and beta adreno-receptors and their agonists and antagonists. Central control of autonomic nervous system for regulation of internal body homeostasis.

(45 lectures)

ii) Skin and Body Temperature Regulation:

Histological structure of skin. Organization of sweat gland. Composition and functions of sweat. Regulation of sweat secretion. Insensible and sensible perspiration. Composition and functions of sebum. Triple response.

Normal body temperature. Channels of heat loss and heat gain process of heat production and heat loss. Regulation of body temperature: higher centers and mechanism of regulation. Hypothermia and hyperthermia. Physiological basis of fever. **(15 lectures)**

iii) Pharmacological Physiology:

The importance of pharmacology in the study of physiological processes. Drugs, Agonist, Antagonist. Pharmacokinetics- absorption, distribution, excretion and bioavailability of drugs. Pharmacodynamics-Drug biotransformation and mechanism of drug action (elementary idea). The dose effect relationship and the characteristics of dose response curve. Assessment of drug toxicity - LD50 and ED50. Drugs affecting synaptic and neuro-effector functional sites – Chemistry, systemic effects and mechanism of action of phenoxybenzamine, phentolamine and propranolol. Drugs affecting catecholamine and cholinergic neuro-transmission – guanethidine, reserpine, physostigmine and isoflurophate. Neuromuscular blocking agents-tubocurarine, succinyl choline, nicotine. Sedative- hypnotics: Barbiturates- actions on organ systems and mechanism of action. Narcotic analgesics: Pharmacological properties and mechanism of action. Antihistamine: Pharmacological properties. Diuretics: Effects on renal functions and mechanism of action of benzothiadiazides. **(15 lectures)**

UNIT-06: 50 Marks

i) Sensory Physiology:

Classification of general and special senses and their receptors. Muller's law of specific nerve energies. Weber-Fechner law. Mechanism of transduction of stimuli from sensory receptors. Adaptation of receptors-phasic and tonic adaptations.

General Sense: Classification, distribution, function and neural pathway of touch, pressure, pain, thermal and kinesthetic sensation.

Olfaction and Gustation: Structure and functions of the receptor organs, nerve pathways, centers. Physiology of taste and smell. Olfactometer.

Audition: Sound waves, decibel, structure and functional significance of auditory apparatus – external, middle and internal ears. Structure of organ of corti. Mechanism of hearing and its modern theories. Discrimination of sound frequency and loudness. Auditory pathway and centers.

Vision: Anatomy and structures of the eyeball. The structures of lens. Errors of refraction and their corrections. Contact Lens. Pupillary reflexes, light reflex, near response. Argyll Robertson pupil. Histological details of retina. Photopic and Scotopic vision. Chemical and electrical changes in retina on exposure to light. Visual Pathway and effects of lesion. Colour visions and its modem concept. Colour blindness. Electroretinogram. Visual field, Perimetry. Visual acuity and its measurement. Factors affecting Visual Acuity. Binocular vision and depth perception. **(45 lectures)**

ii) Work Physiology, Sports Physiology and Ergonomics:

Physical work-definition and units of measurements. Concepts and classification of physiological work-static, dynamic, positive, negative and isokinetic work. Difference between work and sports. Energetics of work - source of energy- aerobic and anaerobic metabolism. Cardiovascular and respiratory responses during graded work. Aerobic and anaerobic capacity. Maximal aerobic power, factors affecting and methods of measurement. Concept of excess post-exercise oxygen consumption. Concept of fatigue. Tests for physical work capacity - Measurement with bicycle ergometer, tread mill and Harvard step test. Basic concepts of Sports Psychology, Role of sports in emotion and social factors.

Elementry idea of ergogenic aids. Physical training - general principles and different methods. Nutrition in sports - nutrients and calorie requirements for different kinds of sports. Anthropometry – common instruments for anthropometric measurements. Application of anthropometry in nutrition and ergonomics. Basic concepts of ergonomics and its application in industry to increase individual and group productivity. Work-rest cycle. Industrial safety, Occupational hazards – Physical Bio-chemical hazards. Occupational diseases - Silicosis, Asbestosis, Farmer's lung. **(30 lectures)**

PAPER-IV
UNIT-07: 50 Marks

i) Metabolism of Bio-molecules

Digestion and absorption of carbohydrates, lipid, proteins and nucleoproteins.

Carbohydrate Metabolism: Glycolysis, R-L cycle, TCA cycle, Gluconeogenesis, Cori cycle, Glucose-Alanine cycle. Pentose Phosphate Pathway, Glycogenesis and Glycogenolysis. Inborn errors of metabolism of glycogen, galactose.

Biological Oxidation: Concept of substrate-level phosphorylation and oxidative phosphorylation, Redox Potential and redox couple. Mitochondrial Electron Transport Chain and its components. Mechanism of electron transport and ATP synthesis. Oxidative Phosphorylation, Inhibitors and uncouplers.

Lipid Mechanism: β-oxidation of saturated fatty acids (Palmitic acids), ω and α oxidation. Biosynthesis of saturated fatty acid (C_{16}). Formation and sphingomyelin. Brief concept of cholesterol biosynthesis and its physiological significance. Metabolism of adipose tissue. Role of lipoproteins in transport and storage of lipids.

Amino Acids Metabolism: Glucogenic and ketogenic amino acids and amino acid pool. Non protein nitrogen. Trans-amination, oxidative and non-oxidative deaminations. Ammonotelic, ureotelic and uricotelic organisms. Metabolism of glycine, sulphur containing amino acids, tryptophan and tyrosine, Synthesis of specialized products from amino acids (viz., catecholamines, creatine phosphate, nicotinamide, histamine, serotonin and melatonin, melanin, gamma-aminobutyrate, taurine and glutathione). Inborn errors of metabolism of trytophan, phenylalanine and tyrosine. One carbon metabolism, labile methyl group and transmethylation. Synthesis of Urea and Nitric oxide.

Reactive Oxygen Species: Formation of Reactive Oxygen Species and the role of Catalase, Superoxide Dismutase, Glutathione Peroxidase and Glutathione Reductase in combating oxidative stress. Role of vitamins as antioxidants.

Purine & Pyrimidine Metabolism: Purines and Pyrimidines: Biosynthesis - de novo and salvage pathways. Catabolism (Regulation of the above mentioned biochemical pathways/cycle not required).

Mineral metabolism: Sodium, potassium, chloride, calcium and phosphorus metabolism. Trace elements (iron, iodine, fluorine, selenium) - their functions and deficiencies. **(30 lectures)**

ii) Nutrition & Dietetics:

Basic concept: Nutrition, Nutrients, Nutraceutical, Cosmoceutical, Nutrigenomics.

Nutritional Evaluation of Carbohydrates: Glycemic Index (GI), Classification of dietary fibers with potential of health benefit, Resistance starch as prebiotics-Fructo - oligosaccharide, Galacto-oligosaccharide, soy - oligosaccharide, Nutritive value of major carbohydrates like rice, wheat, roots, tubers, leafy vegetables, red-yellow vegetables and fruits.

Nutritional Evaluation of Proteins: Essential and Non essential amino acids, Protein Efficiency ratio (PER), nitrogen balance, Net protein utilization (NPU), Biological value of protein, protein spares, Nutritive value of protein food stuffs like pulses, egg, fish, meat, milk, soybeans.

Nutritional Evaluation of Fats: essential fatty acids, saturated and unsaturated fatty acids, Dietary requirement of fat, Non-glyceride edible oil, Nutritive value of fat food stuffs like egg, fish, milk, edible oils, and nuts.

Vitamins: Water soluble vitamins (Vit-B complex, Vit-C, Folic acid) and fat soluble vitamins (Vit-A, D, E and K): source, brief chemistry, dietary requirements, functions, deficiency, hyper-vitaminosis, and antioxidant.

Energy in Human Nutrition: Basic concept of energy and units, calorific and physiological fuel value, respiratory quotient (RQ), Total energy expenditure (TEE), Basal metabolic rates (BMR) and Resting energy expenditure (REE), Specific dynamic action (SDA), physical activity ratio (PAR), Determination of BMR by Benedict Roth apparatus and WHO/ICMR prediction equation, Factors affecting BMR, Adult

consumption unit (ACU), determination of energy requirements of Indians in different age groups by doubly labeled water (DLW) method and prediction equation method.

Formulation of Diet chart: Basic principle of diet chart. ICMR specified food groups (Five Group Plans, Nine Group Plan and 11-Group Plan), Food guide pyramid. Formulation of balance diet chart for vegetarian and non vegetarian, infant, growing child, sedentary adults, moderate working adults, college students, pregnant and lactating mothers and athletes in low and moderate socio economic status.

Space Nutrition: change of body composition, energy recommendation for space flights, space food system, types of space foods. **(25 lectures)**

iii) Social Physiology and Community Health:

Basic Concept: Demography, Society and Community. Factors affecting Community Health, Direct and Indirect Nutritional Assessment of Human Individual and Community (Steps- Diet History, Nutritional Anthropometry, Dietary Survey, Clinical Examinations, Biochemical and Radiological assessment, Mortality rates, and Morbidity rates).

Nutritional Problem in Community: Malnutrition, Undernutrition, Kwashiorkor, Marasmus, Marasmic Rickets, Osteomalacia, Xeropthalmia, BeriBeri, Pellagra, Nutritional Anemia, Dental Caries, Endemic Goiter. Nutritional Deficiencies in pregnancy and remedial measures. Dietary Management for coronary heart disease, Diabetes mellitus. Diets of Renal Disorders, Obesity and Cancer.

Causes, pathogenesis and Preventions of Some Communicable Diseases: cholera, measles, pox, tuberculosis, malaria, HIV and poliomyelitis. Composition, functions and uses of ORS.

National Nutrition Related Health Programmes: Vit. A Prophylaxis Programme, Anemia Prophylaxis Programme, ICDS, Mid Day Meal Programme. Human Breast milk Composition, its requirement and benefits. Colostrum. **(20 lectures)**

UNIT-08: 50 Marks

i) Microbiology:

Organization of prokaryotic cell. Classification of bacteria on the basis of morphology, staining characteristics, biochemical tests and 16S rRNA test for identification. Nutritional requirements of bacteria, nutritional types, culture media. Sterilization - types, principles and importance. Pasteurization and its application. Concept of pure culture and different methods of pure culture technique. Bacterial growth curve and physical conditions for growth, Bacterial metabolism: fermentation (ethanol, lactic acid, acetic acid), glyoxylate cycle, Entner-Doudoroff pathway, phosphoketolase pathway. Bacterial genetics: elementary idea of transformation, conjugation and transduction. Control of bacterial growth: concept of antiseptics, disinfectants, antibiotics, probiotics and prebiotics. Elementary idea of bacteriostatic, bactericidal and bacteriolytic agents. Food microbiology – Brief ideas about food spoilage (fish, meat, milk, vegetables) and its prevention. Industrial Microbiology: Elementary knowledge for production of fermented products like alcohol, glutamic acid, penicillin and milk products (cheese, dahi). Environmental Microbiology: Role of microbes in Bio-geo chemical cycle (brief). Elementary knowledge of fungus, algae, protozoa, and virus. **(25 lectures)**

ii) Immunology:

Overview of Immune System - properties of immune system; types of immunity: innate immunity, acquired immunity, active and passive immunity. First and second line defence.

Immuno-competent Cells- Structure and functions of Neutrophil, B-lymphocytes, T-lymphocytes (helper, cytotoxic and suppressor), Natural killer cells, monocytes-macrophages. Primary and secondary lymphoid organs.

Antigen-Antibody: Properties of immunogen, antigens and haptens. Classification, structure and functions of immunoglobqlins (IgG, IgM, IgA, IgD, IgE). Antigen antibody interaction, their physiological effects and clinical applications.

Major Histocompatibility Complex: Elementary ideas about Human leucocyte antigens. Self, Non-self. Antigen processing and presentation with MHC (Class I and II).

Biology of B-lymphocyte: Elementary idea of B-Cell receptors (IgM, Igα/Igβ , CD 19, Cr2/CD21) and activation (in brief).

Biology of T-lymphocyte: Elementary idea of T-Cell receptors (TCR, CD28/l52, CD40L) and. activation of T-cell (in brief):

Humoral immunity: Primary and secondary immune responses. Mechanisms of humoral immunity- Cooperation of T cells B cells and macrophages for the production of specific antibody. Role of cytokines in humoral immunity. Antibody diversity (in brief).

Cytokines: Types and functions.

Complements: Classification, components, activation of pathways (classical, alternative and lectin) and functions.

Cell mediated immunity: Generation and activation CTLs; Effector molecules and mechanism of cytolytic effects. NK cells and their mechanism of killing. Antibody dependent cell mediated cytotoxicity.

Innate immunity: Mechanical barrier against pathogenic organism, Physiological barrier-antibacterial and antifungal substances in external body secretions, bactericidal action of HCl. Mechanism of chemotaxis, phagocytosis-role of lysozyme and reactive oxygen species. Inflammation: mechanism and effects of inflammation. Role of cytokines in inflammatory response. Toll like receptor (in brief)

Hypersensitivity reactions: Mechanism of different types of hypersensitivity reactions and their physiological effects.

Transplantation immunology: Types of graft; Immunological basis of graft rejection; mechanism involved in graft rejection; clinical manifestation of graft rejection.

Autoimmunity: Immunological features of autoimmune diseases. Mechanism of autoimmune diseases of thyroid, kidney and muscles.

Acquired Immunodeficiency: AIDS, The HIV virus & infection; immunological events associated with HIV infection.

Immunization: Concept about immunization, Immunizing agent- vaccine, antisera, DNA vaccine, edible vaccine. Immunization schedules - National and WHO. Hazards of immunization.

Immunological techniques - Principle of Immunoassay, ELISA, RIA and immunoelectrophoresis. Role ELISA and RIA in Hormone assay. **(35 lectures)**

iii) Environmental Physiology:

Environment- Its physiological aspects. Effects of exposure to hot and cold environment. Acclimatization to hot and cold environment. Heat disorders and their preventive measures. Effects of hypobaric and hyperbaric environment. Mountain sickness. Acclimatization to high altitudes. Preventive measures against hypobaric and hyperbaric effects. Physiological effects and preventive measures against G force, noise, vibration and radiation. Types of pollutants (primary, secondary and tertiary), sources, mechanism of action and effects of metabolic pollutants, neurotoxin, mutagen, carcinogen, teratogens. Heavy metal toxicity (Pb, Hg, Cd, As). Air and water pollutions - sources, effects and control. Brief idea about biotransformation, bioaccumulation, bio-magnification and health hazards of pesticides. Basic concept of population overgrowth and their effects on health. Elementary idea about xenobiotics and their effects.

(15 lectures)

PART-III
(One-year course)
P APER- VI

UNIT -09: 50 Marks

i) Endocrine System and Chronobiology:

Concept & Definition of endocrine systems, glands and hormones. Experimental and clinical methods of study of endocrine glands. General classification of hormones on chemical basis. Concepts of hormone receptors and cell signalling. Mechanisms and Modern Concept of hormone actions: G-protein, Cyclic AMP, cyclic GMP, IP_3-DAG, Ca^{2+}, Tyrosine Kinase, JAK-STAT pathway and nuclear receptor mediated action.

Hypothalamo-hypophysial axis: Feedback regulation, Hypothalamus as a neuroendocrine organ, Releasing Factors, Tropic hormones of hypothalamus. Vascular and neural connections between the hypothalamus and the pituitary, role of median eminence.

Histological structures, functions, and regulation of anterior, middle and posterior lobes of pituitary. Chemistry, modes of action and functions of growth hormone, TSH, ACTH, FSH, LH, Prolactin, MSH, Vasopressin and Oxytocin. Cushing's disease, gigantism, acromegaly, dwarfism, Simmond's diseases, Frolich's syndrome, diabetes insipidus.

Thyroid Gland: Electron microscopic structure of thyroid gland. Thyroid hormone: Chemistry, Biosynthesis, Storage and Transport. Functions of T_4 (Thyroxin) and T3 (Triiodothyronine). Regulation of Thyroid hormone secretion. Cretinism. Myxedema, Grave's disease. Hashimoto's disease, iodine deficiency goiter.

Parathyroid Gland: Histological Structure, Parathyroid hormone: Role in calcium metabolism. Relation of parathyroid hormone with bone formation and bone resorption, fragile bone and aging process, Concept of Vitamin D_3 treatment. Calcitonin: its source, functions and regulation. Hormonal control of calcium homeostasis.

Adrenal Cortex: histological structure, regulation different types of hormones and functions of adrenal cortex, Cushing's syndrome, Addison's disease, Hyperaldosteronism.

Adrenal Medulla: Histological structure, regulation and hormonal function of adrenal medulla. Synthesis and metabolism of catecholamine hormones. Actions of adrenaline and nor-adrenaline on different organs and their effect. Pheochromocytoma.

Pancreas: Histological structure of pancreatic islets. Sources, regulation, modes of action and functions of insulin and glucagon, Type-l and Type-II diabetes mellitus.

Gastrointestinal hormones (Gastrin, Secretin, Cholecystokinin, VIP and GIP)- Physiological functions.

Endocrine Role of the Pineal. ANF and its functions.

Chronobiology: Different types of physiological rhythms- ultradian, circadian, infradian. Different zeitgebers and their relation with circadian rhythm. Biorhythms of LH, FSH, Prolactin, Estrogen, Progesterone, ACTH GH, Cortisol. Light dark cycle and regulation of penial hormone. Neural basis of biological clock and the role of suprachiasrnatic nuclei. Brief idea of jet-lag. **(40 lectures)**

ii) Reproductive Physiology:

Primary and secondary sex organs: Physiology and anatomy, secondary sex characters. Puberty and its control.

Testis: Histological structure of testis, seminiferous tubules and interstitial cells of Leydig. Chemical nature and functions of testosterone. Spermatogenesis, Spermiogenesis and hormonal control of testicular function. Prostate and seminal vesicle.

Ovary: Histological structure of ovary, Graafian follicle and Corpus luteum, chemical nature and functions of Estrogen and Progesterone. Hormonal control of ovarian functions. Menstrual cycles and its hormonal control. Formation, Maturation of Ovum. Physiological Mechanism of Ovulation. Basic concepts of ovarian cysts. Estrous cycle.

Pregnancy: Transport of ovum and sperm in female reproductive tract. Fertilization. Uterine implantation of fertilized ovum. Formation, structure, functions and fate of placenta. Placental hormones. Changes during pregnancy and their hormonal control. Pregnancy tests (immunological). Parturition, Ectopic pregnancy.

Lactation and Mammary Gland: Anatomical and Histological structure of mammary gland. Phases of mammary development and their hormonal control. Hormonal control of lactation and milk ejection reflex. **(25 lectures)**

iii) Embryology

Cleavage, Embryogenesis, morula, blastula, gastrula and blastocyst. Formation of trilaminar germ disc. Development of Alimentary system, Heart and Urogenital system. Fetal circulation and its changes after birth. Basic concept of stem cell biology.

(10 lectures)

UNIT -10: 50 Marks

i) Genetics and Molecular Biology:

Chromosome structure: Concept of nucleosome, molecular organization, chromosomal proteins, the different levels of chromatin organization. Double helical structure and Watson Crick model of DNA. Basic concept of DNA replication: Meselson and Stahl Experiment, DNA Polymerases, Ligases and other regulatory proteins. Brief idea of DNA damage and repair. Structure of different RNA molecules and mechanism of transcription of RNA (prokaryotic). Elementary idea of gene, genetic code, Wobble hypothesis and mechanism of translation (prokaryotic). Elementary idea about regulation of gene expression - operon concept, lac operon, lytic and lysogenic cycle of phage (Brief). Chromosomal aberration and gene mutations (agents and types). Idea about human genome project. Concept of oncogenes, tumour suppressor genes and properties of cancer cells. **(30 lectures)**

ii) Applied Biotechnology:

Elementary idea of genetic engineering: concept of cloning and its significance, isolation of DNA fragment to be cloned, restriction enzymes, vectors, ligation of DNA to the vector, introduction of recombinant DNA into host cell, screening for recombinant cell. Applications of recombinant DNA technology and gene therapy, Basic concepts of Southern, Northern, Western blot techniques and DNA micro-array. Fermentation

technology. Fermentation: types (submerged and solid state), bioreactors and its operation, types of microbes, raw materials and downstream processing. Production of human insulin, interferons, vaccines (hepatitis). Production, application and utility of monoclonal antibodies. Concept of single cell proteins, biofuels, bioremediation, biofilters, biopesticides (BT cotton, Alkaloids of *Azadirachta indica* (neem), Pheromone, Baculovirus), bioplastic, biosensors and biochips. Concept of genetically modified organisms, transgenic goats, cattle and chickens. Bio-safety and Intellectual property rights. Elementary idea about bio-informatics, genomics and proteomics. **(25 lectures)**

iii) Biostatistics and Concept of Computer:

Definition and classification of statistics. Defmition of population, parameter and sample. Sampling methods. Frequency distribution & frequency polygon, histogram, bar-diagram, pie diagram. Mean, median, mode and the methods of their computation, merits, demerits and applications. Variance, standard deviation, standard error of mean and their computation. Normal probability distribution. Students t-distribution. Skewness, Kurtosis, Null-hypothesis, errors of inference, level of significance, two tail and one tail 't' test for significance of difference between sample means. Chi-square test. Linear correlation: product moment correlation coefficient, Spearman's p (rho).

Computer: Basic concepts of software, hardware and types of computer. Computer packages: concept of MS Word, Excel, power point. Concepts of networking and web site, computer virus. **(20 lectures)**

Framing of questions and distribution of marks in each unit of theoretical question papers:

1) Five short answer type questions are to be answered from eight questions of two marks each. **(10 marks)**
2) Four semi-long answer type questions are to be answered from six questions of 5 marks each. **(20 marks)**
3) One long answer type question is to be answered from two questions of 15 marks each which will be subdivided into two components: 8 marks and 7 marks.

PRACTICAL
PAPER – V

A. **Histology: 45 Marks** **(10 marks)**

i) Staining and Examination of fresh tissues:
Squamous, ciliated, columnar epithelium (methylene blue), corneal cell space (silver nitrate), mesentry (silver nitrate), urinary bladder (silver nitrate), node of Ranvier (silver nitrate), adipose tissue (Sudan III or IV), voluntary muscle (methylene blue). Specimens should be taken strictly from Goat / Rat.

ii) Tissue preparation, section cutting, staining and submission of five histological slides duly signed by teacher. **(5 marks)**
Liver, Kidney, intestine, tongue, testis, ovary, lung, spleen, salivary gland, pancreas.

iii) Staining and identification of supplied paraffin sections of mammalian tissues (Eosine and Hematoxylene stain). **(10 marks)**
Liver, kidney, esophagus, duodenum, ileum, large intestine, lungs, spleen lymph node, ovary, testis, salivary glands, thyroid, adrenal, pancreas, spinal cord, cerebellum, cerebrum.

iv) Study and identification of stained sections of different mammalian tissues and organs. **(10 marks)**
Bone, cartilage, trachea, lung, spleen, lymph gland, tongue, esophagus, stomach, duodenum, ileum, jejunum, large intestine, liver, kidney, salivary glands, pancreas, adrenal gland, thyroid gland, testis, ovary, uterus, spinal cord, cerebral cortex, cerebellum, skin, cardiac muscle, skeletal muscle, smooth muscle, artery, vein.

v) Hematology **(10 marks)**

Preparation of hemin crystal. Determination of coagulation time by capillary method. Bleeding time (Dukemethod), Blood grouping, Rh typing. Preparation and staining of human blood film (Leishman); Identification and measurement of WBC. Differential count of WBC, Arneth count, platelet. count, total count of RBC and WBC. Staining of reticulocyte. Estimation of hemoglobin (visual method) and cyanmethaemoglobin

method. Determination of hematocrit value, calculation of red blood cell indices (MCV, MCH and MCHC). Study of bone marrow for identification of megakaryocytes.

B. Biochemistry **(35 Marks)**

i) Qualitative analysis of biochemical molecules: Carbohydrates- Glucose, fructose, maltose/ lactose, sucrose, starch, dextrin. Proteins – Albumin, gelatin, peptone; Others - glycerol, cholesterol, bile salts and pigments, acetone, HCI, lactic acid, urea, uric acid blood. **(One sample - 10 marks)**

ii) Analytical biochemistry **(25 marks)**

Quantitative analysis (l0 marks)

a. Determination of strength of NaOH, HCl and H_2SO_4 by titration against oxalic acid.
b. Preparation of buffer (pH 4 to 10)
c. Quantitative estimation of chloride by Mohr's method, amino nitrogen by formol-titration method.
d. Estimation of free and total acidity in supplied gastric juice.
e. Assay of enzymes and TLC: Determination of optimum pH, temperature, V max and Km value of enzyme (amylase through 3, 5 dinitrosalicylate reagent). Chromatography: Identification of amino acid and sugar through TLC or paper chromatography.
f. Estimation of DNA, RNA and total protein by DPA, Orcinol and Lowry method.

Food stuff analysis (15 marks)

Estimation of lactose and calcium from milk. Determination of total carbohydrate by phenol-sulphuric acid method from cereals. Estimation of free amino acids by ninhydrin method and total protein by quantitative biurette reagent method from pulses. Determination of acid value and iodine number of fat. Estimation of Vit-C from lemon juice.

Identification of food adulterants: starch from milk, dalda from butter, saw dust and colouring agents from spices, saccharine in sugar.

C. Laboratory Note Books: **(10 marks)**

D. Viva-Voce: **(10 marks)**

PAPER- VII

A. Experimental Physiology: 20 Marks

i) Skeletal Muscle: Study and use of kymograph, induction coils, key and tuning fork in Gastrocnemius sciatic preparation. Kymographic recording of isotonic muscle twitch. Effects of temperature, summation and load (after-load) on muscle contraction (Demonstration).

Heart: Kymographic recording of heart beat of toad. Preparation of amphibian Ringer solution. Kymographic recording of perfused heart beat of toad. Study of the effects of acetylcholine and excess calcium ion on perfused heart (Demonstrations).

** Students will be trained to interpret the prepared supplied curve. **(5 marks)**

ii) Small Intestine: Kymographic recording of normal movements of rat's intestine in Dale's apparatus. Effects of anoxia, acetylcholine and adrenaline on normal intestinal movements. **(15 marks)**

B. Human experiments & Anthropometric measurements: 20 Marks

(a) Measurement of arterial blood pressure at rest, after exercise and at different postural conditions by Sphygmomanometer. Harvard step test and determination of physical fitness. Measurement of breathing rate before and after exercise. Determination of VO_2 max by Queen's College method. Study of effect of graded exercise (by Bicycle ergometer/Treadmill) on heart rate. Pneumographic effects of talking, laughing, coughing, exercise, hyperventilation and breath holding. Determination of muscular efficiency by Mosso's ergograph. Spirometric measurement of vital capacity. Determination of hand and foot reaction time. **(10 marks)**

(b) Anthropometric parameters: Weight, stature, eye height, shoulder height, elbow height, bi-acromian breadth, head breadth, head circumference and neck

circumference. Mid upper arm circumference, chest circumference, waist circumference, hip circumference, waist hip ratio, BMI, BSA. **(10 marks)**

C. Computer application: 10 Marks

Operation of MS Word and Excel: Preparation of body text and table by using MS word, Graphical representation of data in pie, bar and line diagram using Microsoft Excel, presentation of study material by using power point.

D. Project / Field study Report: 20 Marks

Performed in a group and maximum 6 students will be in a group.

(Field survey report should be prepared on health related issues). **(Preparation 12+Viva-Voce 8)**

E. Educational Excursion: 10 Marks

A report is to be submitted on the basis of a visit to a Medical college / University / Research Institute. Report should be prepared with proper justification and illustrations. (Report - 06 + Viva-Voce - 04)

F. Laboratory Note Books: 10 Marks

G. Viva-Voce: 10 Marks

PAPER-VIII

A. Environmental Physiology: 10 Marks

i) Measurement of environmental temperature - dry bulb and wet bulb, relative humidity, air velocity.
ii) Determination of O_2, CO_2, BOD and COD. Determination of total alkalinity, Ca, Mg and chlorine in water by titration method,
iii) Measurement of noise by Sound level meter.
iv) Determination of light intensity (at library, laboratory & class room) by lux meter.

B. Microbiology and Biotechnology: 20 Marks

Microbiology: Sterilization, Culture preparation and isolation of bacteria. Biochemical characterization of microorganisms (Biochemical tests – Catalase test, Oxidase test, Fermentation of sugar- Glucose, Lactose, Sucrose, Mannitol, Hydrolysis of Starch, Gelatine, Casein, Citrate and propionate utilization test, Indole production test, Nitrate reduction test, Methyl red test and Voges Proskauer [V. P.] test). Negative staining. Gram staining, Acid-fast staining. Bacterial spore staining. Water portability by MPN method.

Biotechnology: Isolation of DNA (from blood and microbial culture), Isolation of protein, Gel electrophoresis of DNA and protein, Quantification of isolated DNA and protein.

C. Clinical Physiology: 10 Marks

Pregnancy test (slide/strip method), Sperm count, sperm viability test by using eosine-Y, Routine clinical tests of urine. Test for supplied CSF: Globulin (Pandy test), total protein, glucose. Measurement of different waves of ECG, Examination of planter reflex, knee jerk reflex.

D. Blood Biochemistry: 20 Marks

a) Photo-colorimetric estimation of blood constituents:

i) Blood glucose by Nelson-Somogyi method
ii) Blood inorganic phosphate by Fiske - Subbarow method
iii) Serum total protein by Biuret method and determination albumin globulin ratio.
iv) Determination of serum amylase by iodometric method.
v) Serum billirubin by Diazo method.
vi) Serum urea by DAM method.
vii) Blood cholesterol by $FeCl_3$ method
viii) Estimation of acid and alkaline phosphatase, SGOT & SGPT of supplied blood.

E. Biostatistics: 10 Marks

Computation of mean, median, mode, standard deviation, standard error of the mean with physiological data like body temperature, height, weight, heart rate, respiratory rate, blood pressure of human subjects. Student's 't' test and chi-square test for significance of difference between means. Spearman's rank difference correlation coefficient. Chi-square test.

F. Diet Survey: 10 Marks

Nutritional assessment as per ICMR specification (Steps- Introduction, Diet History, Methodology, Dietary Survey, Clinical Examinations, Remarks, Recommendation and Conclusion). Report should be hand written. Each student has to prepare and submit the report preferably on his/her own family.

H. Laboratory Note Books: 10 Marks

I. Viva-Voce: 10 Marks

RECOMMENDED BOOKS FOR PHYSIOLOGY (HONOURS) COURSE

(The latest edition available should be used for all books)

TEXT BOOKS:

1. Text book of Medical Physiology, by A.C. Guyton, John E. Hall, Eleventh edition. Elsevier Saunders.
2. Vander et al's Human Physiology: The Mechanisms of Body Function; 9th Edition Eric P. Widmaier, Hershel Raff, Kevin T. Strang The Mc Graw-Hill Companies.
3. Human Physiology, From Cells to Systems Lauralee Sherwood, Brooks/Cole.
4. Best & Taylor's Physiological Basis of Medical Practice, edited by B.R Brobeck. The William and Wilkins Co.
5. Ganong's Review of Medical Physiology, by Kim E. Barrett et al., Lange Medical Book.
6. Harper's Review of Biochemistry by R K. Murry and others. Lange Medical Book, Prentice-Hall International.
7. Lehninger Principles of Biochemistry, by, D. L. Nelson and M. M. Cox, CBS Publishers Inc.
8. Text book of Biochemistry, by E.S. West, W.R. Todd, H.S. Mason, J.T. Van Bruggen, The Macmillan Company.
9. Biochemistry, by D. Das: Academic Publishers.
10. Biophysics and Biophysical Chemistry, by D .Das, Academic Publishers.
11. Samson Wright's Applied Physiology, edited by C.A. Keele. E. Neil & N. Toets. Oxford University Press.
12. Physiology, by R.M. Berne & M.N. Levy, B.M. Koeppen, B. A. Stanton, Mosby Co.
13. Basic Histology, by L.C. Jungquire, J. Carneiro & J.A Long; Appleton & Lange.

14. Neuroscience Third Edition Edited By D. Purves, G. J. Augustine, D. Fitzpatrick, W. C. Hall, A S.I. Lamantia, J.O. Mcnamara, S. M Williams, Publishers Sinauer Associates, Inc.
15. Histology - A Text and Atlas, by M.H.Ross & E.J.Reith, The Williams and Wilkins Company.
16. Bailey's Text Book of Histology, revised by W.M. Copenhaver; The Williams and Wilkins Company.
17. Human Physiology, by R.F. Schmidt & G. Thews, Springer-Verlag.
18. Core Text Book ofNeuro-Anatomy, by M.B. Carpenter; The Williams and Wilkins Company.
19. The Human Nervous System, by Charles Nobach, Mc Graw Hill Book Co.
20. The Human Nervous System by M.L.Barr & I.A. Kierman, Harper & Row.
21. Essential Immunology, by I.M. Roitt, Blackwell Scientific Publications.
22. Cellular & Molecular Biology, by E. D. P. De Robertis & E. M. F. De Robertis, Lea & Febiger.
23. Principles of Genetics, Sixth edition, D. Peter Snustad, Michael J. Simmons John Wiley & Sons, Inc.
24. Molecular Biology of the Gene, by J.D. Watson. H.H. Nancy & others; Pearson education.
25. Molecular Biology of the Cell, by B. Alberts and others, Garland.
26. Human Physiology, by Rhoades & Pflanzer, Brooks/Cole.
27. Carleton's Histological Techniques, by R.A.B. Drury & E.A. Wallignton, Oxford University Press.
28. Medical physiology W. F. Boron and E. I. Boulpsep, Elsevier Saunders.
29. Handbook of Experimental Physiology and Biochemistry, by P. V. Chadha; Jaypee Brothers Medical Publishers.
30. Kuby Immunology, by R.A. Goldsby. T.J. Kindt and B.A. Osbome. W H. Freeman and Co.
31. Neurobiology. by G.M. Shepherd, Oxford University Press.
32. Biochemistry, by L. Stryer, WH. Freeman and Co.
33. Molecular Cell Biology, by H. Lodish, D. Baltimore & others, Scientific American Book.
34. Genetics: Analysis of Genes and Genomes, by D.L. Hartl and E. W Jones. Jones & Boolen Publishers.

35. Note Books on Practical Biochemistry, Experimental Physiology and Histology. (published by the Physiological Society of India, Kolkata).
36. Willam's Text Book of Endocrinology by J.D. Wilson and D.W. Foster W.B. Saunders of Co.
37. The Kidney-An outline of Normal and Abnormal Functions by H.E. Dewardeper. ELBS
38. Essential Food and Nutrition. by M. Swaminathan. The Bangalore Printing & Publishing Co. Ltd.
39. Medical Embryology by J. Langman, .Williams & Wilkins.
40. Circadian Rhythms and the Human by D.S. Minors and 1M. Wat~rhouse, Wright, PSG.
41. Clinical Gynecologic Endocrinology and Infertility by L, Speroff, R. H. Glass, N. G. Kase, MacMillan.
42. Text book of Medical Physiology by G. K. Pal, P. Pal, Ahuja Pub. House.
43. Essential Medical Physiology Edited by L R. Johnson, Academic Press:
44. Human Anatomy and Physiology by E. Marieb, Pearson Education.
45. Fundamentals of Biochemistry by Jain and Jain, S. Chand and Com.
46. Biochemistry by U. Satyanarayan, Boks and Allied.
47. Lippincott's Illustrated Reviews: Biochemistry by P. C. Champe et al., Lippincott Williams & Wilkins.
48. Biochemistry by Pankaja Naik, Jaypee Brothers.
49. Physiology by J. Bullck et al Lippincott Williams & Wilkins.
50. Text book of Biochemistry by T. M.Devlin, John Wiley Pub.
51. Fundamentals of Biochemistry by Voet, Voet, and Pratt, John Wiley Pub.
52. Cellular and Molecular Immunology A.K. Abbas and A.H. Lichtman, Elsevier Saunders.
53. Under Standing Immunology by Peter Wood, Pearson Education.
54. Text Book of Biochemistry and Physiology by G. P. Talwar and LM. Stivastava, Prentice Hall of India.
55. Chronobiology Edited by J.C. Dunlap, J.J. Loros, P.J. deCoursey, Sinauer Associates Inc. Pub.
56. Text Book of Physiology by G. H. Bell, J. N. Daviclcon and H. Scarborougl, ELBS.
57. Physiology of Respiration by J.H. Comroe, Year Book Medical Publishers.

58. Text Book of Physiology. Vols. I & II by H. D. Patton. A. F. Fuchs, B. Hille. A. M. Scher and R. Sleiner, W B. Saunders Co.
59. Concise Medical Physiology by S.K. Chaudhury, New Central Book Agency.
60. Medical Physiology by A.B.S. Mahapatra, Current Books International.
61. Endocrinology, Vols. I, II and III by La. DeGroot. W.B. Saunders Co.
62. Essentials of Human Embryology by AK. Das Current Books International.
63. Human Embryology by I.B. Singh, MacMillan India Ltd.
64. The Circadian System of Man by R.A Wever, springer- verlag.
65. The Clocks That Time Us by M. C. Moore - Ede and others, Harvard University Press.
66. The Physiological Clock: Circadian Rhythms and Biological Chronometry by E. Bunning, Springer Verlag.
67. Theory and Practice of Histological Techniques by J. D. Bancroft & A Stevens, Churchill Living stone.
68. Practical Biochemistry in Medicine by Srinivas Rao, Academic Publishers.
69. The Physiology of Reproduction, Vots, I & II, by E. Knobil and J.D. Neil, Raven Press.
70. Introduction to Biotechnology by W.J. Thieman and M.A. Palladino, Pearson Education.
71. Microbiology by G. J Tortora, B. R. Funke, C. I. Case, Pearson Education.
72. A Text Book of Basic and Applied Microbiology, K.R. Aneja, P. Jain, R. Aneja New Age Inc. Pub.
73. Brock Biology of Microorganism by M. T. Madigan et al., Prentice Hall Inc.
74. Microbiology by J.L. Slonczewski and J.W. Foster, W.W. Norton.
75. Fundamentals of Biochemistry by A.C. Deb, New Central Book Agency.
76. Biotechnology by R.C. Dubey; S. Chand Pub.
77. Essentials of Molecular Biology by V. Malathi, Pearson Education.
78. Biostatistics by P. Mariappan, Pearson Education.
79. Genetics and Genomics by Waseem Ahmad (Faridi), Pearson Education.
80. Text Book of Preventive and Social Medicine, M. C. Gupta and B. K. Mahajan, Jaypee Brothers.
81. Microbial Physiology, A G. Moat, J. W. Foster, M. P. Spector, John Wiley Pub.
82. Essentials of Medical Pharmacology by K. D. Trip:lthi, Jaypee Brothers.
83. Environmental Pollution by S. S. Purohit and A. K. AgrawaL Agrobios India.

84. Genera and Applied Toxicology, B. BallanTye, T. Marrs, P. Turner, Macmillan Pub.
85. Environmental Toxicants Edited by M Lippmann, John Wiley Pub.
86. Basic and Clinical Endocrinology Edited by F. S. Greenspan and D. G. Gardner, Lange Medical Book.
87. A Text Book Biophysics by R. N. Roy, New Central Book Agency.
88. Handbook of Biomedical Instrumentation by R. S. Khandpur, Tata McGraw-Hill Pub.
89. Cell Biology by C. B. Power, Himalaya Publishing House.
90. Neuroscience, M. F. Bear, B. w. Connors, M. A Paradiso, Lippincott Williams & Wilkins.
91. Genetics by L. H. Hartwell et al., McGraw-Hill Pub.
92. Cell and Molecular Biology by G. Karp, John Wiley Pub.
93. Fundamentals of Biostatistics by V. B. Rastogi, Ane Books.
94. Exercise Physiology by S. K.. Powers, E. T. Howley, McGraw-Hill Pub.
95. The Physiological Basis of Physical Education and Athletics by E.L Fox and D.K. Mathews. Saunders College Publishing.
96. Statistics in Biology and Psychology by D. Das, Academic Publishers.
97. Pesticides by P.K.. Gupta, Interpret.
98. Environmental Chemistry by A.K. De, New Age Inc.
99. Exercise Physiology - Energy, Nutrition and Human Performance by W.D. McArdle. F. Katch and Y.L. Katch. Williams and Wilkins.
100. Essentials of Exercise Physiology by L.G. Shaver, Surjeet Publications.
101. Text Book of Environmental Physiology by C. Edger Folic Jr., Lea and Febiger.
102. The Pharmacological Basis of Therapeutics by LS. Goodman and A. Gihnan. Macmillan Publishing Co.
103. Quintessence of Medical Pharmacology. S.K. Chaudhuri. New Central Book Agency.
104. Pharmacology in Medicine by S.N. Praclhan. R.P. Maickel and S.N. Dutta. S.P. Press International Inc.
105. Microbiology by M.I. Pelczer & Others; Tata McGraw Hill Publishing Co. Ltd.
106. Biomedical Instrumentation & Measurements, by L. Cromwell, Fj. Weibell & E.A. Pfeiffer; Prentice Hall of India Pvt. Ltd.
107. Molecular Biology and Biotechnology by R.A. Meyers, VCH publishers
108. Recombinant DNA and Biotechnology by H. Kreuzer and A. Massey, ASM press.

109. Park's Text Book of Preventive and Social Medicine by K. Park, Banarsidas Bhanot Publishers.
110. Text Book of Work Physiology by P.O. Astrand and K. Rodahl. McGraw-Hill Book Co.
111. Human Factors in Engineering and Design by E.O. McConnick and M. Saunders. Tata McGraw-Hill.
112. Energy Work and Leisure by J.Y.G.A. Durinand, R. Passmore. Heinemann Educational Books.
113. Sports Physiology by E.L. Fox. Saunders College Publishing. Holt-Saunders.
114. The Principles and Practice on-Tuman Physiology by O. G. Edholm and others Academic Press.
115. Pharmacology by M. Das, Books and Allied (P) Ltd:
116. Basic and Clinical Pharmacology by E.G. Katzung, Appleton and Lange Pub.
117. An Introduction to Biological Rhythms by John D. Palmer, Academic Press.
118. Medical Statistics by B.K. Mahajan. Jaypee Brothers, Medical Publishers Pvt. Ltd.
119. Statistical Methods by G. W. Snedeeor and W.G. Cochnin, Oxford & ffiH Publishing Co Pvt. Ltd.
120. A text Book of Practical Physiology, C. L. Ghai, Jaypee Brothers.
121. Modern Human Physiology, B. K. Chakraborty, H. N. Ghosh, and S. N. Sahana, The New Book Stall.
122. Medical Physiology. A. K. Das, Books and Allied (P) Ltd.
123. The elements of Immunology, F. H. Khan, Pearson Education.
124. The world of The Cell, Becker, Pearson Education.
125. Physiology of Sports and Exercise, 1.H. Wilmore, D. L. Costill, W. L. Kenney, Pub. Human Kinetics.
126. Crash Course of Physiology, Shahid and Nunhuck, Mosby Pub.
127. Introduction to Clinical Nutrition by V. Sardesai, CRC Press.
128. Endocrinology by Hadley, Pearson Education.
129. Introduction to Biochemistry and Metabolism by Anandhi, Pearson Education.
130. Modern Experimental Biochemistry by Boyer, Pearson Education.
131. Cell Organization and Function by Shakir Ali, Pearson Education.
132. Fundamentals of Immunology by Sumitha Pearson Education.
133. IPR, Biosafety and Bioethics, Goel and Parashar, Pearson Education.
134. Practical Physiological Chemistry by P.B. Hawk, B.L. Oser, W.H. Summerson, McGraw-Hill Publishing Co.

135. Basic Concept in Immunology, A. Hati, S. Roy, B. Saha, K. Bharati, Allied Book Agency, Kolkata.
136. Nutritive Value of Indian Foods, by C. Gopalan and other, NIN, Hydreabad.
137. Text book of Microbiology, by R. Anantanarayan and C. K. Joyram Paniker, Oriennt Longman.
138. Food Microbiology by W.C Frazier and D.C. Westhoff. Tata McGraw Hill Publisher.
139. Text book of Preventive and Social Medicine by M.C. Gupta and B.K. Mahajan, Jaypee Bothers.
140. Recombinant DNA by J.D. Watson, M. Gilman, J. Witkowski and M. Zoller, Scientific American Books.
141. Biotechnology by S. S. Purohit; Agrobios , India.
142. Lippincott's Illustrated Review of Physiology, by R. R. Preston; Lippincott Williams and Wilkins.
143. Computer in Biology by Prof P.C. Dhara. Academic Publication, Kolkata.
144. Vander's Human Physiology by E.P. Widmaier et al., McGraw Hill Publication.

PHYSIOLOGY
(GENERAL COURSE)

PART-I
(One year course)

PAPER-I (Theory): 100 Marks

Lectures

Unit-01: 50 Marks

i)	Physiology as a science of excellence	01
ii)	Units of human system	06
iii)	Biophysical & Biochemical principles involved in human system	08
iv)	Conservation of matter and energy in human system	
	a) Alimentation	10
	b) Biochemistry & Metabolism	20
	c) Nutrition & Dietetics	10

Unit-02: 50 Marks

i)	Blood & Body Fluids	10
ii)	Cardiovascular System	25
iii)	Respiratory System	12
iv)	Renal Physiology	08

PART-II
(One year course)

Paper-II (Theory): 100 Marks Lectures

Unit-03: 50 Marks

i)	Nerve-Muscle Physiology	17
ii)	Nervous System	
iii)	Skin and Regulation of Body Temperature	

Unit-04: 50 Marks

i)	Sensory Physiology	17
ii)	Endocrine System	28
iii)	Reproductive Physiology	10

Paper- III (Practical): 100 Marks Distribution of Marks

A. Histology	30
B. Biochemistry	20
C. Experimental Physiology	05
D. Human Experiments	15
E. Diet Survey Report	10
F. Excursion	05
G. Laboratory Note Books	10
H. Viva-Voce	10

PART-III

Paper-IV A (Theory): 70 Marks Lectures

1.	Application of Physiology	02
2.	Clinical Biochemistry and Molecular Biology	15
3.	Environmental Physiology	08
4.	Microbiology and Immunology	15
5.	Work and Sports Physiology	10
6.	Biostatistics and Modern Instrumentation (Biomedical) & Basic Concepts of Computer	10
7.	Community Health Management	10

Paper-IVB (Practical): 30 Marks Distribution of Marks

A. Hematological Tests	05
B. Clinical Pathology	10
C. Human Experiments	08
D. Laboratory Note Books	03
E. Viva-Voce	04

PHYSIOLOGY
(General Course)

PART-I
(One year course)

PAPER-I
(University Written Examination - 90 marks, Internal Assessment in College - 10 marks)

Unit-01: 50 Marks

1. Physiology as a science of excellence:

Role of Physiology as a basic science. Scope of physiology in improvement of health, nutrition, family planning, physical performance and in various fields. Role of Physiology in interaction of human and environment. **(1 lecture)**

2. Units of human system:

Structure-function relationship of a cell & different tissues. Cell membrane, cell organelles - structure & function. **(6 lectures)**

3. Biophysical & Biochemical principles involved in human system:

Physical importance of the following processes: diffusion, osmosis, dialysis, ultra-filtration, surface tension, absorption, adsorption. Brief ideas of acid, base, buffer, indicator. pH: definition, significance & maintenance of pH in the body. Colloids: definition, classification, property and physiological importance. Enzyme: definition, classification, factors affecting enzyme action. Mode of enzyme action. Concept of co-enzyme, iso-enzyme, anti-enzyme, Catalyst (in brief). **(8 lectures)**

4. Conservation of matter and energy in human system:

a) Alimentation:

Structure in relation to function of alimentary canal and digestive glands. Composition; function and regulation of secretion of digestive juice including bile. Digestion and absorption of food stuffs. Movements of the stomach & small intestine. **(10 lectures)**

b) Biochemistry & Metabolism:

Chemistry of carbohydrates, lipids, proteins and nucleic acids. Glycolysis, Hexose monophosphate shunt, glycogenesis, glycogenolysis, TCA cycle, gluconeogenesis. Depot fat, fatty acid oxidation, ketone bodies: synthesis & their significance. Deamination, transamination. **(20 lectures)**

Amino acid pool-Fate & functions of amino acids in the body. Formation of urea & its importance. Elementary idea of electron transport chain, oxidative-phosphorylation.

c) Nutrition & Dietetics:

Basic constitution of food & their nutritional significance. Vitamins: definition, classification, function, deficiency symptoms & daily requirements, hyper-vitaminosis. Mineral metabolism: Ca, Fe, P. BMR: definition, factors affecting, determination by Benedict Roth apparatus. RQ: definition, factors affecting, significance. Biological value of proteins, essential & non essential amino acids, N_2 equilibrium, minimum protein requirement. Positive and negative N_2 balance. SDA - definition & importance. **(10 lectures)**

Unit-02: 50 Marks

1. Blood & Body Fluids

Blood - composition, functions. Plasma Proteins: origin, functions, separation. Plasma-pheresis: bone marrow, formed elements of blood - their formation, functions, fate. Hemoglobin: types of compounds & derivatives. Hematocrit value and its

importance. Blood volume determination (dye & radio isotope methods), regulation. Blood coagulation: mechanism, factors affecting, anticoagulation. Disorders of blood coagulation. Lymph & tissue fluid: composition, formation & functions. Blood groups. Blood transfusion & incompatible transfusion. **(10 lectures)**

2. Cardio- Vascular System

a) Heart: Anatomy & histology of heart, properties of cardiac muscle, origin & propagation of cardiac impulse, Events of cardiac cycle, Heart rate, Heart Sound, Heart rate control, Cardiac output: Methods (dye & Fick methods), factors affecting, regulation. ECG - normal waves, different intervals. Myocardial Infarction. Atherosclerosis, thrombosis, hypertension, heart block, cardiac myopathy - a brief idea.

b) Circulation: Structure of arteries, arterioles, capillaries, venules and veins. Pulse - arterial & venous. Blood pressure and its regulation, measurement of blood pressure. Peculiarities of regional circulations: coronary, pulmonary, renal, hepatic, cerebral. **(25 lectures)**

3. Respiratory System

Anatomy & histology of the respiratory passages and organs. Role of respiratory muscles in respiration. Artificial respiration, significance of anatomical and physiological dead space, lung volumes and capacities. Exchange of respiratory gases between lung and vessels, and between tissues. Transport of O_2 and CO_2 in vessels. Regulation of respiration - neural & chemical. Hypoxia, apnea, hypercapnia, orthopnea, cyanosis. Mountain sickness, acclimatization. **(12 lectures)**

4. Renal Physiology

Relationship between structure & function of kidney. Mechanism of the formation of urine. Physiology of urine storage, micturition. Renal regulation of acid-base balance. Normal & abnormal constituents of urine. Non excretory functions of kidney. Renal function tests. **(8 lectures)**

Framing of questions and distribution of marks in each unit of theoretical question papers:

1. Five short answer type questions are to be answered from eight questions of two marks each. (10 marks).
2. Four semi-long answer type questions are to be answered from six questions of 5 marks each (20 marks).
3. One long answer type question is to be answered from two questions of 15 marks each which will be subdivided into two components: 8 marks and 7 marks.

PART-II
(1 year course)

PAPER-II
(University Written Examination - 90 marks, Internal Assessment in College - 10 marks)

Unit-03: 50 Marks

1. Nerve-Muscle Physiology:

Different types of muscles & their structures. Concept of sarcotubular system. Red and white muscles. Mechanism of muscle contraction. Structural, chemical and mechanical changes in skeletal muscle during contraction & relaxation. Isotonic and isometric contraction. Properties of muscle: all or none law, beneficial effect, summation, refractory period, tetanus and fatigue. Single-unit and multi-unit smooth muscle. A brief idea of muscle spindle.

Structure & classification of nerves. Origin & propagation of nerve impulse. Velocity of impulse in different types of nerve fibres. Properties of nerve fibre: all or none law, rheobase, chronaxie, refractory period, indefatiguability. Synapse: structure, classification, mechanism of synaptic transmission. Motor unit, motor point. Neuromuscular junction: structure, mechanism of impulse transmission, end plate potential. A brief overview on neurotransmitter. Degeneration & regeneration of nerve fibre. Myelination. **(17-lectures)**

2. Nervous System:

A brief outline of the organization and functions of nervous system (sensory, motor, association). CNS and PNS (emphasis on the structure of spinal cord and brain stem). Ascending and descending tracts: pyramidal tract and extra pyramidal tracts (in brief). Reflex action: definition, reflex arc, classification, properties. Functions of spinal cord. Outline of functions of brain stem. A brief idea about the structure, connection and function of cerebral cortex: histological structure and localization and function. Basic concept of upper and lower motor neurons. A brief description of the organization of autonomic nervous system (sympathetic and parasympathetic). Functions of ANS. CSF: formation, circulation and functions. **(30 lectures)**

3. Skin & Body Temperature Regulation:

Structure and functions of skin. Sensible and insensible perspiration. Composition and functions of sweat and sebum. Physiology of sweat secretion and regulation. Regulation of body temperature - physical, physiological processes involved in it. Significance of body temperature. Types of Heat stress, Heat stroke and Management.

(8 lectures)

Unit-04: 50 Marks

1. Sensory Physiology:

Classification of general and special senses, and their receptors. Receptors as biological transducers. Muller's law of specific nerve energies. Weber-Fechner law. Concept of receptor adaptation.

a) Olfaction & Gustation: Structure of sensory organs, neural pathway of smell & taste sensation. Chemistry of taste & smell. Mechanism of taste sensation. Olfactory and gustatory adaptation. After taste.

b) Audition: Structure of ear, auditory pathway, organ of Corti, mechanism of hearing, perception of pitch and loudness.

c) Vision: Structure of the eye. Histology of retina, visual pathway, light reflex, chemical changes of retina on exposure to light. Accommodation: mechanism & pathway. Error of refraction & correction. Positive & negative after-image, optical illusion, flicker, light & dark adaptation. Elementary idea of colour vision & colour blindness. **(17 lectures)**

2. Endocrine System:

Anatomy of endocrine system. Classification of hormones. Basic concept of the regulation of hormone actions. Positive and negative feedback mechanisms. Elementary idea of hormone action.

Pituitary: Histological structure, hormones and their functions, hypothalamo-pituitary axis. Hypo and hyper active states of pituitary gland. Neuro-hormones: Vasopressin and oxytocin.

Thyroid: Histological structure, functions of T3, T4, thyrocalcitonin. Hypo- and hyperactive state of thyroid. Goitrogens.

Parathyroid: Histological structure, functions of parathyroid hormone. Parathyroid tetany; Hyperparathyroidism.

Adrenal: Histological structure and functions of medullary hormones. Adrenal cortex: Histological structure and functions of cortical hormones. Hypo and hyperactive states of adrenal cortex.

Pancreas: Histology of islets of Langerhans. Origin and functions of pancreatic hormones. Hormonal regulation of blood glucose/sugar level. Diabetes mellitus.

Local hormones: (Brief idea) - The origin & functions of renin angiotensin system. Prostaglandins. Erythropoietin and melatonin. Elementary idea about gastrointestinal hormones. **(28 lectures)**

3. Reproductive Physiology:

Primary and accessory sex organs, Secondary sex characters. Puberty- A brief idea. Testis: histology, spermatogenesis, Testicular hormones and their functions. Ovary: Histology, oogenesis, ovarian hormones and their functions. Estrous and menstrual cycle, and their hormonal control. Fertilization, implantation. Placenta formation and its function. Placental hormones, maintenance of pregnancy, hormonal factors, parturition. Pregnancy tests. Development of mammary gland and lactation.

(10 lectures)

PRACTICAL
PAPER-III

A. Histology: 30 Marks

i) Hematological Experiments: **(10 marks)**

a) Leishman's staining of human blood film & identification of different blood corpuscles.

b) Preparation of haemin crystals.

c) Estimation of hemoglobin

ii) Fresh tissue experiments: **(10 marks)**

a) Examination & staining of fresh tissue: squamous, ciliated & columnar epithelium, skeletal muscle fibre (Rat/Goat) by Methylene blue stain.

b) Transitional epithelium, mesentery (Rat/Goat) (counter stain by Methylene blue).

c) Staining of adipose tissue by Sudan III or IV.

iii) Identification of permanent slides: **(10 marks)**

Bone, cartilage, lung, trachea, spleen, lymph gland, liver, salivary glands, pancreas, esophagus, stomach, small intestine, large intestine, ovary, adrenal, testis, thyroid, spinal cord, cerebellum, cerebral cortex, kidney, skin, tongue.

iv) Demonstration: Eosin - Haematoxylene staining of blood film, Reticulocyte staining.

B. Biochemistry: 20 Marks

i) <u>Qualitative Experiments</u> **(10 marks)**

a) Qualitative tests for identification of starch, dextrin, lactose, sucrose, maltose, glucose, galactose, fructose, albumin, gelatin, peptone, lactic acid, HCl, uric acid, acetone, Glycerol, bile salts, urea, blood.

b) Qualitative analysis of pulse, rice, milk to test the presence of carbohydrate, protein, fat. Demonstration of qualitative identification of lipid & cholesterol.

ii) Quantitative Analysis **(10 marks)**

a) Quantitative estimation of glucose, sucrose by Benedict's method.
b) Estimation of lactose from milk by Benedict's method
c) Estimation of blood sugar by Folin-Wu method.
d) Estimation of chloride by Mohr's Method.
e) Estimation amino-nitrogen through formol-tritration method.

C. Experimental Physiology: 5 Marks (5 marks)

Demonstration: Students will be trained to interpret the prepared supplied curve.

a) Use of Kymograph, induction coil and keys.
b) Recording of simple muscle curve with sciatic nerve-gastrocnemius muscle preparation of a toad. Determination of latent period, contraction period, relaxation period & maximum height of contraction.
c) Normal tracing of unperfused toad's heart beat.
d) Effect of warm saline on unperfused toad's heart beat.
e) Effect of ion (K^+ & Ca^{2+}) on unperfused toad's heart beat.
f) Effect of adrenaline and acetylcholine on unperfused toad's heart beat.

D. Human Experiments: 15 Marks

a) Determination of PFI of an individual by Harvard Step Test and graphical plotting of changes in pulse & breathing rate during recovery period.
b) Measurement of systolic and diastolic arterial blood pressure by sphygmomanometer and determination of pulse pressure & mean pressure during quiet rest and exercise.

E. Diet Survey Report: 10 Marks

Report should be as per ICMR specification. Report should be hand written. Each student has to prepare and submit the report on his/her own family.

F. Laboratory Note Books: 10 Marks

LNB for Biochemistry - 4 marks
LNB for Histology - 3 marks

LNB for Experimental Physiology-3 marks

G. Viva-Voce: 10 Marks

PART-III
(1 year course)

PAPER-IV A
(University Written Examination - 63 marks, Internal Assessment in College - 07 marks)

1. **Application of Physiology:**
   Introduction to the application of Physiology in different fields – Hematology, Biochemistry, Molecular Biology, Immunology, Microbiology, Social Physiology, Work and Sports Physiology, Environmental Physiology, Space Physiology, Pharmacology. **(2 lectures)**

2. **Clinical Biochemistry and Molecular Biology:**
   DNA and RNA: types and functions. Elementary idea of gene, genome, genetic code, transcription, translation and genetic engineering. Pathological significance of the following blood constituents: glucose, urea, creatinine, uric acid, cholesterol, lipoproteins, bilirubin, SGPT and SGOT, alkaline and acid phosphatases and ketone bodies.

   Dose response relationship. ED 50, LD 50, CO, TLV, therapeutic index of drugs, safety factor for drugs and pollutants. Narcotic drug abuse and addiction, addiction of alcohol and nicotine. Abuse of medicines: sulfa drugs, antibiotics, androgenic steroids, doping. **(15 lectures)**

3. **Environmental Physiology:**
   Environment - its physiological aspect. Some common pollutants & their effect- Carbon monoxide, lead & arsenic. Effects of noise on human body and preventive measures. Pesticides: Bio magnification and effects on body. Radio-active wastes and their health effects. Natures Kidney as scavenger. Food pollution and adulteration & their effects on human body. **(8 lectures)**

4. **Microbiology & Immunology:**
Virus: DNA virus & RNA virus, phages. Bacteria - structure & morphological classification. Gram positive, gram negative, pathogenic & nonpathogenic bacteria. Sterilization, pasteurization, brief idea about antibiotics, idea about innate and acquired immunity. Humoral and cell mediated immunity. Vaccination principles and importance of immunization. Basic principles of immunological detection of pregnancy.
Immunization Program: Immunization against Polio, Hepatitis-B, Tetanus, Measles, Whooping cough, Tuberculosis, Rabbies through vaccine, AIDS- causative virus, mode of transmission, effects on human body, preventive measures, diagnostic test for AIDS (ELISA). **(15 lectures)**

5. **Work & Sports Physiology:**
Definition of work, cardiac index, work index or pulse, O_2 debt, classification of physical work - static & dynamic, positive & negative work, cardiovascular & respiratory changes during physical exercise. Brief idea about VO_2 max, physical fitness index - Harvard step test. **(10 lectures)**

6. **Biostatistics and Modern Instrumentation (Biomedical) & Basic Concepts of Computer:**
Sampling and its methods, frequency distribution, properties & computation of standard deviation. Sampling errors, standard error or difference between means. Principle & application of artificial pacemaker, MRI, hemo-dialysis, USG, CT scan, X-ray, endoscopy. Basic concept of computer, uses of computer, elementary ideas about hardware, software and software packages. **(10 lectures)**

7. **Community Health Management:**
Basic Concept of Population, Society, Community and Community Health. Population control & family planning, causes and management of different types of diabetes, thalassemia, nutritional anemia, atherosclerotic disorders, gout, obesity, filria, endemic goiter. Dental carries. **(10 lectures)**

PRACTICAL

PAPER-IVB

A. Hematological Tests: 5 Marks

a) DC of WBC, PCV, MCV, determination of clotting time, bleeding time, ABO grouping.
b) Demonstration - TC of RBC & WBC. Haematocrit, ESR.

B. Clinical Pathology: 10 Marks

a) Identification of abnormal constituents of urine - glucose, proteins, acetone, blood, bile salts.
b) Pregnancy Test (strip method).

C. Human Experiments: 8 Marks

a) Pneumographic recording of normal respiratory movements, recording during drinking water, talking, forced hyperventilation & breath holding.
b) Spirometric measurement of vital capacity.
c) Determination of VO_2 max by Queen's College method.
d) Measurements of cornmon anthropometric parameters: stature, eye height, shoulder height, elbow height, knee height (sitting). Circumference: head, chest, wrist, hip. BMI measurement.
e) Calculation of body surface area.

D. Laboratory Note Books: 3 Marks

E. Viva-Voce: 4 Marks

RECOMMENDED TEXT AND REFERENCE BOOKS FOR PHYSIOLOGY (GENERAL), PART-I, II AND III

(The latest edition available should be used for all books)

1. Human Physiology Vol. 1 & 2, C.C. Chatterjee, Medical Allied Agency.
2. Sharirbigyan (Bengali) Vol. 1, 2 & 3. Debnath, Sridhar Prakashani.
3. Modem Human Physiology, B.K. Chakraborty, H.N. Ghosh, and S.N. Sahana, The New Book Stall.
4. Concise Medical Physiology, S. K. Chowdhury, New Central Book Agency.
5. Biochemistry, D. Das, Academic Publishers.
6. Paripak Bipak o Pusti. D. Das, Paschim Banga Rajya Pustak Parshad.
7. Bailey's Text Book of Histology, M.S.H. Di Fiore, Lea and Febiger.
8. Atlas of Human Histology, M.S.H. Di Fiore, Lea & Febiger. The New Book Stall.
9. Essential of Exercise Physiology, L.G. Shaver, Surjeet Publications.
10. Text book of Medical Physiology, by A.C. Guyton, John E. Hall, Eleventh edition. Elsevier Saunders.
11. The Living Body, O.H. Best & N.B. Taylor, Williams and Wilkins.
12. Human Physiology Vol. 1 & 2, T.K. Basu, Biomed Publications.
13. Biomedical Instruments and Measurements, L. Cromwell, F.1. Weibell, E.A. Pafaiffer Prentice Hall of India Pvt. Ltd.
14. A text Book of Practical Physiology, C.L. Ghai, Jaypee Brothers Medical Publishers Pvt. Ltd.
15. Medical Physiology, A. K. Das, Books and Allied (P) Ltd.
16. Medical Physiology, A.B. Singha Mahapatra, Current Books International.
17. Essentials of Medical Physiology, K. Sembulingam and P. Sembulingam, Jaypee Brothers Medical Publishers Pvt. Ltd.
18. Note Books on Practical Biochemistry, Experimental Physiology J and Histology (Published by the Physiological Society of India, Kolkata).
19. Text book of Medical Physiology by Veena M. Ahuja, Ane Books.
20. Environmental Chemistry by A K. De, New Age Inc.
21. Text book of Microbiology, by R. Anantanarayan and C. K. Joyram Paniker, Oriennt Longman.
22. Immunology, by D.M. Weir, ELBS.
23. Park's Text Book of Preventive and Social Medicine, by K. Park, Banarsi Bhanot Publishers.

24. Nutritive Value of Indian Foods, by C. Gopalan and other, NIN, Hyderabad.
25. Physiology by A.B. Singha Mahapatra, Current Books International.
26. Harpers's Biochemistry, by R. K. Murry and Others, Lange Medical Book, Prentice-Hall International.
27. Hawk's Physiological Chemistry by B.L. Oser, Tata McGraw-Hill Publishing Co. Food and Nutrition by M. Swaminathan, The Bangalore Printing & Publishing Co. Ltd.
28. Essential Food and Nutrition by M. Swaminathan. The Bangalore Printing & Publishing Co. Ltd.
29. Statistics in Biology and Psychology by D. Das and A. Das, Academic Publishers.
30. Basic Concept in Immunology, A. Hati, S. Roy, B. Saha, K. Bharati, Allied Book Agency, Kolkata.

VIDYASAGAR UNIVERSITY

ENVIRONMENTAL STUDIES

Under Graduate Syllabus

(3 Tier Examination Pattern)
w.e.f. 2014-2015

REVISED

Vidyasagar University

Midnapore 721 102
West Bengal

ENVIRONMENTAL STUDIES

FOR UNDER GRADUATE COURSES OF ALL BRANCHES
(Arts, Science & Commerce)

Full Marks -100, Written Examination: 70 Marks, Project Report: 30 Marks

Question Pattern and Distribution of marks for Written Examination:

Time: 3 Hours F.M. 70 Marks

Type 1: Short Answer Type - 20 questions (out of 30) x 2 = 40 Marks
Type 2: Long Answer Type - 3 questions (out of 6) x 10 = 30 Marks

Detailed Syllabus:

Unit 1: The Multidisciplinary nature of environmental studies

- Definition, Nature, Scope and Importance of Environment
- Types and components of environment
- Goals of environmental education
- Environmental ethics
- Global environmental crisis

(5 Lectures)

Unit 2: Natural resources: Renewable and non-renewable resources

- Nature and natural resources – their conservation and associated problems.
- Forest resources – uses, types and importance, deforestation, and effects of deforestation on tribal people; conservation and protection of forest and forest resources; Joint Forest Management.

- Water resources – Distribution of water on Earth; use and over-utilization of surface and ground water, water resources of India & its future.
- Agricultural resources: World food production & distribution, Food crisis - its causes.
- Livestock resources
- Energy resources: Renewable and Nonrenewable energy sources, use of alternate energy sources, energy conservation
- Land resources: Land as a resource, land degradation, landslides, soil erosion and desertification - causes and effects.
- Wildlife resources
- Use of resources for sustainable development.

(5 Lectures)

Unit 3: Ecology and Ecosystems

- Concept of ecosystem, ecology and biomes.
- Producers, consumers and decomposers
- Energy flow in the ecosystem, energy flow models
- Food chains, food webs and ecological pyramids
- Biogeochemical cycles: Pattern and basic types of biogeochemical cycles (Nitrogen, Phosphorus)

(5 Lectures)

Unit 4: Biodiversity and its conservation

- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use and social values
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India

- Conservation of biodiversity: *In situ* and *Ex-situ* conservation of biodiversity
- Biodiversity Acts
- Wildlife management, The Wildlife Protection Act, 1972 : Definitions of Animal, Wildlife, Haunting: Provisions relating to haunting of wild animal, Sanctuary, National park, Community Reserve and Tiger reserve.

(5 Lectures)

Unit 5 : **Environmental Degradation and Pollution**

- Definition, sources, causes, effects and control measures of:
  a. Air pollution
  b. Water pollution
  c. Soil pollution
  d. Noise pollution

- Solid waste management: causes, effects and control measures of biomedical wastes and municipal solid wastes.
- Monitoring of pollution
- Pollution control using biotechnology
- Disaster management: floods, earthquake, cyclone and landslides
- Environmental Impact Assessment (EIA)

(5 Lectures)

Unit 6: Social Issues and the Environment

- Water conservation, rain water harvesting
- Climate change, global warming, acid rain, ozone layer depletion
- Carbon trading
- Wetland resources and their conservation
- National wetland conservation programme with special reference to Ramsar sites

- Govt. Agencies, viz, CPCB, SPCB and their functions under the Water Act & Air Act. Constitutional provisions for protecting environment - Articles 48 (A), 51A (g)
- The Environment (Protection) Act, 1986
- Air and Water Acts and their role in environmental protection
- Environment Protection Movements in India - Chipko movements, Silent Valley Movements, Movements in Kamataka, Public awareness
- Rural Environment – Problems and their management
- Reducing emissions from deforestation and forest degradation
- (REDD) - Concept

(15 lectures)

Unit 7: Human Population and the Environment

- Definition, characteristics: human population growth, concept of carrying capacity
- Population stabilisation - Family Welfare Programme
- Environment and human health, concept of health and diseases - Examples of common communicable & non-communicable diseases, community health education.
- Uses of Biotechnology

(10 lectures)

Unit 8: Field Work Report / Project Report / Term Paper (based on anyone of the **following topics and to be evaluated by internal teachers only) :**

- Environmental assets - river/ forest/grassland/hill/mountain etc.
- Environmental pollution – Urban/Rural/Industrial/Agricultural
- Study of common plants / insects / birds / wild lives etc.
- Study of simple ecosystems – pond / river / hill slopes, etc.
- Human population & Environment

- Municipal solid waste management and handling
- Sound pollution
- Public Health, Sanitation and Nutrition
- Renewable Energy Resources
- Pollution from radioactive wastes
- Women and child health
- Health issues of tribal people
- Common Property Resource Management
- Coastal ecosystem
- Disaster management
- Innovative Experiments in resource management
- Environmental Impact Assessment (EIA)

Project/Field Work Report should contain at least 20 A-4 size Pages and appropriate photographs. The report should be preserved in the colleges for future record.

Recommended Books:

1. Erach Bharucha, Textbook for Environmental Studies For Undergraduate Courses of all Branches of Higher Education, University Grants Commission, http://www.ugc.ac.inloldpdf/modelcurriculumlenv.pdf
2. Frank B. Golley, A Primer for Environmental Literacy, Universities Press, 1999.
3. Kiran Chhokar, Mamata Pandya, Meena Raghunathan, Understanding Environment, Sage Publications
4. E.P. Odum. Fundamentals of Ecology. W.B. Saunders Co. USA, 1971.
5. N K Uberoi, Environmental Management, Excel Books.

6. De A. K., Environmental Chemistry, New Age International Publisher, New Delhi.
7. Sharma P. D., Ecology and Environment, Rastogi Publications, New Delhi.

Vidyasagar University

Ability Enhancement Compulsory Course (AECC – Environmental Studies)

Environmental Studies — Credits: 4

Unit 1: Introduction to environmental studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development.

(2 lectures)

Unit 2: Ecosystems

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems:
  a) Forest ecosystem
  b) Grassland ecosystem
  c) Desert ecosystem
  d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit 3: Natural Resources: Renewable and Non---renewable Resources

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Joint forest management.
- Water: Use and over---exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter---state).
- Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

(8 lectures)

Unit 4: Biodiversity and Conservation

- Levels of biological diversity : genetic, species and ecosystem diversity; Bio-geographic zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega---biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: Habitat loss, poaching of wildlife, man---wildlife conflicts, biological invasions; Conservation of biodiversity: In---situ and Ex---situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

(8 lectures)

Unit 5: Environmental Pollution

- Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.
- Noise pollution.

(8 lectures)

Unit 6: Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.
- Environmental policy and gender issues.

(7 lectures)

Unit 7: Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

(6 lectures)

Unit 8: Field work

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted site---Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems---pond, river, Delhi Ridge, etc.
- Disaster management.
- Coastal ecosystem.

(Equal to 5 lectures)

Suggested Readings:

1. Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. 1993. *This Fissured Land:An Ecological History of India*. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.
4. Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. *Science*, 339: 36---37.
7. McCully, P. 1996. *Rivers no more: the environmental effects of dams* (pp. 29---64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.

11. Rao, M.N. & Datta, A.K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. *Environment*. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India*. *Tripathi 1992*.
14. Sengupta, R. 2003. *Ecology and economics*: An approach to sustainable development. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. *Ecology, Environmental Science and Conservation*. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. *Conservation Biology*: *Voices from the Tropics*. John Wiley & Sons.
17. Thapar, V. 1998. *Land of the Tiger*: *A Natural History of the Indian Subcontinent*.
18. Warren, C. E. 1971. *Biology and Water Pollution Control*. WB Saunders.
19. Wilson, E. O. 2006. *The Creation: An appeal to save life on earth*. New York: Norton.
20. World Commission on Environment and Development. 1987. *Our Common Future*. Oxford University Press.

VIDYASAGAR UNIVERSITY

PHILOSOPHY

(Honours & General)

Under Graduate Syllabus

(3 Tier Examination Pattern)

w.e.f. 2014-2015

REVISED

Vidyasagar University

Midnapore 721 102

West Bengal

VIDYASAGAR UNIVERSITY
CURRICULUM FOR PHILOSOPHY

(HONOURS COURSE)

PART - I
PAPER-I : FULL MARKS – 100

(University Examination 90 + Internal Assessment by college 10)

INDIAN PHILOSOPHY
The figures in the right-hand margin indicate number of lectures

[Lecture on each system must start with a brief outline of its origin and development]

Group-A (Full Marks 50)

Unit-I

1. Basic features of Indian Philosophy 02
2. Cārvāka: *Pratyaksaikapramānavāda; Materialism; Bhūtacaitanyavāda – Dehātmavāda, Indriẏātmavāda, Pranātmavāda and Manātmavāda; Ethics* 07
3. *Bauddha*: *Ārya-catustaya; Pratityasamutpāda-vāda; Ksanabhangavāda; Nairātmyavāda*; Schools of Hinay*ā*na and Mahay*ā*na; Schools of M*ā*dhyamika, *Yogācāra, Vaibhāsika* and *Sautrāntika*; *Pramā* and *Pramāna; Pratyaksa* 09

4. *Jaina*: Theory of Knowledge; *Pramāna* and *Naya*; *Syādvāda* and *Saptabhanginaya*; *Anekāntavāda*; Theory of *Jīva* and *Ajīva*, Ethics; Atheism 07

Unit-II

5. *Vaiśesika*: The Scheme of Seven categories; *Dravya; Guna; Karma; Sāmānya; Viśeså; Samavāya* and *Abhāba; Atomism* 13
6. *Nyāya*: Theory of Knowledge; *Pramā* and *Pramāna*; Detailed study of four *Pramānas*; Theory of Self; Theism; Bondage and Liberation 12

Group-B (Full Marks 50)

Unit-I

7. *Sāmkhya: Satkāryavāda; Prakrti* and the *Gunas; Purusa*; Theory of evolution. Theory of Knowledge, Bondage and Liberation 08
8. *Yoga: Citta; Cittabhumi; Cittavrtti; Cittavrttinirodha*; Practical Psychology of *Astāngayoga*; Theism 08
9. *Mīmāmsa* (Bhātta and Prābhākara): *Pramā*, *Pramāna* and *Prāmānya;* Pratyaksa; outline of different categories; Theory of Self, Ethics and Religion 09

Unit-II

10. *Advaita Vedānta of Śankara*: *Sattātraibidhyavāda; Adhyāsa; Brahman; Jagat; Maya or Avidya*; *Jīva*; *Jīva* and *Brahman*; Bondage and Liberation of Jīva; *Pramā* and *Pramāna*; *Pratyaksa* 10
11. *Visistadvaitavāda of Ramānuja*: Brahman; *Jagat*; Refutation of Advaita doctrine of *Māyā*; *Jīva*; Brahman and *Jīva*; *Pramā*, *Pramāna* and *Pratyaksa*; Bondage and Liberation of Jīva 10

12. Other schools of Vedānta (Brief outline): Dvaita Vedānta of Madhva; Dvaitādvaita Vedānta of Nimbārka; Suddhādvaita Vedānta of Vallabha; Achintyabhedābheda Vedānta of Śri Chaitanya 05

Suggested Readings:

1. C. D. Sharma: A Critical Survey of Indian Philosophy
2. Datta and Chatterjee: An Introduction to Indian Philosophy
3. Niradbaran Chakraborty: Bhāratīya Darshan
4. Pradyot Kumar Mondal: Bhāratīya Darshan
5. Debabrata Sen: Bhāratīya Darshan
6. Samarendra Bhattacharya: Bhāratīya Darshan
7. Dipak Kumar Bagchi: Bhāratīya Darshan
8. M. Hiriyanna: Outlines of Indian Philosophy
9. S. Radhakrishnan: Indian Philosophy
10. S. N. Dasgupta: History of Indian Philosophy, Vol. I & Vol. II
11. Rama Choudhury: Vedānta Darshan

Paper-II : Full Marks - 100

HISTORY OF WESTERN PHILOSOPHY

(University Examination – 90 + Internal Assessment – 10)

The figures in the right-hand margin indicate number of lectures

Group-A (Full Marks 50)
Ancient Greek Philosophy and Modern Rationalist Philosophy

Unit-I

1. Pre-Socratic Philosophy: Brief outline 03
   (Thales, Anaximander, Anaximanes, Heraclitus, Parmenides) 02
2. Socrates: Socratic Method
3. Plato: Theory of knowledge, Theory of Forms, Idea of Good and its relation to God 10
4. Aristotle: Critique of Plato's theory of Forms, Theory of Causation, Form and Matter 10

Unit-II

5. Descartes: Method of Doubt, Cogito Ergo Sum, Criterion of truth; theory of Ideas, theory of substance. Argument for the Existence of God 09
6. Spinoza: Doctrine of substance, attributes and modes, Pantheism, Determinism 08
7. Leibnitz: Doctrine of monads – Pluralism, Truths of Reason and Truths of Fact, Laws of Thought, Pre-established harmony 08

Group-B (Full Marks 50)
Empiricism, Critical Philosophy and Phenomenology

Unit-I

8. Locke: Refutation of Innate Ideas, Ideas and their classification, Realism, Theory of knowledge, Concept of qualities 08
9. Berkeley: Refutation of Abstract Ideas, Rejection of the distinction between primary and secondary qualities and Esse-Est-Percipi, The problem of solipsism 08
10. Hume: Impression and Idea and relation of ideas. Association of Ideas. Distinction between judgments concerning matters of fact; theory of causation; self and personal identity, the rejection of metaphysics, skepticism 09

Unit-II

11. Kant: Conception of critical philosophy, Distinction between a-priori and a-posteriori judgments, Distinction between analytic and synthetic judgments, Copernican Revolution, Metaphysical and Transcendental exposition of space and time 15
12. Hegel's Dielectic Method 04
13. Basic tenets of phenomenology and Existentialism 06

Suggested Readings:

1. W. T. Stace*: A Critical History of Greek Philosophy.*
2. F. Coplestone*: A History of Western Philosophy*,Vol. 1, 4, 5, 6.
3. Bertrand Russell*: History of Western Philosophy*
4. Frank Thilly*: A History of Western Philosophy*
5. Debabrata Sinha*: Phenomenology & Existentialism*

6. Swapan Sarkar*: Astivadi Darshan O Pratibhās Vij*ñān
7. Rashbehari Das: *A Handbook to Kant's Critique of Pure Reason*
8. Rashbehari Das: *Kanter Darshan*
9. A. G. Grayling (ed.): *Philosophy 1 – A Guide through the Subjects*
10. J. Bennett: Locke, Berkeley, Hume
11. D.J.O'Connor (ed.): *A Critical History of Western Philosophy*
12. J. Cottingham: *The Rationalists*
13. T. H.Irwine: *Classical Philosophy*
14. A. Kenny: *A New History of Western Philosophy* (4 Vols.)
15. B. Williams: *Descartes: The Project of Pure Enquiry*
16. S. Hamphire: *Spinoza*
17. G. H. R. Parkinson: *Leibnitz*
18. E. J. Lowe: *Locke*
19. G. Berkeley: The Works of George Berkeley T.E. Jessop & A.R. Luce (Ed.)
20. J. N. Mohanty (ed.): *An Enquiry Concerning Human Understanding by D. Hume*
21. B. Stroud: *Hume*
22. P. Guyer: *Kant*
23. S. Korner: *Kant*
24. R. Scruton: *A History of Philosophy from Descartes to Wittgenstein*
25. Y. H. Masih: *A Critical History of Modern Philosophy*
26. Haldane & Ross*: The Works of Descartes* (ed.)
27. J. Locke: *An Essay Concerning Human Understanding*
28. D. Hume*: A Treatise on Human Nature*
29. James Fieser and Norman Lillegard: *A Historical Introduction to Philosophy*
30. Robert C Solomon: *Introducing Philosophy (Ninth Edition)*
31. J.W. Phelan: *Philosophy* : *Themes and Thinkers*

32. B.N.Moore & K. Bruder: *Philosophy : The Power of Ideas* (Sixth Edition)
33. R.S.Woolhouse: *The Empiricists*
34. Ramaprasad Das and Shibapada Chakraborty: *Paschatya Darshaner Ruprekha*
35. Pramod Bandhu Sengupta : *Paschatya Darshaner Itihas*
36. Kalyan Chandra Gupta : *Paschatya Darshaner Itihas*

Part-II

Paper-III : Full Marks – 100
(University Examination – 90 + Internal Assessment – 10)

PSYCHOLOGY & PHILOSOPHY OF MIND AND SOCIAL & POLITICAL PHILOSOPHY

The figures in the right-hand margin indicate number of lectures.

Group-A (Full Marks 50)
(Psychology and Philosophy of Mind)

Unit-I

1. Definition and Scope of Psychology, Methods of Psychology – Subjective, Objective and Experimental 04
2. Brain and its function – Central Nervous System 03
3. Sensation and Perception – Nature of Perception, Gestalt theory of Perception 03
4. Memory: Different types of memory, Factors of Memory, Marks of good memory, forgetfulness and its causes 05
5. Learning – Trial and error theory, Gestalt theory, Pavlov's theory of conditioned response, B. F. Skinner's theory of Operant Conditioning (reinforcement, extension, punishment) 05
6. Intelligence – Measurement of Intelligence, I.Q. Test of Intelligence, Benet-Simon test, Terman – Merrill and Wechsler test 05

Unit-II

7. Relation between Brain/body and mind; Different theories – Interactionism, Epiphenomenalism, Double – Aspect theory, Identity theory, Functionalism, Philosophical behaviourism 13
8. Consciousness – Nature and characteristics of consciousness; Conscious; sub-conscious, Unconscious, Proofs for the existence of Unconscious, Freud's theory of Dream 12

GROUP-B (Full Marks 50)
Social and Political Philosophy

Unit-I

1. Nature and Scope of (i) Social Philosophy, (ii) Political Philosophy, Relation between Social and Political Philosophy 07
2. Basic Concepts: Individual, Society, Social Group, Community, Association, Institution, State and Nation 09
3. Theories regarding the relation between individual and society
   i. Individualistic theory 09
   ii. Organic theory
   iii. Idealistic theory

Unit-II

4. Political Ideals : Democracy – Its different forms;
   Socialism – Utopian and Scientific; Anarchism, Sarvodaya, M.K.Gandhi's conception of Non-Violence and Trusteeship 10
5. The Idea of Freedom with special reference to the views of Marx, Sartre, M.N.Roy and Rabindranath 09
6. Feminism: the distinction between the liberals and the radicals 06

Suggested Readings:

1. Paul M. Churchland. *Matter and Conciousness: A Contemporary Introduction to the Philosophy of Mind*
2. J.Heil: *Philosophy of Mind*
3. J.Shaffer: *Philosophy of Mind*
4. Pareshnath Bhattacharya: *A text book of Psychology*
5. W. James: *Principle of Psychology*
6. J.S. Mackenzie: *Outlines of Social Philosophy*
7. P. Gisbert: *Fundamentals of Sociology*
8. R.M. Maciver and C.H. Page: *Society*
9. M. Ginsberg: *Sociology*
10. T. Bottomore; *Sociology*
11. P. B. Sengupta: *Handbook of Social Philosophy*
12. Gordan Graham: *Contemporary Social Philosophy*
13. C.E.M. Joad: *Introduction to Modern Political Theory*
14. Krishna Roy: *Political Philosophy: East and West*
15. D.D. Raphael: *Problems of Political Philosophy*
16. Buddhadeb Bhattacharya. *The Evolution of Political Philosophy of Gandhi*
17. D.M. Datta: *The Philosophy of Mahatma Gandhi*
18. Mary Evans: *Introducing Contemporary Feminist Thought*
19. Alison Stone. *An Introduction to Feminist Philosophy*
20. Pritibushan Chattopadhyay: *Samāj Darshan Dīpika*
21. Parimal Bhusan Kar: *Samāj Tattva*
22. A.K. Mahapatra and P. Mukherjee; *Samajdarshan o Rastradarshaner Parichay*
23. Amal Kumar Mukhopadhyay: *Rastradarshaner Dhara*
24. Samarendra Bhattacharya: *Samajdarshan o Rastradarshan*

25. Basudha Chakrabarty: *Manabatabad*
26. Marx O Engels: *Samyabader Itihas*
27. Shefali Maitra: *Naitikat*ā *o Naribād*
28. Shyamali Mishra: *Tathakothito Narivād: Ek Khondita Darshan ebong Anyānya Prabandha*
29. M. Gatens: *Feminism and Philosophy*
30. P.N. Bhattacharya: *A Text Book of Psychology*
31. P.B. Sengupta : *Manovidya*
32. Samarendra Bhattacharya: *Samāj Darshan o Pratibhasvijnan*
33. Basanta kumar Lal : Contemporary Indian Philosophy
34. Swapan Sarkar : Astivadi Darshan o Pritibhiavijan
35. Sudhir Kumar Nandi : Rabindradarshan
36. Pabitra Kumar Roy : Rabindradarshan

Paper – IV (Full Marks – 100)
(University Examination 90 + Internal Assessment by college 10)

WESTERN LOGIC

The figures in the right-hand margin indicate number of lectures

Recommended Text : Introduction to Logic (11th Ed.) I. M. Copi and C. Cohen

Group-A (Full Marks – 50)

Unit-I

1. Validity and Invalidity – Truth and Validity 02
2. Immediate Inference: Conversion, obversion and their combined Application, square of opposition and Immediate Inference-based theorem; To determine the truth-value of a proposition given the truth value of another proposition 08
3. Categorical syllogism: General Rules; To test syllogistic argument for validity by applying general rules for syllogism; to solve problems and prove theorems concerning syllogism 07
4. Boolean interpretation of categorical propositions: Use of Venn diagrams to test arguments for validity; Review of the traditional laws of logic concerning immediate inference and syllogism; Hypothetical and Disjunctive syllogisms; Dilemma 08

Unit-II

5. Induction: Induction by Simple Enumeration. Argument by Analogy; Appraising Analogical arguments 04

6. Causal Connections: Mill's Method of Experimental Inquiry: Cause and effect; the meaning of 'cause'. The plurality of causes; the uniformity of nature 05
7. Mill's Methods: Method of Agreement, Method of Difference, Joint Method of Agreement and Difference, Method of Residue, Method of Concomitant Variation
8. Science and Hypothesis: 06
   Explanations: Scientific and unscientific; evaluating scientific explanations; The Detective as Scientist: the Problem, Preliminary Hypothesis, Collecting Additional Facts, Formulating the Hypothesis, Deducting Further Consequences, Testing the consequence, application 06
9. Probability: Alternative Conceptions of probability, The Probability Calculus; Expectation or Expected value 04

Group-B (Full Marks – 50)

Unit-I

1. Truth-functions: Negation, Conjunction, Disjunction; Reducing sentences to logical form: the conditional and the material implication, the paradoxes of material implication. Material equivalence; argument and argument form, statement and statement form; testing arguments by employing Truth-table method; Three laws of thought 14
2. Rules of Inference and Rules of Replacement; Formal Proof of Validity; Proof of Invalidity; Inconsistency 11

Unit-II

3. Singular Proposition; Quantification; Traditional Subject-Predicate – Propositions; Proving validity; Proving invalidity; Asyllogistic inference 25

Recommended Reference Books:

1. Ramaprasad Das: *Navya Yukti Vijñān* (Vols. I – IV)
2. Chhanda Chakraborty: *Logic: Informal, Symbolic and Inductive*
3. Basson and O'Conor: *Introduction to Symbolic Logic*
4. Indra Kumar Roy: *Pratīkī Nyāya*

Paper V (Full Marks – 100)

(University Examination 90 + Internal Assessment by college 10)

INDIAN EPISTEMOLOGY, LOGIC AND PHILOSOPHY OF LANGUAGE

The figure in the right-hand margin indicate number of lectures

Recommended Text:

Annambhatta: Tarkasamgraha with Dīpikā – From *Buddhi* to *Smrtivibhāga*

Group: A Full Marks : 50

Unit-I

From definition of *Buddhi* (knowledge) to *Pratyaksakhanda*; 25

Unit-II

Paratah-prāmānyavāda; *Anyathākhyātivāda*; *Apramavibhāga; Smrtivibhaā* 25

Group: B Full Marks : 50

Unit-I

Anumānakhanda; 25

Unit-II

Śabdakhanda. 25

Recommended Reference Books:

1. Narayan Chandra Goswami (ed.); Tarkasamgraha with Dīpikā.
2. Gopinath Bhattacharya (ed.) : Tarkasamgraha with Dīpikā

PART – III

Paper-VI: Full Marks – 100
(University Examination 90 + Internal Assessment by college 10)

ETHICS
The figures in the right-hand margin indicate number of lectures

Group-A (Full Marks – 50)
(Theoretical Ethics)

Unit-I

1. Nature and scope of Ethics: Ethics, Morality and Moral Problems, Moral and Non-moral actions 05
2. Nature and Characteristics of Moral judgment, Object of Moral Judgment 05
3. Hedonism: Psychological Hedonism and Ethical Hedonism – Egoism of Aristipus and Epicurus 05
4. Altruism of J. Bentham and J. S. Mill 05
5. Types of Utilitarianism: Act-Utilitarianism and Rule-Utilitarianism; Primitive Rule-Utilitarianism; Rule-Utilitarianism of Rawls 05

Unit-II

6. Kant's Deontological Moral Theory 05
7. Indian Concept of *Purusartha: Dharma, Artha, Kama* and *Moksa* 08
8. Theory of *Karma. Niskāma Karma* of the *Bhagavadgītā* 05
9. Theories of Punishment. , Capital Punishment 07

Group-B (Full Marks-50)
(Applied Ethics)

Unit-I

1. Concept of Applied / Practical Ethics 04
2. Peter Singer's analysis of the concept of Equality 06
3. Concept of Discrimination, Gender Discrimination, Racial Discrimination and Caste Discrimination in Indian Context, Reverse Discrimination 10
4. Value of Life; Killing; Suicide; Euthanasia 05

Unit-II

5. Environmental Ethics; The Environment and the Human Community –, Reverence for Life; Deep Ecology; True Environmental Ethics 13
6. Gandhi's idea of means – end relationship 05
7. Swami Vivekananda's application of Vedanta in man's practical life 07

Suggested Readings

1. W. Lillie - Introduction to Ethics
2. Samarendra Bhattacharya - Nitividya
3. Peter Singer - Practical Ethics (Chapters I & VII)
4. James Rachels (Ed.) - Moral Problems (Part- I, Part-III, Part-VI- relevant Portions)
5. Basant Kumar Lal - Contemporary Indian Philosophy
6. Bernard Williams : Morality : An Introduction to Ethics
7. Raghvan Iyer : Moral and Political Thought of Mahatma Gandhi

8. J.J.C Smart and Bernard Williams : Utilitarianism : For and Against
9. Peter Singer - Applied Ethics
10. W.K. Frankena - Ethics
11. J.L Mackie - Ethics : Inventing right and wrong
12. Peter Singer (ed) : A Companion to Ethics
13. J. Rachel : Elements of Moral Philosophy
14. R. A. Duff : Trials and Punishments
15. Dr. Dikshit Gupta - Nitividya O Phalita Nitividya
16. Somnath Chakravorty - Kathay O Karme Ethics
17. Nabakumar Nandi : Vyavaharik Nitividya
18. Pradip Kumar Roy, (Bangla Academy,Dhaka) -Vyāvahārik Nitividya
19. Swami Vivekanander Vani O Rachana (Udbodhan)
20. Swami Vivekanada - Practical Vedanta
21. Somnath Chakravorty : Nītividyār Tattvakatha
22. Santosh kumar Pal : Samakalin Paribesh Nitishastrer Ruprekha
23. Santosh kumar Pal : Phalita Nitishastra (Vol. I)
24. P. B. Sengupta : Nītividyā

Paper-VII (Full Marks-100)

(University Examination 90 + Internal Assessment by college 10)

PHILOSOPHY OF LANGUAGE, EPISTEMOLOGY AND METAPHYSICS (WESTERN)

The figures in the right-hand margin indicate number of lectures

Recommended Text :

J. Hospers : An Introduction to Philosophical Analysis

Group-A (Full Marks – 50)

Unit-I

1. Meaning and Definition: Word meaning, Definition, vagueness, sentence meaning 13
2. Analytic Truth and Logical Possibility. The a-priori 12

Unit-II

3. Concepts, The sources of knowledge, some principal uses of the word 'know'; conditions of philosophical knowledge, knowledge by acquaintance, knowledge by description, knowing how and knowing that, knowledge representation problem 10
4. Theories of knowledge: rationalism, empiricism, Kant's Critical Theory 08
5. Theories of Truth: Correspondence, Coherence, Pragmatic 07

Group-B (Full Marks – 50)

Unit-I

1. Metaphysics – a) Nature, b) Type 07
2. Empirical knowledge: Law, Theory and Explanation, The problem of Induction, Testability and Meaning 18

Unit-II

3. Cause, Determinism and Freedom: What is a cause? The causal principle; Determinism and Freedom 08
4. Substance and Universals 09
5. Our knowledge of the Physical world: Realism, Idealism, Phenomenalism 08

Recommended Reference Books:

1. R.Taylor : Metaphysics
2. D.W.Hamlyn : Metaphysics
3. A.J.Ayer : The Central Questions of Philosophy
4. A.J.Ayer: Language, Truth and Logic
5. G.Ryle: The Concept of Mind
6. N. A. Stillings et.al.: Cognitive Science: An Introduction
7. W. H. Walsh: Reason and Experience
8. Edward and Pap (Ed.) : A Modern Introduction to Philosophy
9. D. W. Hamlyn: Theory of Knowledge
10. A.C. Ewing: The Fundamental Questions of Philosophy
11. J. Cottingham: The Rationalist
12. R.S.Woolhouse: The Empiricist
13. Samarikanta Samanta: Darshanik Visleshaner Ruprekha

Paper-VIII : Full Marks – 100

(University Examination – 90 + Internal Assessment – 10)

PHILOSOPHY OF RELIGION AND PHILOSOPHICAL CLASSICS/ESSAY-WRITING

The figures in the right-hand margin indicate number of lectures

Group-A (Full Marks-50)
Philosophy of Religion

Unit-I

1. Nature of Religion 03
2. Origin of Religion : Different theories 04
3. Historical development of Religion; Characteristics of the Universal Religion 05
4. Nature of Religious Consciousness 05
5. Proofs for the existence of God : Ontological argument, Cosmological or casual argument; Moral argument, Nyaya and Yoga arguments for the existence of God 08

Unit-II

6. Western theories against the existence of God : Materialism; Naturalism; Positivism; Agnosticism; Marxist interpretation of Religion : Indian theories against the existence of God : Bauddha, Samkhya and Mimamsa arguments against the existence of God. Antitheistic arguments of Freud and Durkheim 11
7. Religious Language : Nature of religious language; Peculiarity of religious language; Religious language as cognitive / non-cognitive 05

8. Comparative Religion : Nature and Aim of Comparative Religion, Possibility of Comparative Religion 05
9. Basic concepts of Hinduism, Christianity and Islam 04

Suggested Readings :

1. J. D. Hick - Philosophy of Religion
2. M. Edward - Philosophy of Religion
3. J. Caird - An Introduction to Phiolsophy of Religion
4. Sushil Kumar Chakraborty – Dharmadarshan
5. Kalyan Chandra Gupta & Amitabha Bandyopadhyay Dharmadarshan
6. P. B. Sengupta – Dharmadarsan
7. Debiprasad Chattopadhyay – Indian Atheism
8. Debabrata Sen – Bharatiya Darshan
9. Sukhamoy Bhattacharya – Samikhyadarshaner Vivaran

Group-B (Full Marks-50)
Philosophical Classics

Any one of the following texts:

1. Sadānandayogīndra – Vedāntasāra
   Beginning from *mangalācarana,* the entire section of *adhyāropa (*upto the text-evamadhyaropa

Unit – I

Mangalācarana to ajñāna – nirupana 25

Unit – II

Īsvara – nirupana to ātmā – nirupana 25

Recommended Reference Books:

1) Bipadbhanjan Pal (ed.): Vedāntasāra
2) Swami Nikhilananda(tr.): Vedāntasāra

2. Bertrand Russell – The Problems of Philosophy

Selected Chapters –

Unit-I

1) Appearance and Reality 07
2) The Existence of Matter 06
3) The Nature of Matter 06
4) Idealism 06

Unit-II

5) Knowledge by Acquaintance and Knowledge by Description 05
9) The World of Universals 05
12) Truth and Falsehood 05
14) The Limits of Philosophical Knowledge 05
15) The value of Philosophy 05

Reference Book:

1) Susil Kumar Chakraborty (tr.) : Darshaner Samasya

Or

Essay writing (two) Marks: 25+25

Questions are to be set from three units. (Three topics from each unit) Examinees will have to write two essays from any two units taking any one topic from each unit

Recommended units and topics are as follows:

Unit: I Epistemology 25

Topics

1. Cārvāka Epistemology
2. Nyāya theory of perception
3. Svatah prāmānyavāda and Paratah-prāmānyavāda in respect of jñapti
4. Akhyātivāda and anyathākhyātivāda
5. Nyāya concept of Pramā
6. Theory of knowledge, according to Plato
7. Locke's theory of knowledge
8. Hume's theory of knowledge
9. Descartes' Method
10. Correspondence and coherence theories of truth.

Unit: II (Metaphysics) 25

1. Buddhist theory of no-self
2. Vaiśesika category of Sāmānya
3. Asatkāryavāda and Satkāryavāda
4. Concept of Brahman in the Vedānta system

5. Advaita doctrine of māyā and its refutation by Rāmānuja
6. Aristotle's theory of causation
7. Substance according to Descartes and Spinoza
8. Leibnitz's doctrine of Monad
9. Primary and Secondary Qualities
10. Realism and Idealism

Unit-III (Ethics) 25

1. Jaina ethics with special reference to the concept of Triratna
2. Nyāya theory of liberation
3. Advaita theory of liberation
4. Indian concept of Purusārtha
5. Theory of Niskāma Karma
6. Nature and object of moral judgment
7. Act-utilitarianism and Rule-utilitarianism
8. Moral theory of Kant: The Categorical Imperative
9. Euthanasia and its moral implications
10. Environmental ethics

General note on the instruction for Paper-setters:
In all papers questions are to be set from each unit of Group A and Group B

VIDYASAGAR UNIVERSITY

Syllabus for B.A. (General)

In

PHILOSOPHY

With effect from 2014 – 2015

Part – I

Paper – I (Full Marks – 100)

(University Examination – 90 + Internal Assessment – 10)

INDIAN PHILOSOPHY

1. **Introduction**
   - (i) Nature of Indian Philosophy 04
   - (ii) Characteristics of Indian Philosophy 04
   - (iii) Division of Indian Philosophical Systems into Āstika and Nāstika 04

2. **The Carvaka System** :
   (i) Epistemology; (ii) Metaphysics; (iii) Ethics; (iv) Review of Carvaka Philosophy; 12

3. **The Bauddha System:** (i) The Four Noble Truths; (ii) *Pratityasamutpada tattva*; (iii) *Ksanabhanga Vada*; (iv) Brief

discussion on the four Schools of the Bauddha philosophy; (iv) Review of the Bauddha philosophy 13

4. **The Jaina System**: (i) Epistemology; (ii) Syadvada and Saptabhangi – naya; (iii) Metaphysics – *Anekantavada* relation of *Anekantavada* and *Syadvada;* Jīva and Ajīva; (iv) Jaina Ethics 12

5. **The Nyaya System**: (i) Epistomology – Detailed Study of Four *Pramanas – Pratyaksa, Anumana, Upamana* and *Sabda;* (ii) Metaphysics – Theory of Self, Nature and arguments for the existence of God (iii) Ethics – Bondage and liberation of human Self 13

6. **The Vaisesika System**: Seven Categories (Padartha) – Dravya*, Guna, Karma, Sāmānya, Samavāya, Viśesa* and *Abhāva,* Atomism 12

7. **The Systems of Samkhya and Yoga**: (i) Satkaryavada; (ii) Prakrti; (iii) Purusa; (iv) Theory of evolution; (v) The Yoga views of Citta, Cittabhumi, Cittavrtti, Cittavrttinirodha, Astanga – Yoga 12

8. **The two Vedanta Systems of Advaita and Visistadvaita**:

   i) Advaita Vedanta of Sankara – Brahman; Jagat (the World); Ajnana or Maya; Jiva; Realtion of Brahman to Jiva and Jagat; Bondage and liberation of Jiva 07
   ii) Visistadvaita Vedanta of Ramanuja – Brahman; Jagat; Refutation of Mayavada; Jiva; Bondage and liberation of Jiva 07

Part – II

PAPER- II (Full Marks-100)
(University Examination – 90 + Internal Assessment – 10)

WESTERN METAPHYSICS & EPISTEMOLOGY AND WESTERN LOGIC

Group A (50 Marks)

Western Metaphysics and Epistemology

1. Theories of the Origin of Knowledge :
   Rationalism, Empiricism and Kant's Critical Theory 12

2. Realism and Idealism as theories of reality :
   i) Realism : Naive Realism, Scientific Realism, New and Critical Realism 07
   ii) Idealism : Subjective Idealism (Berkeley), Objective Idealism (Hegel) 06

3. Causality: Entailment Theory, Regularity Theory

4. Mind - Body Problem: Interactionism, Parallelism and the Identity Theory

Group- B (50 Marks)
Western Logic

1. Proposition, Categorical Propositions and Classes : Quality, quanitity and distribution 7
2. Traditional Square of Oppositions 3
3. Further immediate Inference : Conversion, Obversion and Contraposition 6
4. Existential Import of Propositions :
5. Boolean Interpretation of Categorical propositions. Translating categorical propositions into standard forms 8
6. Categorical syllogism : Figure, Mood, Testing Syllogism for validity. Testing arguments by Venn Diagram, Rules and Fallacies. Disjunctive and hypothetical syllogism. The Dilemma 9
7. Symbolic Logic : The value of special symbols for conjunction, Negation and Disjunction, implications and material implications. Statements and Statement Forms. Argument and Argument Froms. Truth - Table Method for testing arguments 9
8. Inductive Logic: Analogy. Hypothesis - Nature and Condition. Scientific Method - its different steps 8

Paper – III

(University Examination – 90 + Internal Assessment – 10)

PSYCHOLOGY AND SOCIAL & POLITICAL PHILOSOPHY

Group A (50 Marks)
Psychology

1. Definition and Scope of Psychology, Nature of psychology as a science, Methods of psychology - subjective objective and experimental 6
2. Sensation: Nature, Classification and attribute of sensation 5
3. Perception : Nature of Perception and its relation to sensation. Gestalt theory of Perception: Perception of distance, solidity and motion, illusion and hallucination 6
4. Percept and Image : Memory - its factor and range, marks of good memory, laws of Association, Forgetfulness and its causes 6
5. Attention : its nature and types, conditions of attention 4
6. Learning: The Trial and Error Theory, The Gestalt Theory, Pavlov's Conditioned – Response Theory 6
7. Emotion : Nature of emotion, James - Lange Theory of emotion 4
8. Consciousness : Conscious, sub - conscious, unconscious - its evidence, Freud's theory of Dream 5
9. Personality : Factors of Personality, Heredity and Environment 5
10. Intelligence : Measurement of Intelligence, Binet - Simon test 4

Group B (50 Marks)
Social & Political Philosophy

1.	Nature and Scope of Social Philosophy	6
2.	Primary concepts : Society, Community, Association, Institutions	7
3.	Social groups : its different forms	7
4.	Social Codes : Religious and Moral codes, Custom and Law. Culture and Civilization	8
5.	Social class and caste, class attitudes and class consciousness	8
6.	Political Ideals : Equality, Justice and Liberty; Democracy : Its different forms	8
7.	Secularism	6

Part – II
PAPER – IV

(University Examination – 90 + Internal Assessment – 10)
Full Marks – 100

THEORETICAL AND APPLIED ETHICS

Group - A (50 Marks)
Theoretical Ethics

1.	Nature and Scope of Ethics	4
2.	Moral and non - moral actions	8
3.	Postulates of morality	6
4.	Hedonism - Mill and Bentham	8
5.	Kant's conception of good will, duty and Categorical Imperative	8
6.	Ethics of *Niskāma karma* of the Bhagavadgita	8

7. Theories of Punishment, Capital Punishment 8

Group - B (50 Marks)
Applied Ethics

1. Concept of Applied Ethics 5
2. Rights : Human rights and Discrimination on the basis of sex, race, caste and religion 9
3. Value of Life: Killing, Suicide and Euthanasia 9
4. Environmental Ethics: The environment and the human community, Reverence Future generations, Reference for life, Deep ecology 9
5. Mahatma Gandhi's Conception of Ahimsā (non - violence) Satyagraha (zest for truth) and means –end relationship 9
6. Vivekananda's Practical Vedanta 9

Suggested Readings for General Course
Part - I
PAPER- I
INDIAN PHILOSOPHY

1. Dutta and Chatterjee - An Introduction to Indian Philosophy
2. Dr. Niradbaran Chakravorty - Bharatiya Darshan
3. Haridas Bandyopadhyay - Bharatiya Darshaner Marmakatha
4. Dr. Karuna Bhattacharya - Nyāya- Vaiśeşika Darshan
5. Dr. Samarendra Bhattacharya - Bharatiya Darshan
6. C. D. Sharma - A Critical Survey of Indian Philosophy
7. Jagadiswar Sanyal - Indian Philosophy
8. M. Hiriyanna – Outlines of Indian Philosophy
9. J. N. Sinha - Indian Philosophy

10. Dipak Kumar Bagchi - Bharatiya Darshan
11. Pradyot Kumar Mandal – Bharatiya Darshan

PAPER- II
(Group A and Group B)
Western Metaphysics & Epistemology and Western Logic

1. Ramaprasad Das and Shibapada Chakravorty - Paschatya Darshaner Ruprekha (W.B.S.B.B)
2. Niradbaran Chakravorty - Paschatya Darshaner Bhumika
3.Pramode Bandhu Sengupta and Mrinmoy Basu - Paschatya Yuktivijnan
4. R.C. Munshi – Tarkashastra
5. Ramaprasad Das - Paschatya Darshan O Yuktivijnan
6. Jagadiswar Sanyal – Yutivijnan
7. Pramod Bandhu Sengupta - Paschatya Darsan
8. Jagadiswar Sanyal - Paschatya Darshan
9. John Hospers - An Introduction to Philosophical Analysis
10. Dr. Samarendra Bhattacharya - Paschatya Darshan
11. I.M. Copi and C. Cohen (11th Ed.) - Introduction to Logic
12. Ramaprasad Das - Navya Yuktivijnan
13. Ramchandra Pal - Darsan Parichaya
14. S.P Chakravorty - Darsaner Bhumika
15. Satyajyoti Chakravorty - General Philosophy

PAPER- III
(Group A and Group B)

Psychology and Social & Political Philosophy

1. P. N. Bhattacharya – A Text Book of Psychology
2. P. N Bhattacharya : Manovidya
3. Deviprasad Chattopadhyay - Manovijnan
4. Jagadiswar Sanyal - Manovidya
5. G. D. Boaz - General Psychology
6. Pramod Bandhu Sengupta - Manovidya
7. Dr. Samarendra Bhattacharya - Samaj Darshan O Rastra Darshan
8. Dr. Samarendra Bhattacharya - Manovidya
9. Dr. Pritibhusan Chattopadhyay & Sandeep Das – Manovidya, Samaj O Rastradarshan Dipika
10. Sengupta, Basu and Ghosh - Manovidya Samajdarshan O Rastradarshan
11. Maciver and Page - Society
12. Parimal Bhusan Kar - Samajtattwa
13. Sudarsan Roychowdhury - Rastra

Part - II
PAPER – IV

(Group A and Group B)

Theoretical and Applied Ethics

1. W. Lillie - Introduction to Ethics
2. Samarendra Bhattacharya - Nitividya
3. Peter Singer - Practical Ethics (Chapters I & VII)
4. James Rachels (Ed.) - Moral Problems (Part- I, Part-III, Part-VI-relevant Portions)
5. Basant Kumar Lal - Contemporary Indian Philosophy
6. Bernard Williams : Morality : An Introduction to Ethics
7. Raghvan Iyer : Moral and Political Thought of Mahatma Gandhi
8. J. J. C. Smart and Bernard Williams : Utilitarianism : For and Against
9. Peter Singer - Applied Ethics
10. W.K. Frankena - Ethics
11. J. L. Mackie - Ethics : Inventing right and wrong
12. Peter Singer (ed) : A Companion to Ethics
13. J. Rachel : Elements of Moral Philosophy
14. R. A. Duff : Trials and Punishments
15. Dr. Dikshit Gupta - Nitividya O Phalita Nitividya
16. Somnath Chakravorty - Kathay O Karme Ethics
17. Nabakumar Nandi : Vyavaharik Nitividya
18. Pradip Kumar Roy, (Bangla Academy,Dacca) -Vyavaharik Nitividya
19. Swami Vivekanander Vani O Rachana. (Udbodhan)
20. Swami Vivekanada - Practical Vedanta

21. Somnath Chakravorty : Nitividyar Tattvakatha
22. Santosh kumar Pal : Samakalin Paribesh Nitishastrer Ruprekha
23. Santosh kumar Pal : Phalita Nitishastra (Vol. I)
24. P. B. Sengupta : Nitividya

VIDYASAGAR UNIVERSITY

Curriculum for 3-year B.A (General)

Philosophy

Revised Syllabus under CBCS
(w. e. f. 2022-2023)

Vidyasagar University
Midnapore 721102
West Bengal

Vidyasagar University

Curriculum for B.A (General) in Philosophy

[Revised Syllabus w.e.f. 2022-23]

SEMESTER-I

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
Core-1 [DSC-1A]		**DSC-1A: Indian Philosophy**	Core Course-1	5	1	0	6	75
Core-2 [DSC-2A]		**DSC-2A: TBD *(from other Discipline*)**	Core Course-2				6	75
AECC Core [L-1]		**English-I**	Core Course-3 AECC **[Language core]**	5	1	0	6	75
AECC (Elective)		**English**	AECC (Elective)	1	1	0	2	50
Semester Total							**20**	**275**

L=Lecture, **T**=Tutorial, **P**=Practical, **CC =** Core Course, **TBD =** To be decided, **AECC (Elective) =** Ability Enhancement Compulsory Course (Elective) **DSC-1** = Discipline Specific Core of Subject-1, **DSC -2** = Discipline Specific Core of Subject-2,
AECC- Core [L-1]: Ability Enhancement Compulsory Course-Core [Language Core -1]

SEMESTER- I

Core Courses (CC)

DSC-1A (CC-1): Indian Philosophy **Credits 06**

DSC1AT: Indian Philosophy **Credits 06**

1. Introduction:

(a) General Features of Indian Philosophy: *Āstika and Nāstika*

2. Cārvāka:

(a) *pratyakṣa* (perception) as the only Source of Knowledge

(b) *jaḍavāda* and *dehātmavāda*

3. Jainism:

(a) *anekāntavāda*

(b) *syādvāda*

4. Buddhism:

(a) Four Noble Truths

(b) *pratītyasamutpāda*

(c) *kṣaṇabhaṅgavāda*

5. Nyāya–Vaiśeṣika:

(a) *pramāṇa*: *pratyakṣa* (perception) and its different types, *anumāna* (inference), *upamāna* (comparison)and *śabda* (testimony)

(b) *Vaisesika* theory (definition and classification) of *padārthas*.

6. Sāṁkhya:

(a) *Satkāryavāda* (Theory of Causality)

(b) *Pariṇāmavāda* (Theory of Evolution)

7. Yoga:

(a) *aṣṭāṅgayoga*

8. Mīmāṁsā

(a) Vidhi and Nisedha

9. Advaita Vedānta:

(a)Brahman, *jīva* and *jagat*

Suggested Readings:

- S. C. Chatterjee & D. M. Dutta: *An Introduction to Indian Philosophy*
- C. D. Sharma: *A Critical Survey of Indian Philosophy*
- Haridas Bandyaopadhyay: *Bhāratīya Darśaner Marmakathā*
- J. N. Mohanti : Classical Indian Philosophy
- Niradbaran Chakraborty: *Bhāratīya Darśan*
- Karuna Bhattacharya: *Nyāya-Vaiśeṣika Darśan*
- Panchanan Shastri: *Cārvāka Darśan*
- Panchanan Shastri: *Bauddha Darśan*
- Rajat Bhattacharya: *Sāṁkhyakārikā* O *Sāṁkhyatattvakumudī*
- Niradbaran Chakraborty: *Bhāratīya Darśan*
- Deepak Kumar Bagchi: *Bhāratīya Darśan*
- Debabrata Sen : *Bhāratīya Darśan*
- Pradyot Kumar Mandal: *Bhāratīya Darśan*
- Kanakprabha Bandyopadhyay: *Sāṁkhyapātañjaladarśan*
- Tarakishor Sharma Choudhury: *Pātañjaladarśan*
- Gobindagopal Mukhopadhyay: *Yoger Kathā: Patañjalir Dṛṣṭite*
- Purnachandra Vedanta Chunchu: *Pātañjal Darśan*

Vidyasagar University

Curriculum for B.A (General) in Philosophy

[Revised Syllabus w.e.f. 2022-23]

SEMESTER-II

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
Core-4 [DSC-1B]		**DSC-1B: Western Philosophy**	Core Course-4	5	1	0	6	75
Core-5 [DSC-2B]		**DSC-2B: TBD *(from other Discipline)***	Core Course-5	5	1	0	6	75
AECC Core		**MIL-1**	Core Course-6 AECC- **[Language core]**	5	1	0	6	75
AECC (Elective)		**ENVS**	AECC-2 (Elective)				4	100
Semester Total							**22**	**325**

L=Lecture, **T**=Tutorial, **P**=Practical, **CC** = Core Course, **TBD** = To be decided, **AECC (Elective)** = Ability Enhancement Compulsory Course (Elective) **DSC-1** = Discipline Specific Core of Subject-1, **DSC -2** = Discipline Specific Core of Subject-2, **MIL** = Modern Indian Language **ENVS**= Environmental Studies

AECC- Core: Ability Enhancement Compulsory Course-Core [Language Core]

SEMESTER- II

Core Courses (CC)

DSC-1B: Western Philosophy **Credits 06**

DSC1BT: Western Philosophy **Credits 06**

1. **Metaphysics:** Nature of Metaphysics, Elimination of Metaphysics
2. **Realism:** Naïve Realism, Scientific Realism, Representative Realism
3. **Idealism:** Subjective Idealism, Objective Idealism
4. **Critical Theory of Kant:** Possibility of metaphysics, Phenomena (Appearance) and Noumenon (Reality), Space and Time
5. **Theories of Causation:** Regularity Theory and Entailment Theory
6. **Substance:** Views of Descartes, Spinoza, Locke and Berkeley
7. **Relation between Mind and Body:** Interactionism and Parallelism

Suggested Readings:

1. Falkenberg : History of Western Philosophy
2. Sibapada Chakraborty : General Philosophy
3. Sibapada Chakraborty : An Introduction to General Philosophy
4. Ramchandra Pal : Darśan Parichaya
5. Rama Prasad Das & Sibapada Chakraborty : Pāścātya Darśaner Rūprekhā
6. Niradbaran Chakraborty : Pāścātya Darśaner Bhūmikā
7. J. N. Sinha, Introduction to Philosophy
8. Falguni Mukhopadhyaya, Jnanavidya o Adhividya (in Bengali)

Vidyasagar University

Curriculum for B.A (General) in Philosophy

[Revised Syllabus w.e.f. 2022-23]

SEMESTER-III

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
Core-7 [DSC-1C]		**DSC-1C: Logic**	Core Course-7	5	1	0	6	75
Core-8 [DSC-2C]		**DSC-2C: TBD** ***(from other Discipline)***	Core Course-8	5	1	0	6	75
AECC Core		**English-II**	Core Course-9 AECC- **[Language core]**	5	1	0	6	75
SEC-1		**SEC-1:** Philosophy of Human Rights **Or** **SEC-1:** Ethics in Practice	Skill Enhancement Ccourse-1 (Elective)	1	1	0	2	50
Semester Total							**20**	**275**

L=Lecture, **T**=Tutorial, **P**=Practical, **CC** = Core Course, **TBD** = To be decided, **AECC (Elective)** = Ability Enhancement Compulsory Course (Elective), **SEC** = Skill Enhancement Course, DSC = Discipline Specific Core, **MIL** = Modern Indian Language **ENVS**= Environmental Studies
AECC- Core: Ability Enhancement Compulsory Course-Core [Language Core]

SEMESTER- III

Core Courses (CC)

DSC-1C: Logic **Credits 06**

DSC1CT: Logic **Credits 06**

1. Basic Concept of Logic:
   (a) Nature and Scope of Logic,
   (b) Sentence, Proposition and Statement,
   (c) Inference and Argument
2. Types of Argument and Inference:
   (a) Deductive Argument and Inductive Argument,
   (b) Immediate inference and Mediate inference,
   (c) Categorical Syllogism,
   (d) Truth Functional Argument and Quantificational Argument
3. Opposition of Propositions: Rules and Fallacies
4. Immediate Inference: Rules and Fallacies
5. Categorical Syllogisms: Rules and Fallacies, Venn diagram
6. Truth functional Argument: Rules and Fallacies
7. Inductive Argument: Fallacies
8. Mill's Method

Suggested Readings:

1. M. Copi, C. Cohen, P. Jetli & M. Prabhakar : Introduction to Logic (14th Edition)
2. R. S. Agarwal: A Modern Approach to Logical Reasoning, Paperback, 2007
3. Bo Bennett : Logically Fallacious: The Ultimate Collection of Over 300 Logical Fallacies (Academic Edition)

Skill Enhancement Course (SEC)

SEC-1: Philosophy of Human Rights **Credits 02**

SEC1T: Philosophy of Human Rights **Credits 02**

Course Contents:

1. Definition and Nature of Human Rights
2. Meaning of Natural Right and Fundamental Right
3. Natural Right, Fundamental Right and Human Right
4. Preamble, Fundamental Rights and Duties (Indian Constitution)
5. Some Important features of Human Rights: Right of Life, Liberty and Property
6. Idea of Natural Law and Natural Rights: Thomas Hobbes and John Locke
7. Contemporary Perspectives: Joel Feinberg—Basic Rights

Suggested Readings:

1. Patrick Hayden (ed.): *The Philosophy of Human Rights*, Paragon House, St. Paul,First Edition, 2001.
2. Morton E. Winston (ed.): *The Philosophy of Human Rights*, Wadsworth PublishingCo. Belmont, California, 1989.
3. Jeremy Waldron (ed.): *Theories of Rights*, Oxford University Press, Oxford, 1984
4. Ashwani Peetush and Jay Drydyk: *Human Rights: India and West*, OxfordUniversity Press, New Delhi, 2015.
5. James Nickel: *Making Sense of Human Rights*, Blackwell Publishing, Oxford,2007.
6. Henry Shue: *Basic Rights: Subsistence, Affluence and U. S. Foreign Policy*,Princeton University Press, 1980
7. Gary, B. Herbert: *Philosophical History of Human rights*, Transaction Publishers,New Jersey, 2002.
8. Michael Freeden: *Rights*, Worldview Publications, New Delhi, 1998.
9. Lynn Hunt: *Inventing Human Rights*: A History, Norton & Company, New York,2007.
10. Jack Donnelly: *Universal Human rights in Theory and Practice*, Manas Publications, New Delhi, 2013,
11. Benulal Dhar: *The Philosophical Understanding of Human* R*ights*, D. K. PrintWorld, New Delhi, 2013.
12. William A. Edmundson: *An Introduction to Rights*, Cambridge University Press,Cambridge, 2012.
13. Carl Wellman: *The Moral Dimensions of Human Rights*, Oxford University Press,Oxford, 2011.
14. Benulal Dhar, *Manvadhikar Ki Ebong Kena* (PragatiPrakashak, Kolkata, 2016)
15. J. K. Das: *Human Rights Law and Practice*, (PHI Learning, 2016
16. Durga Das Basu : *Introduction to the Constitution of India*, (Lexis Nexis, 2016)
17. Justice Ruma Paul & M.P Jain: *Indian Constitutional Law* (Lexis Nexis, 2016)
18. L. K. Thakur, *Comparative International human Rights*, Authors Press, Delhi,2001
19. Payel Rai Chowdhuri: Manab Adhikar o Manab Unnayan, Progressive Publishers, Kolkata.

Or

SEC-1: Ethics in Practice **Credits 02**

SEC1T: Ethics in Practice **Credits 02**

Course Contents:

1. Notion and Methodology of Practical /Applied ethics.
2. Branches of applied /practical ethics
3. Bio-medical Ethics: Surrogate Motherhood, Euthanasia, Genetics.
4. Environmental Issues: Overcoming Speciesism, Land Ethics, Deep Ecology.
5. Animal Ethics: Animal Welfare and Animal Rights.
6. Professional Ethics: Patient-doctor Relationship, Teaching and Journalism.
7. Equality: Casteism, Gender discrimination and Reverse discrimination.
8. Concept of Pancasila in Buddhism.
9. Jaina concepts of Manchamahabrata, Triratna.

Suggested Readings:

1. W. Frankena: Ethics
2. Y. V. Satyanarayan : Ethics : Theory and Practice
3. S. K. Maitra : Ethics of the Hindus
4. C. Sharma : The Ethical Philosophy of India
5. W. Lillie : An Introduction to Ethics
6. Santosh Kumar Pal- : Falita Nitisastra.
7. J. S. Mackenzie : A Manual of Ethics
8. P. B. Chatterjee : Principles of Ethics
9. P. Singer : Practical Ethics
10. Surama Dasgupta: Developments of Moral Philosophy in India
11. K. N. Tewari: Classical Indian Ethical Thought
12. S. Radhakrishnan: The Bhagavadgitā
13. Ranchor Prime, (1994) Hinduism and Ecology, MLBD, Delhi.
14. Peter Harvey : Buddhist Ethics
15. Hammalawa Saddhatissa, (2003) Buddhist Ethics, Wisdom pub, Boston.
16. K. P. Sinha: Studies in Jainism
17. Walter Glannon: Biomedical Ethics
18. Peter Singer Anima: Liberation
19. Tom Regan : The Case for Animal Rights:

Vidyasagar University

Curriculum for B.A (General) in Philosophy

[Revised Syllabus w.e.f. 2022-23]

SEMESTER-IV

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
Core-10 [DSC-1D]		**DSC-1D:**Contemporary Indian Philosophy	Core Course-10	5	1	0	6	75
Core-11 [DSC-2D]		**DSC-2D: TBD *(from other Discipline)***	Core Course-11	5	1	0	6	75
AECC Core		**MIL-II**	Core -12 AECC- **[Language core]**	5	1	0	6	75
SEC-2		**SEC-2:** Philosophical Analysis **Or** **SEC-2:** Man and Environment	Skill Enhancement Ccourse-2 (Elective)	1	1	0	2	50
Semester Total							**20**	**275**

L=Lecture, **T=**Tutorial, **P=**Practical, **CC =** Core Course, **TBD =** To be decided, **AECC (Elective) =** Ability Enhancement Compulsory Course (Elective), **SEC** = Skill Enhancement Course, DSC = Discipline Specific Core, **MIL** = Modern Indian Language **ENVS**= Environmental Studies
AECC- Core: Ability Enhancement Compulsory Course-Core [Language Core]

SEMESTER- IV

Core Courses (CC)

DSC-1D: Contemporary Indian Philosophy **Credits 06**

DSC1DT: Contemporary Indian Philosophy **Credits 06**

Philosophical Thoughts of Rabindranath Tagore, Swami Vivekananda, Md. Iqbal and Mahatma Gandhi

1. **Rabindranath Tagore**
   (a)Nature of man: The Finite Aspect of Man, the Infinite Aspect of Man, the Finite-Infinite Aspect of Man, (b) Nature of Religion, (f) Surplus in man

2. **Swami Vivekananda**
   (a)Practical Vedānta, (b) Universal Religion,

3. **Md. Iqbal**
   (a)Nature of the Self, (b) Nature of the World, (c) Nature of God

4. **Mahatma Gandhi**
   (a) God and Truth, (b) Ahimsa, (c) Trusteeship

Suggested Readings:

1. B. K. Lal : *Contemporary Indian Philosophy*
2. D. M. Dutta : *Chief Currents of Contemporary Philosophy*
3. Binay Gopal Roy : *Contemporary Indian Philosophers*
4. Swami Vivekananda : *Complete Works of Swami Vivekananda* (Vol. II)
5. Nikhilesh Bandopadhyay: Binsho Shatabdir Bharatiya Darshon (suggested for addition)
6. Sadhana by Rabindranath Tagore

Skill Enhancement Course (SEC)

SEC-2: Philosophical Analysis **Credits 02**

SEC2T: Philosophical Analysis **Credits 02**

Course Contents:

1. **Meaning:** (a) Word - meaning and Sentence - meaning, (b) Testability and Meaning
   Word - Meaning: What is a word? The relation of words to things, The rule of commonusages of word and its exceptions, Meaning of the word "meaning."
   Sentence- Meaning: Sentence and meaning, Sentence and Proposition, Criteria of Sentence - meaning.
2. **Definition**
   Definition: What is definition? Defining characteristic and accompanying characteristic.
3. **Concept and Truth**
   Truth: (a) Propositional Truth, Verbal Truth, (b) Theories of Truth: CorrespondenceTheory, Coherence Theory and Pragmatic Theory.
4. **Knowledge:** Nature and Source of Knowledge
   Knowledge: (a) Sources of knowledge – Sense-experience, Reason. (b) Knowledge andBelief, The use of the verb " know," Strong and weak sense of knowledge
5. **Determinism and Freedom**
   Determinism and Freedom: (a) Determinism, Indeterminism and compatibility with free will. (b) Self-determinism and Freedom.

Suggested Readings:

1. Hospers: *An Introduction to Philosophical Analysis* (Chapters—1, 2, 3, 4 & 5)
2. Darshanik Bishlesaner Bhumika (Vol- 1, 2, 3): Samarendra Bhattercharya Darshanik Bishlesaner Ruparekha (vol- 1&2): Samari Kanta Samanta.
3. Darshanik Bishlesaner Bhumika: Rabindranath Das. (suggested for addition)

Or

SEC-2: Man and Environment **Credits 02**

SEC2T: Man and Environment **Credits 02**

Course Contents:

A. Classical Indian Attitude to Environment
   a. The Upanisadic world-view
   b. Tagore's understanding of nature
   c. The post - Upanisadic view of nature

B. Respect for Nature
   a. The attitude of respect
   b. Bio-centric outlook to nature
   c. Ethical standards and rules that follow from the attitude of respect to nature,

d. Intrinsic Value of Nature

C. Intrinsic Value of Nature

a. Moore's talk of 'intrinsic properties',
b. Chilsom's idea of intrinsic value,
c. Attfield on the intrinsic value of nature,
d. Deep Ecology and its Third World Critique
e. Arne Naess on Deep Ecology,
f. Ramchandra Guha's critique of Deep Ecology

D. Eco-feminism

a. Understanding nature and the feminine,
b. Dualisms in Western tradition,
c. Masculinity, humanity and nature,

Suggested Readings:

1. John Passmore, 'Attitudes to Nature', Environmental Ethics (ed.) Robert Elliot, Oxford University Press, Oxford,
2. Rabindranath Tagore, Sadhana (first Chapter), Macmillan, New York,
3. Paul Taylor, Respect for Nature: A Theory of Environmental Ethics (Select Parts), Princeton University Press, Princeton,
4. Robert Elliot, 'Intrinsic value, Environmental Obligation and Naturalness', Monist,
5. Arne Naess, 'The Shallow and the Deep, Long-Range Ecology Movements: A Summary', Inquiry,
6. Val Plumwood, Nature, Self and Gender: Feminism, Environmental Philosophy and the Critique of Rationalism, Environmental Ethics (ed.) Robert Elliot, Oxford University Press, Oxford,
7. Nirmalya Narayan Chakraborty, Paribesh o Naitikata, Progressive Book Forum, Kolkata,

Vidyasagar University

Curriculum for B.A (General) in Philosophy

[Revised Syllabus w.e.f. 2022-23]

SEMESTER-V

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
DSE-1A		**DSE-1A:** Philosophy of Religion **Or** **DSE-1A:**Contemporary Issues in Ethics	DSE-1 (Elective)	5	1	0	6	75
DSE-2A		**DSE-2A: TBD** ***(from other Discipline)***	DSE-2 (Elective)	5	1	0	6	75
GE-1		**TDB**	GE-1 (Elective)	5	1	0	6	75
SEC-3		**SEC-3:** Philosophy in Practice **Or** **SEC-3:** Value Education	Skill Enhancement Ccourse-3 (Elective)	1	1	0	2	50
Semester Total							**20**	**275**

L=Lecture, **T**=Tutorial, **P**=Practical, **CC =** Core Course, **TBD =** To be decided, **AECC (Elective) =** Ability Enhancement Compulsory Course (Elective), **SEC** = Skill Enhancement Course, DSC = Discipline Specific Core, **MIL** = Modern Indian Language **ENVS**= Environmental Studies

AECC- Core: Ability Enhancement Compulsory Course-Core [Language Core]

SEMESTER- V

Discipline Specific Elective (DSE)

DSE-1A: Philosophy of Religion **Credits 06**

DSE1AT: Philosophy of Religion **Credits 06**

Course Contents:

1. Nature and Scope of Philosophy of Religion:
(a) Philosophy of Religion, Comparative Religion and Theology

2. Origin and Development of Religion: historical, psychological and anthropological

3. Fundamental Features of Major Religions:
Hinduism, Christianity, Islam, Buddhism: Basic Tenets, Prophets (if any), Incarnation, Bondage and Liberation

4. Arguments for the Existence of God (Indian and Western):
Nyāya Arguments, Cosmological Arguments, Teleological Arguments, Ontological Arguments

5. Arguments against the Existence of God:
Sociological Arguments, Freudian Arguments, Buddhist Arguments

Suggested Readings:

1. J. Hick : *Philosophy of Religion*
2. P. B. Chatterjee : *Studies in Comparative Religion*
3. Edward : *Philosophy of Religion*
4. Swami Vivekananda: *A Study of Religion*
5. Kalidas Bhattacharyya : *Alternative Religions*
6. Amlan Datta : *Dharma O Yukti*
7. D. Mahanta: Dharma Darśaner Katipay Samasyā
8. Kalyan Gupta & Amitava Chakraborty : *Dharma Darsana*
9. M.M.Sharif : *A History of Muslim Philosophy*
10. M. Fakhry : *A History of Islamic Philosophy*
11. S. R. Saha (ed) : *Religions of the People of India*
12. R. K. M. Institute of Culture : *The Religion of the World*
13. Osman Ghani : *Ilamer Chita O Chetanar Kramabikash* (Dasham Khanda)
14. Hasan Ayub : *Islami Darshan*
15. R. S. Franks : *The Doctrine of Trinity*
16. K. N. Tiwari : *Comparative Religion*
17. Pijush Kanti Ghosh : *Dharma Darshan*
18. N. Arabinda Basu and Nibedita Chakraborty: *Dharma Darsan Parichaya*
19. A. Bandyopadhyay & K.C. Gupta : *Dharma Darśan*
20. Susil Kumar Chakraborty : *Dharma Darśan*
21. Samarendra Bhattacharya : *Dharma Darśan*

OR

DSE-1A: Contemporary Issues in Ethics **Credits 06**

DSE1AT: Contemporary Issues in Ethics **Credits 06**

Course Contents:

A. Bioethics
1. Understanding Ethics and Bioethics
2. Human Dignity and Human rights

B. Autonomy, consent and privacy
1. Autonomy and individual responsibility
2. Consent
3. Persons without the capacity to consent
4. Respect for human vulnerability and personal integrity
5. Privacy and confidentiality

C. Health and Responsibility
1. Social responsibility and health
2. Sharing of benefits
3. Protecting future generations
4. Protection of the environment, the biosphere and bio-diversity.

Suggested Readings:

1. Bioethcs: An Anthology,Kuhse,H and Singer,P(2008)2ND Ed.,Blackwels
2. The Cambridge Textbook of Bioethics,Singer,P.A. and Viens,A.M(2008),Cambridge University Press
3. Principles issues and cases, Vaughn, L(2012),Oxford University Press
4. Human Dignity, Human Rights and Responsibility – The New Language of GlobalBioethics and Biolaw, Barilan,Y.M (2014), USA:MIT

Generic Elective (GE)

[Interdisciplinary for other Department]

GE-1: Western Philosophy **Credits 06**

GE1T: Western Philosophy **Credits 06**

Course Contents:

1. **Metaphysics:** Nature of Metaphysics, Elimination of Metaphysics
2. **Realism:** Naïve Realism, Scientific Realism, Representative Realism
3. **Idealism**: Subjective Idealism, Objective Idealism
4. **Critical Theory of Kant**
5. **Theories of Causation:** Regularity Theory and Entailment Theory
6. **Substance:** Views of Descartes, Spinoza, Locke and Berkeley
7. **Relation between Mind and Body**: Interactionism and Parallelism
8. **Theories of Evolution:** Mechanistic and Emergent

Suggested Readings:

1. Falkenberg : History of Western Philosophy
2. Sibapada Chakraborty : General Philosophy
3. Sibapada Chakraborty : *An Introduction to General Philosophy*
4. Ramchandra Pal : *Darśan Parichaya*
5. Rama Prasad Das & Sibapada Chakraborty : *Pāścātya Darśaner Rūprekhā*
6. Niradbaran Chakraborty : *Pāścātya Darśaner Bhūmikā*

Or

GE-1: Indian Philosophy **Credits 06**

GE1T: Indian Philosophy **Credits 06**

Course Contents

1. Introduction:

General Features of Indian Philosophy: Āstika and Nāstika

2. Cārvāka:

(a) *pratyakṣa* (perception) as the only Source of Knowledge
(b) Refutation of *anumāna* (inference) and *śabda* (testimony) as Sources ofKnowledge
(b) *jaḍavāda* and *dehātmavāda*

3. Jainism:

a. anekāntavāda
b. syādvāda and *saptabhangi naya*

4. **Buddhism:**

(a) Four Noble Truths
(b) *pratītyasamutpāda*

(c) *kṣaṇabhaṅgavāda*
(d) *nairātmyavāda*

5. Nyāya–Vaiśeṣika:

a. *pramāṇa*: *pratyakṣa* (perception) and its different types, *anumāna* (inference), *upamāna* (comparison)and *śabda* (testimony)
b. *Saptapadārtha* (Seven Categories)

6. Sāṁkhya:

a. *Satkāryavāda* (Theory of Causality)
b. *Pariṇāmavāda* (Theory of Evolution)

7. Yoga :

a. cittavṛttinirodha
b. aṣṭāṅgayoga

8. Mīmāṁsā

a. arthāpatti
b. anupalabdhi

9. Advaita Vedānta:

Brahman, *jīva* and *jagat*

Suggested Readings:

1. S. C. Chatterjee & D. M. Dutta: *An Introduction to Indian Philosophy*
2. C. D. Sharma : *A Critical Survey of Indian Philosophy*
3. Haridas Bandyaopadhyay : *Bhāratīya Darśaner Marmakathā*
4. J. N. Mohanti : Classical Indian Philosophy
5. Niradbaran Chakraborty : *Bhāratīya Darśan*
6. Karuna Bhattacharya : *Nyāya-Vaiśeṣika Darśan*
7. Panchanan Shastri : *Cārvāka Darśan*
8. Panchanan Shastri : *Bauddha Darśan*
9. Rajat Bhattacharya : *Sāṁkhyakārikā* O *Sāṁkhyatattvakumudī*
10. Niradbaran Chakraborty : *Bhāratīya Darśan*
11. Deepak Kumar Bagchi : *Bhāratīya Darśan*
12. Debabrata Sen : *Bhāratīya Darśan*
13. Pradyot Kumar Mandal : *Bhāratīya Darśan*
14. Kanakprabha Bandyopadhyay : *Sāṁkhyapātañjaladarśan*
15. Tarakishor Sharma Choudhury : *Pātañjaladarśan*
16. Gobindagopal Mukhopadhyay : *Yoger Kathā : Patañjalir Dṛṣṭite*
17. Purnachandra Vedanta Chunchu : *Pātañjal Darśan*

Or

GE-1: Philosophy of Religion **Credits 06**

GE1T: Philosophy of Religion **Credits 06**

Course Contents:

(a) Nature and scope of Philosophy of Religion. Doctrine of karma and rebirth,doctrine of liberation.

(b) Origin and Source of Religion: Animism, Totemism, Freud's theory
(c) National Religion, Universal religion.
(d) The Philosophical teachings of the Holy Quran: God the Ultimate Reality, His attributes, His relation to the world and man.
(e) Some basic tenets of Christianity: The doctrine of Trinity, The theory ofRedemption
(f) Arguments for the existence of God: Cosmological, Teleological and Ontologicalarguments,
(g) Grounds for disbelief in God: Sociological theory of Durkheim, Freudian Theory, Cārvāka View.

Suggested Readings:

1. Philosophy of Religion: J. Hick
2. An Introduction to the Philosophy of Religion: Brian Davies
3. Indian Philosophy of Religion: A. Sharma
4. Comparative Religion: P.B. Chatterjee
5. Comparative Religion: Eric J. Sharpe
6. Patterns in Comparative Religion: M. Eliade (Ch I, Sec. I)
7. Atheism in Indian Philosophy: D.P. Chattopadhyay
8. Essays in Indian Philosophy (pp-145-169): Sukharanjan Saha (ed.)
9. Studies in Nyaya-Vaisesika Theism (pp-102-137,139-159): Gopika MohanBhattacharya
10. The Religions of the World: R.K.M. Institute of Culture
11. Encyclopedia Britannica, Vol. I
12. Encyclopedia of Islam, Vols. I & II
13. Indian Religions: S. Radhakrishnan
14. Foundations of Living Faith: H.D. Bhattacharya
15. Aspects of Hindu Morality: Saral Jhingram
16. A History of Muslim Philosophy (Vols.I &II): M.M. Sharif
17. Islam and Secularism: Sayed Muhammad Al-Naquib Al-Attas
18. The History of Philosophy in Islam-T.J. de Boer: E. Jones (tr.)
19. The Holy Quran: Mohammad Yusuf Ali (tr.)
20. The Spirit of Islam: Syed Amir Ali
21. The Meaning of the Glorious Koran: M. Pickthall
22. A History of Islamic Philosophy: M. Fakhry
23. The Spirit of Islam's Message, Muhammad Qamaruddin in Religions of the Peopleof India: S.R. Saha (ed.)
24. Cultural Heritage of Islam: Osman Ghani
25. Old Testament: R. Kittel (ed.)
26. New Testament: Kilpatrick
27. The Doctrine of the Trinity: R.S. Franks
28. The Doctrine of the Trinity: Loenard Hodgson
29. The Idea of the Holy: R. Otto
30. A Brief Account of the Religion of the Hindus: Srilekha Dutta in Religions of thePeople of India: S.R. Saha (ed.)
31. Dharma in Hinduism: An Ideal Religion: Tapan Kumar Chakraborty in Religionsof the People of India: S.R. Saha (ed.)
32. Jainism-A Religion of Non-Theistic Humanism: Tushar Sarkar in Religions of thePeople of India: S.R. Saha (ed.)
33. Essays in Analytical Philosophy (Ch.VII): Gopinath Bhattacharya
34. Buddhism in India and Abroad: Anukul Badyopadhyay

Skill Enhancement Course (SEC)

SEC-3: Philosophy in Practice **Credits 02**

SEC3T: Philosophy in Practice **Credits 02**

Course Contents:

1. Nature of Inquiry in Philosophy and darśana

2. Outlines of the types of Inquiry in Philosophy and darśana:
(a) Epistemic Inquiry in Philosophy and *darśana*, (b) Metaphysical Inquiry in Philosophy and *darśana*, (c) Axiological Inquiry in Philosophy and *darśana*

3. A few Model World-views and corresponding paths leading to Perfection
(a) Kant's view (b) Advaita Vedānta View

4. Methods of Philosophical Discourse
(a) Reasoned Speculation, (b) Conceptual Analysis, (c) Linguistic Analysis, (d) Logical Argumentation, (e) Critical Reflection

5. Methods of *Dārśanika* Discourse (*kathā*)
(a) Chala (b) Jāti (c) Nigrahasthāna, (d) Vāda (e) Jalpa (f) Vitaṇḍā

Suggested Readings:

1. H. Cappelen: *The Oxford Handbook of Philosophical Methodology*, Oxford University Press,
2. B.K. Matilal: *The Word and The World* , Oxford University Press, 2001
3. Bimal Krishna Matilal: *The Character of Logic in India*
4. Bertrand Russell: *Problems of Philosophy*
5. Paul F. Kisak: *Philosophical Methodology : the Methods of Philosophical Inquiry* CSI Publishing Platform,
6. E. V. Stubley: Philosophic as a Method of Inquiry
7. R. M. Keon: Philosophic Semantics and Philosophic Inquiry
8. The Methods of philosophy is the Methods of Inquiry (https://explicitblog.wordpress.com)
9. G. E. Moore: *Some Main Problems of Philosophy*, New York
10. Sadānanda Yogīndra: *Vedāntasāra*

Or

SEC-3: Value Education **Credits 02**

SEC3T: Value Education **Credits 02**

Course Contents:

A. Meaning, Characteristics, significance and objectives of Value education
B. Values in different contexts: Individual, Social, Cultural, Moral and Global and Spiritual.
C. Meaning and Characteristics of Peace education

D. Aims and Objectives of Peace Education

E. Types of peace education

F. Peace and Value education in Global Perspective

Suggested Readings:

1. Introduction to Peace Studies: David P. Barash Belmont
2. 'International Relations', in The English Writings of Rabindranath Tagore: A Miscellany, (ed) Sisir Kumar Das: Rabindra Nath Tagore New Delhi: Sahitya Akademi,
3. Handbook of Peace and Conflict Studies: Charles Webel and Johan Galtung(eds.), Routledge, London and New York,
4. Peace and Value Education: Babu Muthuja,
5. Philosophy of Value: Aditya Mohanty

Vidyasagar University

Curriculum for B.A (General) in Philosophy

[Revised Syllabus w.e.f. 2022-23]

SEMESTER-VI

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
DSE-1B		**DSE1B:**Tarkasaṁgraha with Dīpikā **Or** **DSE-1B:** Gender Studies	DSE-3 (Elective)	5	1	0	6	75
DSE-2B		**DSE-2B: TBD** ***(from other Discipline)***	DSE-4 (Elective)	5	1	0	6	75
GE-2		**TDB**	GE-2 (Elective)	5	1	0	6	75
SEC-4		**SEC-4:** Computer Applications **Or** **SEC-4:** Logical Reasoning and Application	Skill Enhancement Ccourse-4 (Elective)	1	1	0	2	50
Semester Total							**20**	**275**

L=Lecture, **T**=Tutorial, **P**=Practical, **CC** = Core Course, **TBD** = To be decided, **AECC (Elective)** = Ability Enhancement Compulsory Course (Elective), **SEC** = Skill Enhancement Course, DSC = Discipline Specific Core, **MIL** = Modern Indian Language **ENVS**= Environmental Studies
AECC- Core: Ability Enhancement Compulsory Course-Core [Language Core]

SEMESTER- VI

Discipline Specific Elective (DSE)

DSE-1B: Tarkasaṁgraha with Dīpikā **Credits 06**

DSE1BT: Tarkasaṁgraha with Dīpikā **Credits 06**

Course Contents:

Recommended Topics:

***Saptapadārtha* – Definition and Classification of padārthas following Dīpikā**

Suggested Readings:

1. Annaṁbhaṭṭa ***:*** *Tarkasaṁgraha with Dīpikā*
2. Gopinath Bhattacharyya (English trans. & elucidation) *Tarkasaṁgrahadīpikā on Tarkasaṁgraha,* Progressive Publishers, Calcutta
3. Narayan Chandra Goswami : *Tarkasaṁgraha of Annambhatta* (Bengali trans. & elucidation)
4. Anamika Roychoudhury : *Tarkasaṁgraha* (Bengali trans. & elucidation)

OR

DSE-1B: Gender Studies **Credits 06**

DSE1BT: Gender Studies **Credits 06**

Course Contents:

A. Scope and rationale of Gender Studies.
B. Gender as social construction vis-à-vis sex.
C. Levels of misogyny, sexism, patriarchy and Phallogocentrism, Androcentrism.
D. Feminism and its different strands: Liberal, Marxist, Radical, Socialist and Post-colonial.
E. Third Gender issues
F. Masculinism

Suggested Readings:

1. Feminist Thought: Androcentrism, Communication and Objectivity: Shefali Moitra, Munshiram Monoharlal Publishers Pvt. Ltd.,2002, New Delhi
2. Understanding Gender: Kamla Bhasin, Women Unlimited,2001,New Delhi
3. Handbook of Feminist Theory : Lisa Disch And Mary Hawkesworth, Oxford University Press,2016
4. Practical Ethics: Peter Singer
5. Applied Ethics: Peter Singer
6. Redefining Ethics As Care: Bidisha Mukherjee, Papyrus,Kolkata 2008
7. The Ethics Of Care : Virginia Held
8. The Core Of Care Ethics : S.Collins, P.Macmillan Publishers, 2015
9. In a Different Voice : Gilligan,C., Harvard University Press, 1982
10. Naitikata O Narivada : Shefali Moitra
11. Nitividya: Samarendra Bhattacharya

Generic Elective (GE)

[Interdisciplinary for other Department]

GE-2: Socio-Political Philosophy **Credits 06**

GE2T: Socio-Political Philosophy **Credits 06**

Course Contents:

9. **Metaphysics:** Nature of Metaphysics, Elimination of Metaphysics
10. **Realism:** Naïve Realism, Scientific Realism, Representative Realism
11. **Idealism**: Subjective Idealism, Objective Idealism
12. **Critical Theory of Kant**
13. **Theories of Causation:** Regularity Theory and Entailment Theory
14. **Substance:** Views of Descartes, Spinoza, Locke and Berkeley
15. **Relation between Mind and Body**: Interactionism and Parallelism
16. **Theories of Evolution:** Mechanistic and Emergent

Suggested Readings:

7. Falkenberg : History of Western Philosophy
8. Sibapada Chakraborty : General Philosophy
9. Sibapada Chakraborty : *An Introduction to General Philosophy*
10. Ramchandra Pal : *Darśan Parichaya*
11. Rama Prasad Das & Sibapada Chakraborty : *Pāścātya Darśaner Rūprekhā*
12. Niradbaran Chakraborty : *Pāścātya Darśaner Bhūmikā*

Or

GE-2: Psychology and Philosophy of Mind **Credits 06**

GE2T: Psychology and Philosophy of Mind **Credits 06**

Course Contents

10. Introduction:

General Features of Indian Philosophy: Āstika and Nāstika

11. Cārvāka:

(a) *pratyakṣa* (perception) as the only Source of Knowledge
(b) Refutation of *anumāna* (inference) and *śabda* (testimony) as Sources ofKnowledge
(c) *jaḍavāda* and *dehātmavāda*

12. Jainism:

a. anekāntavāda
b. syādvāda and *saptabhangi naya*

13. **Buddhism:**

(a) Four Noble Truths
(b) *pratītyasamutpāda*
(c) *kṣaṇabhaṅgavāda*

(d) *nairātmyavāda*

14. Nyāya–Vaiśeṣika:

a. *pramāṇa*: *pratyakṣa* (perception) and its different types, *anumāna* (inference), *upamāna* (comparison)and *śabda* (testimony)
b. *Saptapadārtha* (Seven Categories)

15. Sāṁkhya:

a. *Satkāryavāda* (Theory of Causality)
b. *Pariṇāmavāda* (Theory of Evolution)

16. Yoga :

a. cittavṛttinirodha
b. aṣṭāṅgayoga

17. Mīmāṁsā

a. arthāpatti
b. anupalabdhi

18. Advaita Vedānta:

Brahman, *jīva* and *jagat*

Suggested Readings:

18. S. C. Chatterjee & D. M. Dutta: *An Introduction to Indian Philosophy*
19. C. D. Sharma : *A Critical Survey of Indian Philosophy*
20. Haridas Bandyaopadhyay : *Bhāratīya Darśaner Marmakathā*
21. J. N. Mohanti : Classical Indian Philosophy
22. Niradbaran Chakraborty : *Bhāratīya Darśan*
23. Karuna Bhattacharya : *Nyāya-Vaiśeṣika Darśan*
24. Panchanan Shastri : *Cārvāka Darśan*
25. Panchanan Shastri : *Bauddha Darśan*
26. Rajat Bhattacharya : *Sāṁkhyakārikā* O *Sāṁkhyatattvakumudī*
27. Niradbaran Chakraborty : *Bhāratīya Darśan*
28. Deepak Kumar Bagchi : *Bhāratīya Darśan*
29. Debabrata Sen : *Bhāratīya Darśan*
30. Pradyot Kumar Mandal : *Bhāratīya Darśan*
31. Kanakprabha Bandyopadhyay : *Sāṁkhyapātañjaladarśan*
32. Tarakishor Sharma Choudhury : *Pātañjaladarśan*
33. Gobindagopal Mukhopadhyay : *Yoger Kathā : Patañjalir Dṛṣṭite*
34. Purnachandra Vedanta Chunchu : *Pātañjal Darśan*

Or

GE-2: Applied Ethics **Credits 06**

GE2T: Applied Ethics **Credits 06**

Course Contents:

(h) Nature and scope of Philosophy of Religion. Doctrine of karma and rebirth,doctrine of liberation.
(i) Origin and Source of Religion: Animism, Totemism, Freud's theory
(j) National Religion, Universal religion.

(k) The Philosophical teachings of the Holy Quran: God the Ultimate Reality, His attributes, His relation to the world and man.
(l) Some basic tenets of Christianity: The doctrine of Trinity, The theory ofRedemption
(m) Arguments for the existence of God: Cosmological, Teleological and Ontological arguments,
(n) Grounds for disbelief in God: Sociological theory of Durkheim, Freudian Theory, Cārvāka View.

Suggested Readings:

35. Philosophy of Religion: J. Hick
36. An Introduction to the Philosophy of Religion: Brian Davies
37. Indian Philosophy of Religion: A. Sharma
38. Comparative Religion: P.B. Chatterjee
39. Comparative Religion: Eric J. Sharpe
40. Patterns in Comparative Religion: M. Eliade (Ch I, Sec. I)
41. Atheism in Indian Philosophy: D.P. Chattopadhyay
42. Essays in Indian Philosophy (pp-145-169): Sukharanjan Saha (ed.)
43. Studies in Nyaya-Vaisesika Theism (pp-102-137,139-159): Gopika MohanBhattacharya
44. The Religions of the World: R.K.M. Institute of Culture
45. Encyclopedia Britannica, Vol. I
46. Encyclopedia of Islam, Vols. I & II
47. Indian Religions: S. Radhakrishnan
48. Foundations of Living Faith: H.D. Bhattacharya
49. Aspects of Hindu Morality: Saral Jhingram
50. A History of Muslim Philosophy (Vols.I &II): M.M. Sharif
51. Islam and Secularism: Sayed Muhammad Al-Naquib Al-Attas
52. The History of Philosophy in Islam-T.J. de Boer: E. Jones (tr.)
53. The Holy Quran: Mohammad Yusuf Ali (tr.)
54. The Spirit of Islam: Syed Amir Ali
55. The Meaning of the Glorious Koran: M. Pickthall
56. A History of Islamic Philosophy: M. Fakhry
57. The Spirit of Islam's Message, Muhammad Qamaruddin in Religions of the Peopleof India: S.R. Saha (ed.)
58. Cultural Heritage of Islam: Osman Ghani
59. Old Testament: R. Kittel (ed.)
60. New Testament: Kilpatrick
61. The Doctrine of the Trinity: R.S. Franks
62. The Doctrine of the Trinity: Loenard Hodgson
63. The Idea of the Holy: R. Otto
64. A Brief Account of the Religion of the Hindus: Srilekha Dutta in Religions of thePeople of India: S.R. Saha (ed.)
65. Dharma in Hinduism: An Ideal Religion: Tapan Kumar Chakraborty in Religionsof the People of India: S.R. Saha (ed.)
66. Jainism-A Religion of Non-Theistic Humanism: Tushar Sarkar in Religions of thePeople of India: S.R. Saha (ed.)
67. Essays in Analytical Philosophy (Ch.VII): Gopinath Bhattacharya
68. Buddhism in India and Abroad: Anukul Badyopadhyay

Skill Enhancement Course (SEC)

SEC-4: Computer Applications **Credits 02**

SEC4T: Computer Applications **Credits 02**

Course Contents:

6. Nature of Inquiry in Philosophy and darśana

7. Outlines of the types of Inquiry in Philosophy and darśana:
(a) Epistemic Inquiry in Philosophy and *darśana*, (b) Metaphysical Inquiry in Philosophy and *darśana*, (c) Axiological Inquiry in Philosophy and *darśana*

8. A few Model World-views and corresponding paths leading to Perfection
(a) Kant's view (b) Advaita Vedānta View

9. Methods of Philosophical Discourse
(a) Reasoned Speculation, (b) Conceptual Analysis, (c) Linguistic Analysis, (d) Logical Argumentation, (e) Critical Reflection

10. Methods of *Dārśanika* Discourse (*kathā*)
(a) Chala (b) Jāti (c) Nigrahasthāna, (d) Vāda (e) Jalpa (f) Vitaṇḍā

Suggested Readings:

11. H. Cappelen: *The Oxford Handbook of Philosophical Methodology,* Oxford University Press,
12. B.K. Matilal: *The Word and The World* , Oxford University Press, 2001
13. Bimal Krishna Matilal: *The Character of Logic in India*
14. Bertrand Russell: *Problems of Philosophy*
15. Paul F. Kisak: *Philosophical Methodology : the Methods of Philosophical Inquiry* CSI Publishing Platform,
16. E. V. Stubley: Philosophic as a Method of Inquiry
17. R. M. Keon: Philosophic Semantics and Philosophic Inquiry
18. The Methods of philosophy is the Methods of Inquiry (https://explicitblog.wordpress.com)
19. G. E. Moore: *Some Main Problems of Philosophy,* New York
20. Sadānanda Yogīndra: *Vedāntasāra*

Or

SEC-4: Logical Reasoning and Application **Credits 02**

SEC4T: Logical Reasoning and Application **Credits 02**

Course Contents:

G. Meaning, Characteristics, significance and objectives of Value education
H. Values in different contexts: Individual, Social, Cultural, Moral and Global and Spiritual.
I. Meaning and Characteristics of Peace education
J. Aims and Objectives of Peace Education

K. Types of peace education

L. Peace and Value education in Global Perspective

Suggested Readings:

1. Introduction to Peace Studies: David P. Barash Belmont
2. 'International Relations', in The English Writings of Rabindranath Tagore: A Miscellany, (ed) Sisir Kumar Das: Rabindra Nath Tagore New Delhi: Sahitya Akademi,
3. Handbook of Peace and Conflict Studies: Charles Webel and Johan Galtung(eds.), Routledge, London and New York,
4. Peace and Value Education: Babu Muthuja,
5. Philosophy of Value: Aditya Mohanty

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year B. A (HONOURS)
in

Philosophy

Under Choice Based Credit System (CBCS)
w.e.f 2018-2019

VIDYASAGAR UNIVERSITY

BA (Honours) in Philosophy

[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
	Semester-I								
1	I	Core-1		C1T: Indian Philosophy -I	6	5-1-0	15	60	75
		Core-2		C2T: History of Western Philosophy - I	6	5-1-0	15	60	75
		GE-1		TBD	6	5-1-0	15	60	75
		AECC-1 **(Elective)**		English/MIL	2	1-1-0	10	40	50
	Semester –I: total				**20**				**275**
	Semester-II								
	II	Core-3		C3T: Indian Philosophy - II	6	5-1-0	15	60	75
		Core-4		C4T: History of Western Philosophy - II	6	5-1-0	15	60	75
		GE-2		TBD	6	5-1-0	15	60	75
		AECC-2 **(Elective)**		ENVS	4		20	80	100
	Semester-II : total				**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
	Semester-III								
2	**III**	Core-5		C5T: Philosophy of Mind	6	5-1-0	15	60	75
		Core-6		C6T: Social and Political Philosophy	6	5-1-0	15	60	75
		Core-7		C7T: Philosophy of Religion	6	5-1-0	15	60	75
		GE-3		TBD	6	5-1-0	15	60	75
		SEC-1		**SEC-1:**Computer Application **Or SEC-1:** Philosophy of Human Rights	2	1-1-0	10	40	50
		Semester – III : total			**26**				**350**
	Semester-IV								
	IV	Core-8		C8T: Western Logic - I	6	5-1-0	15	60	75
		Core-9		C9T: Western logic - II	6	5-1-0	15	60	75
		Core-10		C10T:Epistemiology and metaphysics (Western)	6	5-1-0	15	60	75
		GE-4		TBD	6	5-1-0	15	60	75
		SEC-2		**SEC -2:** Value Education **Or SEC -2:** Man and Environment	2	1-1-0	10	40	50
		Semester – IV : total			**26**				**350**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
		Semester-V							
3	**V**	Core-11		C11T: Nayaya Logic and Epistemiology	6	5-1-0	15	60	75
		Core-12		C12T: Ethics(Indian)	6	5-1-0	15	60	75
		DSE-1		TBD	6	5-1-0	15	60	75
		DSE-2		TBD	6	5-1-0	15	60	75
		Semester –V : total			**24**				**300**
		Semester-VI							
	VI	Core-13		C13T: Nayaya Logic and Epistemiology-II	6	5-1-0	15	60	75
		Core-14		C14T: Ethics (Western)	6	5-1-0	15	60	75
		DSE-3		TBD	6	5-1-0	15	60	75
		DSE-4		TBD	6	5-1-0	15	60	75
		Semester – VI : total			**24**				**300**
Total in all semester:					**142**				**1900**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENVS** = Environmental Studies ,

List of Core and Elective courses

Core Courses (CC)

CC - 1: Indian Philosophy - I
CC - 2: History of Western Philosophy - I
CC - 3: Indian Philosophy - II
CC - 4: History of Western Philosophy- II
CC - 5: Philosophy of Mind
CC - 6: Social and Political Philosophy
CC - 7: Philosophy of Religion
CC - 8: Western Logic – I
CC - 9: Western Logic – II
CC -10: Epistemology and Metaphysics (Western)
CC -11: Nyya Logic and Epistemology – I
CC -12: Ethics (Indian)
CC -13: Nayaya Logic and Epistemology – II
CC -14: Ethics (Western)

Discipline Specific Elective (DSE)

DSE-1: Philosophy of language (Indian)

DSE-2: Ethics (Applied Ethics)
Or
DSE-2: Philosophy of Language (Western)

DSE-3: ***(Any one text from following four texts of Western philosophy and Indian philosophy)***

DSE-3A: An Enquiry Concerning Human Understanding - D. Hume
Or
DSE-3B: The Problems of Philosophy-- Bertrand Russell
Or
DSE-3C: Vedāntasāra: Sadananda Yogindra Saraswati
Or
DSE-3D: Śrimadbhagabadgīta

DSE-4: ***(Any one philosophical system from following philosophical systems of contemporary Indian thought)***

DSE-4A: Swami Vivekananda
Or
DSE-4B: Rabindranath Tagore
Or
DSE-4C: Sri Aurobindo
Or
DSE-4D: M.K.Gandhi

Skill Enhancement Course (SEC)

SEC-1: Computer Application
Or
SEC-1: Philosophy of Human Rights

SEC -2: Value Education
Or
SEC -2: Man and Environment

Generic Elective (GE)
[Interdisciplinary for other department]

GE-1: Ethics: Indian and Western
Or
GE-1: Western Logic

GE-2: Feminism
Or
GE-2: Philosophy of Mind

GE-3: Theory of Inference in Nyāya
Or
GE-3: Theory of God in Nyāya Metaphysics

GE- 4: Environmental Ethics
Or
GE- 4: Termination of Life & Ethics

Core Courses (CC)

CC-1: Indian Philosophy – I **Credits 06**

C1T: Indian Philosophy – I

Course Contents:

a) Introduction: Division of Indian Philosophical Schools:Āstika and Nāstika
b) Cārvāka School- Epistemology, Metaphysics, Ethics.
c) Jainism- Concept of Dravya, Sat, Guṇa, Paryāya Anekāntavāda, Syādvāda and Saptabhaṅginaya.
d) Buddhism- Four noble Truths, Theory of Dependent Origination (Pratītyasamutpādavāda), Definition of Reality(Arthakriyākāritva), Doctrine of Momentariness, (Kṣanabhangavāda), Theory of no-soul (Nairātmyavāda), Four Schools of Buddhism (Basic tenets).
e) Nyāya – Pramā and Pramāṇa, Pratyakṣa (Definition), Sannikarṣa, Classification ofPratyakṣa: Nirvikalpaka, Savikalpaka, Laukika, Alaukika;
f) Anumiti, Anumāna (Definition), vyāpti, parāmarśa, Classification of Anumāna: pūrvavat, śesavat, smānyatodṛsta, kevalānvayī, kevalavyātirekī, anvayavyātirekī, svārthānumāna, parārthānumāna, Upamāna (definition), Śabda (definition),
g) Vaiśeṣika—Seven Padārthas, dravya, guṇa, karma, sāmānya, viśeṣa, samavāya, abhāva,
h) Different types of causes: samavayi, asamavayi and nimitta. Asatkāryavāda.

Suggested Readings:

English:

- Outlines of Indian Philosophy: M. Hiriyanna
- A Critical Survey of Indian Philosophy: C.D. Sharma
- An Introduction to Indian Philosophy: D. M. Dutta & S.C. Chatterjee
- Classical Indian Philosophy: J.N. Mohanty
- History of Indian Philosophy: S.N. Dasgupta
- Indian Philosophy (Vol. I & II): S. Radhakrishnan
- Indian Philosophy (Vol. I & II): J.N. Sinha
- Studies on the Carvaka/Lokayata: Ramakrishna Bhattacharya
- The Central Philosophy of Buddhism: T.R.V. Murti
- Yogacara Idealism: A.K.Chatterjee
- An Introduction to Maddhyamika Philosophy: Jaydev Singh
- Reflections on Indian Philosophy: K.P. Sinha
- Philosophy of Jainism: K.P. Sinha
- Nyaya Theory of Knowledge: S.C. Chatterjee
- Six Ways of Knowing: D.M. Dutta
- Nyaya-Vaisesika Metaphysics: Sadananda Bhaduri
- The Doctrine of Maya: A.K. Roychoudhuri
- Self and Falsity in Advaita Vedanta: A.K. Roychoudhuri
- The Word and the world: Bimal Krishna Matilal
- Logic, Language and Reality: Bimal Krishna Matilal

Bengali:

- Bharatiya Darshan: Debabrata Sen
- Bharatiya Darshan: Nirodbaran Chakraborty
- Sayan Madhaviya Sarva Darshan Samgraha: Satyajyoti Chakraborti
- Lokayata Darshan: Debiprasad Chatoopadhyay
- Carvakacarca: Ramakrisna Bhattacharya
- Carvaka Darshan: Panchanan Sastri
- Carvaka Darshan: Amit Kumar Bhattacharya
- Bauddha Dharma O Darshan: Swami Vidyaranya
- Bauddha Darshan: Panchanan Sastri
- Gautama Buddher Darshan o Dharma: Sukomol Choudhury
- Bauddha Darshan: Amit Kumar Bhattacharya
- Ksanabhangavada: Bidhubhusan Bhattacharya
- Jainadarshaner Digdarshan: Satindra Chandra Bhattacharya
- Nyaya Darshan: Phanibhushan Tarkavagisha
- Nyaya Paricaya: Phanibhushan Tarkavagisha
- Nyaya-Vaisesika Darshan: Karuna Bhattacharya
- Nyaya Tattva Parikrama: Kalikrishna Bandyopadhyaya
- Samkhya Darshan: Bhupendranath Bhattacharya
- Samkhya Darshaner Vivarana: Bidhubhushan Bhattacharya
- Samkhyamata Samiksa: Yogendranath Bagchi
- Samkhya Tattva Kaumudi: Narayan Chandra Goswami
- Samkhya-Patanjal Darshan: Kanakprabha Bandyopadhyaya
- Patanjal Darshan: Purnachandra Vedantachanchu
- Puva Mimasa Darshan: Sukhamaya Bhattacharya
- Vedanta Darshan: Roma Choudhury
- Vedanta Darshan: Advaitavada: Ashutosh Sastri
- Mayavada: Pramatha Nath Tarkabhushan
- Vedanta Darshan: Swami Vidyaranya

CC-2: History of Western Philosophy – I **Credits 06**

C2T: History of Western Philosophy – I

Course Contents:

a) **Pre Socratic Philosophy:** A brief outline
b) **Plato:** Theory of Knowledge, Theory of Forms.
c) **Aristotle :** Critique of Plato's theory of Forms, Doctrine of four causes, Form and Matter
d) **St. Thomas Aquinas:** Faith and Reason, Essence and Existence.
e) **Descartes:**Cartesian method of doubt, cogito ergo sum, criterion of truth, types of ideas, Proofs for the existence of God, Mind- body dualism Proofs for the existence of the external world,
f) **Spinoza:** Doctrine of substance, Attributes and Modes, Existence of God, Pantheism, Three orders of knowing.
g) Leibniz: Monads, Truths of reason, Truths of facts, Innate ideas, Some metaphysical principles: Law of Identity of indiscernibles, Law of sufficient reason, Law of continuity, Doctrine of Pre-established harmony.

Suggested Readings:

English:

- The Greek Philosophers from Thales to Aristotle: W. K. C. Guthrie
- A Critical History of Greek Philosophy: W.T. Stace
- Encyclopedia of Philosophy: P. Edwards (ed.)
- A History of Philosophy: F. Copleston, vols. I, II, IV, V, VI
- History of Western Philosophy: B. Russell
- History of Modern Philosophy: R. Falckenberg
- A Critical History of Modern Philosophy: Y.H. Masih
- A History of Philosophy: F. Thilly
- A History of Modern Philosophy: W.K. Wright
- A Critical History of Western Philosophy: D.J. O'Connor
- A History of Philosophy from Descartes to Wittgenstein: R. Scruton
- The Fundamental Questions of Philosophy: A.C. Ewing
- A Brief History of Western Philosophy: A. Kenny
- The Works of Descartes: Haldane & Ross (eds.)
- Descartes: The Project of Pure Enquiry: B. Williams
- Descartes: A. Kenny
- Spinoza: Leon Roth
- Leibniz: An Introduction to His Philosophy: N. Rescher
- The Rationalists: J. Cottingham

Bengali:

- Paschatya Darshaner Itihas: Tarak Candra Roy (pratham o dwitiya khanda)
- Paschatya Darshaner Itihas: Kalyan Chandra Gupta
- Paschatya Darshaner Itihas: Susanta Chakraborty
- Paschatya Darshaner Itihas: Samarendra Bhattacharya (pratham o dwitiya khanda)
- Paschatya Darshaner Itihas(Plato o Aristotle): N.B. Chakraborty
- Paschatya Darshaner Itihas(Plato o Aristotle): Debabrata Sen
- Paschatya Darshaner Itihas(Adhunik Yuga-Yuktivada (Descartes), Spinoza, Leibniz:): Chandrodaya Bhattacharya

CC-3: Indian Philosophy – II **Credits 06**

C3T: Indian Philosophy – II

Course Contents:

a) Sāmkhya - Satkāryavāda, Nature of Prakṛti, its constituents and proofs for its existence. Nature of Puruṣa and proofs for its existence, Plurality of Puruṣas, theory of evolution.
b) Yoga - Citta, Cittavṛtti, Cittabhūmi. Eight fold path of Yoga, God.
c) Mīmāmsā (Prābhakara and Bhātta) :Anvitābhidhānvāda and avihitānvayavāda, Arthāpatti and Anupalabdhi as sources of knowledge
d) Advaita Vedānta - Sankara's view of Brahman, Saguṇa and Nirguṇa Brahman, Three grades ofSattā: prātibhāsika, vyavahārika and pāramārthika, Jīva, Jagat and Māyā.
e) Viśistādvaita - Rāmānuja's view of Brahman, Jīva, Jagat. Refutation of the doctrine of Māyā.

Suggested Readings:

English:

- Outlines of Indian Philosophy: M. Hiriyanna
- A Critical Survey of Indian Philosophy: C.D. Sharma
- An Introduction to Indian Philosophy: D. M. Dutta & S.C. Chatterjee
- Classical Indian Philosophy: J.N. Mohanty
- History of Indian Philosophy: S.N. Dasgupta
- Indian Philosophy (Vol. I & II): S. Radhakrishnan
- Indian Philosophy (Vol. I & II): J.N. Sinha
- Six Ways of Knowing: D.M. Dutta
- The Doctrine of Maya: A.K. Roychoudhuri
- Self and Falsity in Advaita Vedanta: A.K. Roychoudhuri
- The Word and the world: Bimal Krishna Matilal
- Logic, Language and Reality: Bimal Krishna Matilal

Bengali:

- Bharatiya Darshan: Debabrata Sen
- Bharatiya Darshan: Nirodbaran Chakraborty
- Sayan Madhaviya Sarva Darshan Samgraha: Satyajyoti Chakraborti
- Lokayata Darshan: Debiprasad Chatoopadhyay
- Carvakacarca: Ramakrisna Bhattacharya
- Carvaka Darshan: Panchanan Sastri
- Carvaka Darshan: Amit Kumar Bhattacharya
- Bauddha Dharma o Darshan: Swami Vidyaranya
- Bauddha Darshan: Panchanan Sastri
- Gautama Buddher Darshan o Dharma: Sukomol Choudhury
- Bauddha Darshan: Amit Kumar Bhattacharya
- Ksanabhangavada: Bidhubhusan Bhattacharya
- Jainadarshaner Digdarshan: Satindra Chandra Bhattacharya
- Nyaya Darshan: Phanibhushan Tarkavagisha
- Nyaya Paricaya: Phanibhushan Tarkavagisha
- Nyaya-Vaisesika Darshan: Karuna Bhattacharya
- Nyaya Tattva Parikrama: Kalikrishna Bandyopadhyaya
- Samkhya Darshan: Bhupendranath Bhattacharya
- Samkhya Darshaner Vivarana: Bidhubhushan Bhattacharya
- Samkhyamata Samiksa: Yogendranath Bagchi
- Samkhya Tattva Kaumudi: Narayan Chandra Goswami
- Samkhya-Patanjal Darshan: Kanakprabha Bandyopadhyaya
- Patanjal Darshan: Purnachandra Vedantachanchu
- Puva Mimasa Darshan: Sukhamaya Bhattacharya
- Vedanta Darshan: Roma Choudhury
- Vedanta Darshan: Advaitavada: Ashutosh Sastri
- Mayavada: Pramatha Nath Tarkabhushan
- Vedanta Darshan: Swami Vidyaranya

CC- 4: History of Western Philosophy – II **Credits 06**

C4T: History of Western Philosophy – II

Course Contents:

a) Locke **:** Refutation of innate ideas, the origin and formation of ideas, simple and complex ideas, substance, modes and relations, nature of knowledge and its degrees, limits of knowledge, primary and secondary qualities, representative realism.
b) Berkeley: Refutation of abstract ideas. Criticism of Locke's distinction between primary and secondary qualities, Immaterialism, esse-est-percipi, role of God.
c) Hume:Impression and ideas, association of ideas, distinction between judgements concerning relations of ideas and judgements concerning matters of fact, theory of causality, theory of self and personal identity, scepticism.
d) Kant **:** Conception of critical Philosophy, distinction between a priori and a posteriori judgements, distinction between analytic and synthetic judgements. Synthetic a priori judgements, General problem of the Critique, Copernican Revolution in Philosophy, Transcendental Aesthetic **:** Space & time - Metaphysical & Transcendental expositions of the ideas of space & time.

Suggested Readings:

English:

- Encyclopedia of Philosophy: P. Edwards (ed.)
- A History of Philosophy: F. Coppleston, vols. I, II, IV, V, VI
- History of Western Philosophy: B. Russell
- History of Modern Philosophy: R. Falckenberg
- A Critical History of Modern Philosophy: Y.H. Masih
- A History of Philosophy: F. Thilly
- A History of Modern Philosophy: W.K. Wright
- A Critical History of Western Philosophy: D.J. O'Connor
- A History of Philosophy from Descartes to Wittgenstein: R. Scruton
- The Fundamental Questions of Philosophy: A.C. Ewing
- A Brief History of Western Philosophy: A. Kenny
- The Rationalists: J. Cottingham
- An Essay Concerning Human Understanding: J. Locke
- John Locke: R. Aron
- Berkeley: G. Pitcher
- The Works of George Berkeley: T.E. Jessop & A.R. Luce(eds.) 8 vols
- An Enquiry Concerning Human Understanding-D. Hume: J. N. Mohanty (ed)
- A Treatise on Human Nature: D. Hume
- Locke, Berkeley, Hume: J. Bennett
- Locke, Berkeley, and Hume: C.R. Morris
- A Critique of Pure Reason-Immanuel Kant: N.K. Smith(tr. & ed.)
- Kant's Metaphysics of Experience: H.J. Paton vols I & II
- The Philosophy of Kant: J. Kemp
- Kant: Paul Guyer
- A Handbook to Kant's Critique of Pure Reason: Rasvihari Das
- Kant: S. Körner
- Kant: Allen W. Wood
- Lectures on Kant's Critique of Pure Reason: J.N. Mohanty

Bengali:

- Paschatya Darshaner Itihas: Tarak Candra Roy (pratham o dwitiya khanda)
- Paschatya Darshaner Itihas: Kalyan Chandra Gupta
- Paschatya Darshaner Itihas: Susanta Chakraborty
- Paschatya Darshaner Itihas:Ikshanvada(Locke, Berkeley,Hume): Chandrodaya Bhattacharya
- Paschatya Darshaner Itihas:(Locke, Berkeley,Hume): N.B. Chakraborty
- Hume-er Enquiry-Ekti Upasthapana: Ramaprasad Das
- Kanter Darshan-Tattva o Prayog: Prahlad Kumar Sarkar (ed.)
- Kanter Darshan:Rasvihari Das
- Kanter Shuddha Prajnar Bichar: Mrinal Kanti Bhadra
- Bishuddha Prajnar Bichar: Gopal Chandra Khan

CC-5: Philosophy of Mind **Credits 06**

C5T: Philosophy of Mind

Course Contents:

a) Psychology: Definition, Nature and Scope
b) Methods of Psychology: Introspection, Extrospection, Experimental Methods – variables - dependent &independent, controls in experiment, limitations of experimental method.
c) Sensation and Perception: Nature of sensation, nature of perception, relation between sensationand perception, Gestalt theory of perception. Illusion and Hallucination.
d) Learning: Theories of Learning - Trial and error theory, Thorndike's laws of learning, GestaltTheory, Pavlov's theory of conditioned response, B.F. Skinner's theory of Operant Conditioning(reinforcement, extinction, punishment).
e) Philosophical Theories of Mind: Interactionism, Double-aspect theory, Philosophical Behaviorism, Materialism mind - brain identity theory, The Person theory (Strawson).
f) Consciousness: Levels of mind—Conscious, Sub-conscious, Unconscious, proofs for the existence of Unconscious, Freud's theory of Dream.
g) Personality: Types, Factors and Traits of Personality.

Suggested Readings:

English:

- A Textbook of Psychology: Paresh Nath Bhattacharya
- Introduction to Psychology: G.T. Morgan, R. A. King Jr.
- A Modern Introduction to Psychology: Rex Knight & M. Knight
- A Manual of Psychology: G.F. Stout
- Psychology: Woodworth & Marquis
- Science and Human Behaviour: B.F. Skinner
- About Behaviorism: B.F. Skinner
- General Psychology: G.D. Boaz
- General Psychology: G. Murphy
- Psychology: W. James
- A Textbook of Psychology: E.B. Titchener

- Principles of Psychology: W. James
- Introduction to Psychology: N.L. Muna
- A Materialist Theory of Mind: D.M. Armstrong
- Philosophy of Mind: J. Heil
- Philosophy of Mind: J. Shaffer
- An Introduction to Philosophy of Mind: C.J. Lowe

Bengali:

- Monovidya: Priti Bhushan Chattopadhyay
- Monovidya: Pareshnath Bhattacharya
- Monovidya: Ira Sengupta
- Monovidya: Samarendra Bhattacharya
- Monosamikksha: M. N. Mitra o Pushpa Mishra
- Monodarshan-Sarirvada o Tar Vikalap: M. N. Mitra o P. Sarkar (Sampadito)
- Monovijana Prasanga: Saradindu Bandyopadhyay
- Adhunik Monovijana: Ira Sengupta
- Shikshashrayi Monovidya: Sushil Roy
- Monodarshan: Arabinda Basu o Nibedita Chakraborty

CC- 6: Social and Political Philosophy **Credits 06**

C6T: Social and Political Philosophy

Course Contents:

a) Nature and Scope of i) Social Philosophy ii) Political Philosophy iii) Relation between social and Political Philosophy.
b) Primary concepts: Society, community, association, institution, family: nature, different forms of family, role of family in the society.
c) Social Class and Caste: Principles of class and caste, Marxist conception of class, Varṇaśrama dharma.
d) Theories regarding the relation between individual and society:
   I. Individualistic theory
   II. Organic theory
   III. Idealistic theory
e) Secularism—its nature, Secularism in India.
f) Social Change: Nature, Relation to Social progress, Marx-Engles on social change, Gandhi onsocial change.
g) Political Ideals: Nature of Democracy and its different forms, direct and indirect democracy, liberal democracy, democracy as a political ideal, Socialism: Utopian and Scientific, Anarchism.

Suggested Readings:

English:

- Philosophy: A Guide through the subject: A.C. Grayling (Ed.)
- Individuals: An Essay in Descriptive Metaphysics: P.F. Strawson
- The Concept of Person and Other Essays: A.J.Ayer
- Fundamentals of Sociology: P. Gisbert

- Outlines of Social Philosophy: J.S. Mackenzie
- Problems of Polical Philosophy: D.D. Raphael
- Society: R.M. MacIver & C.H. Page
- Sociology: M. Ginsberg
- Sociology: Tom Bottomore
- Sociology: S.N. Shankar Rao
- Sociology: D.C. Bhattacharya
- Sociology: P.B. Kar
- Guide to Modern Thought: C.E.M. Joad
- Introduction to Modern political Theory: C.E.M. Joad
- The Evolution of Political Philosophy of Gandhi: Buddhadeb Bhattacharya
- Social and Political Thought of Gandhi: Jayantanuja Bandyopadhyay
- The Philosophy of Mahatma Gandhi: D.M. Dutta
- The Philosophy of Sarvodaya: K.S. Bharathi
- Communist Manifesto: Karl Marx & Frederick Engels
- Socialism: Utopian and Scientific: F. Engels Ngv nnv
- Open Society and Its Enemies: Karl Popper
- The Open Philosophy and The Open Society: M. Cornforth
- Religion in India: T.N. Madan(ed.)
- Religion and Society: S. Radhakrishnan
- Secularism in the Present Indian Society, Amal Kumar Mukhopadhyay in Bulletin of the Ramakrishna Mission Institute of Culture, Vol.LVII, No. 11
- Secularism and Its Critics: Rajeev Bhargava (ed.)
- Civil Society and Its Institutions: Andre Beteille
- Unravelling the Nation:Sectarian Conflict and India's Secular Identity: Kaushik Basu &Sanjay Subramaniyam (eds.)
- India as A Secular State: D.E. Smith
- Political Thought: C.L. Wayper
- Political Philosophy:An Introduction: W.T. Blackstone
- Political Philosophy:East and West: Krishna Roy
- Political Philosophy: V.P. Verma
- Essays in Social and Political Philosophy: Krishna Roy & Chhanda Gupta (eds.)
- Western Political Thought: Brian R. Nelson
- Western Political Thought: From Plato to Marx: Shefali Jha

Bengali:

- Samaj Darshan Dipika: Pritibhushan Chattopadhyay
- Samaj Tattva: Parimal Bhushan Kar
- Samaj Tattva: T. Bottomore
- Bisay Samaj Tattva: Anadi Kumar Mahapatra
- Samajdarshan o Rashtradarshaner Parichoy: A.K. Mahapatra o P. Mukherjee
- Rashtradarshaner Dhara: Amal kumar Mukhopadhyay
- Samajdarshan o Rashtradarshan: Samarendra Bhattacharya
- Samaj o Rajnaitikdarshan: Sandip Das
- Samyabader Itihas: Marx o Engels
- Samajtantra: Kalpanik o Baijnanik: F. Engels
- Marxiya Rashtrachinta: Shovan Lal Dutta Gupta
- Sarvodaya Andoloner Itihas: Gurudas Bandyopadhyay
- Gandhi Rachanasambhar: M.K. Gandhi

- Bharater Dharmanirapekshatar Sankat, Bholanath Bandyopadhyay in Essays on Science and Society: Biplab Chakraborti
- Dharmanirapekshata Birodhi Istahar: Ashis Nandy.

CC-7: Philosophy of Religion **Credits 06**

C7T: Philosophy of Religion

Course Contents:

a) Nature and scope of Philosophy of Religion. Doctrine of karma and rebirth, doctrine of liberation, (Hindu, Bauddha and Jaina views).
b) The Philosophical teachings of the Holy Quran: God the ultimate Reality, His attributes, Hisrelation to the world and man.
c) Some basic tenets of Christianity: The doctrine of Trinity, The theory of Redemption
d) Religious Pluralism, Inter-religious dialogue and Possibility of Universal Religion.
e) Arguments for the existence of God: Cosmological, Telelogical and Ontological arguments, Nyāya arguments
f) Grounds for Disbelief in God: Sociological theory (Durkheim), Freudian theory, Cārvāka, Bauddha and Jaina views
g) The Peculiarity of Religious Language: The doctrine of analogy, Religious statements as Symbolic, Religious language as Non-Cognitive (Randal's view), the language game theory (D.Z. Phillip).

Suggested Readings:

English:

- Philosophy of Religion: J. Hick
- An Introduction to the Philosophy of Religion: Brian Davies
- Indian Philosophy of Religion: A. Sharma
- Comparative Religion: P.B. Chatterjee
- Comparative Religion: Eric J. Sharpe
- Patterns in Comparative Religion: M. Eliade (Ch I, Sec. I)
- Atheism in Indian Philosophy: D.P. Chattopadhyay
- Essays in Indian Philosophy : Sukharanjan Saha (ed.)
- Studies in Nyaya-Vaisesika Theism: Gopika Mohan Bhattacharya
- The Religions of the World: R.K.M. Institute of Culture
- Encyclopedia Britannica, Vol. I
- Encyclopedia of Islam, Vols. I & II
- Indian Religions: S. Radhakrishnan
- Foundations of Living Faith: H.D. Bhattacharya
- Aspects of Hindu Morality: Saral Jhingram
- A History of Muslim Philosophy (Vols.I &II): M.M. Sharif
- Islam and Secularism: Sayed Muhammad Al-Naquib Al-Attas
- The History of Philosophy in Islam-T.J. de Boer: E. Jones (tr.)
- The Holy Quran: Mohammad Yusuf Ali (tr.)
- The Spirit of Islam: Syed Amir Ali
- The Meaning of the Glorious Koran: M. Pickthall

- A History of Islamic Philosophy: M. Fakhry
- The Spirit of Islam's Message, Muhammad Qamaruddin in Religions of the People of India:S.R. Saha (ed.)
- Cultural Heritage of Islam: Osman Ghani
- Old Testament: R. Kittel (ed.)
- New Testament: Kilpatrick
- The Doctrine of the Trinity: R.S. Franks
- The Doctrine of the Trinity: Loenard Hodgson
- The Idea of the Holy: R. Otto
- A Brief Account of the Religion of the Hindus: Srilekha Dutta in Religions of the People of India: S.R. Saha (ed.)
- Dharma in Hinduism: An Ideal Religion: Tapan Kumar Chakraborty in Religions of the People of India: S.R. Saha (ed.)
- Jainism - A Religion of Non-Theistic Humanism: Tushar Sarkar in Religions of the People of India: S.R. Saha (ed.)
- Essays in Analytical Philosophy (Ch.VII): Gopinath Bhattacharya
- Buddhism in India and Abroad: Anukul Badyopadhyay

CC-8: Western Logic –I **Credits 06**

C8T: Western Logic –I

Course Contents:

a) Logic and Arguments, Deductive and Inductive Arguments, Argument forms and arguments, statement forms and statement, Truth and Validity. Categorical propositions and classes: quality, quantity and distribution of terms, Translating categorical propositions into standard form.
b) Immediate inferences: Conversion, Obversion and Contrapositon, Traditional square of opposition and Immediate Inferences based there on; Existential Import, symbolism and Diagrams for categorical propositions.
c) Categorical Syllogism: Standard Form categorical Syllogism; The Formal nature of Syllogistic Argument, Rules and Fallacies, General Rules; To test Syllogistic Arguments for validity (by applying general rules for syllogism); To solve problems and prove theorems concerning syllogism.
d) Boolean Interpretation of categorical propositions; Review of the Traditional Laws of Logic concerning immediate inference and syllogism; Venn Diagram Technique for Testing Syllogisms, Hypothetical and Disjunctive Syllogisms, Enthymeme, The Dilemma.
e) Induction: Argument by Analogy, Appraising Analogical Arguments, Refutation by Logical Analogy.
f) Causal Connections: Cause and Effect, the meaning of "Cause"; Induction by Simple Enumeration; Mill's Method of Experimental Inquiry; Mill's Method of Agreement, Method of Difference, Joint Method of Agreement and Difference, Method of Residues, Method of Concomitant Variations; Criticism of Mills Methods, Vindication of Mill's Methods.
g) Science and Hypothesis: Explanations; Scientific and Unscientific, Evaluating Scientific Explanations; The pattern of Scientific Investigation; Crucial Experiments and Ad Hoc Hypotheses.

h) Probability: Alternative Conception of Probability; The Probability Calculus; Joint Occurrences; Alternative Occurrences.

Suggested Readings:

English:

- Introduction to Logic (13th Edn.): I.M. Copi & C. Cohen
- Symbolic Logic: I.M. Copi
- Methods of Logic (Part I,Ch.s 5,7,9): W.V.O. Quine
- Introduction to Logic and Scientific Method: Cohen & Nagel
- Logic: Informal, Symbolic and Inductive: Chhanda Chakraborty
- Logic: Stan Baronett & Madhuchhanda Sen
- The Elements of Logic: Stephen Barkar
- Understanding Symbolic Logic: Virginia Klenk
- Logic- A Comprehensive Introduction; S.D. Guttenplan & M. Tamney
- Logic & Philosophy- A Modern Introduction: Howard Kahne
- Logic- A First Course: A.E. Blumberg

Bengali:

- Nabya Yuktibijnana(Pratham theke caturtha khanda): Ramaprasad Das
- Sanketik Yuktibijnana:Ramaprasad Das
- Samsad Yuktibijnana Abhidhan: Ramaprasad Das o Subirranjan Bhattacharya

CC-9: Western Logic – II **Credits 06**

C9T: Western Logic – II

Course Contents:

a) Symbolic Logic**:** The value of special symbols; Truth-Functions; Symbols for Negation, Conjunction, Disjunction, Conditional Statements and Material Implication; Material Equivalence and Logical Equivalence; Dagger and stroke functions; inter-definability of truth functors.
b) Tautologous, Contradictory and Contingent Statement-Forms; The Paradoxes of Material Implication; The three Laws of Thought.
c) Testing Argument Form and Argument for validity by
    i. The Method of Truth-table.
    ii. The Method of Resolution (Fellswoop & Full Sweep)[dot notation excluded]
d) Determining the logical character of statement form and statements by
    i. The Method of Truth-table.
    ii. The Method of Resolution [dot notation excluded]
e) The Method of Deduction: Formal Proof of Validity: Difference between Implicational Rules and the Rules of Replacement; Construction of Formal Proof of Validity by using nineteen rules; Proof of invalidity by assignment of truth-values.
f) Quantification Theory**:** Need for Quantification Theory, Singular Propositions; Quantification; Translating Traditional subject predicate proposition into the logical notation of propositional function and quantifiers;

g) Quantification Rules and Proving Validity; Proving Invalidity for arguments involving quantifiers.

Suggested Readings:

English:

- Introduction to Logic (13th Edn.): I.M. Copi & C. Cohen
- Symbolic Logic: I.M. Copi
- Methods of Logic (Part I,Ch.s 5,7,9): W.V.O. Quine
- Introduction to Logic and Scientific Method: Cohen & Nagel
- Logic: Informal, Symbolic and Inductive: Chhanda Chakraborty
- Logic: Stan Baronett & Madhuchhanda Sen
- The Elements of Logic: Stephen Barkar
- Understanding Symbolic Logic: Virginia Klenk
- Logic- A Comprehensive Introduction; S.D. Guttenplan & M. Tamney
- Logic & Philosophy- A Modern Introduction: Howard Kahne
- Logic- A First Course: A.E. Blumberg

Bengali:

- Nabya Yuktibijnana(Pratham theke caturtha khanda): Ramaprasad Das
- Sanketik Yuktibijnana:Ramaprasad Das
- Samsad Yuktibijnana Abhidhan: Ramaprasad Das o Subirranjan Bhattacharya

CC-10: Epistemology and Metaphysics (Western) Credits 06

C10T: Epistemology and Metaphysics (Western)

Course Contents:

a) Concepts, Truth.
b) Sources of Knowledge.
c) Some Principal uses of the verb "To know", Conditions of Propositional Knowledge, Strong and weak senses of "know".
d) Analytic truth and logical possibility.
e) The apriori.
f) The Problem of Induction.
g) Cause and Causal Principles
h) Realism, Idealism.
i) Phenomenalism
j) Substance and Universal

Suggested Readings:

English:

- An Introduction to Philosophical Analysis—John Hospers
- The Problem of Knowledge: A.J. Ayer
- Language, Truth and Logic: A.J. Ayer
- Readings in Philosophical Analysis: J. Hospers
- The Central Questions of Philosophy: A.J. Ayer
- Theory of Knowledge: A.J. Woozley
- An Introduction to Philosophy: Shibapada Chakraborty

Bengali:

- Darshanik Jijnasa (Bagarthatattva): Ramaprasad Das
- Darshanik Jijnasa (Jnanatattva-Jnaner Svarup): Ramaprasad Das
- Darshanik Jijnasa (Jnanatattva): Ramaprasad Das
- Darshanik Jijnasa (Paratattva o Bhauto Jagater Jnana): Ramaprasad Das
- Darshanik Bishlesaner Ruparekha (Pratham O dvitiya khanda): Samarikanta Samanta
- Paschatya darshaner Ruparekha: Ramaprasad Das o Shibapada Chakraborty

CC-11: Nyaya Logic and Epistemology –I **Credits 06**

C11T: Nyaya Logic and Epistemology –I

Course Contents:

a) Definition of buddhi or jñāna (cognition), its two kinds; Definition of smṛti; Two kinds of smṛti (memory);Definition of anubhava, its division into veridical (yathārtha) and non-veridical (ayathārtha);Three kinds of nonveridical anubhava; Definitions clarified in Tarkasaṁgraha Dīpikā.
b) Four-fold division of pramā and pramāṇa. Definition of "Kāraṇa" (special causal condition) and "kāraṇa" (general causal condition). The concept of anyathāsiddhi (irrelevance) and its varieties.The definition of kārya (effect). Kinds of cause: smavāyi, a-samavāyi and nimitta kāraṇa (definitions and analysis).
c) Definition of pratyakṣa and its two-fold division: nirvikalpaka and savikalpaka jñāna. Evidence for the actuality of nirvikalpaka.
d) Sannikarsa and its six varieties. Problem of transmission of sound; the claim of "anupalabdhi" as a distinctive pramāṇa examined.

Suggested Readings:

English:

- Tarkasaṁgraha with Dipika: Gopinath Bhattacharya
- Tarkasaṁgraha: M.R. Bodas & Y.V. Athalye (tr. & ed.)
- The Elements of Indian Logic and Epistemology: Chandrodaya Bhattacharya
- A Primer of Indian Logic: Kuppuswami Shastri
- Fundamental Questions of Indian Metaphysics & Logic: S.K. Maitra
- The Nyaya Theory of Knowledge: S.C. Chatterjee

Bengali:

- Tarkasamgraha with Dipika: Narayan Chandra Goswami
- Tarkasamgraha with Dipika: Indira Mukhopadhyay
- Tarkasamgraha with Dipika: Panchanan Shastri
- Tarkasamgraha with Dipika: Kanailal Poddar

CC-12: Ethics (Indian) **Credits 06**

C12T: Ethics (Indian)

Course Contents:

a) Introduction: Concerns and Presuppositions, Concept of Sthitaprañjna, Karmayoga: (Gīta) Puruṣārthas and their inter-relations.
b) Meaning of Dharma, Concept of ṛṇa and ṛta. Classification of Dharma: sādhāraṇadharma and Asadharana Dharma,Varnasrama Dharma
c) Vidhi and Niṣedha
d) Buddhist Ethics: Pancaśīla, Brahmavihārabhāvanā (Bauddha) Anubrata, Mahābrata, Ahimsā.
e) Jaina Ethics: anubrata, mahābrata
f) Mimāṁsa Ethics: nitya naimittika karma and kāmya karma, the imperative in kāmya karmas and in kāmya karmas involving hiṁsā.

Suggested Readings:

English:

- The Fundamentals of Hinduism-A Philosophical Study: S.C. Chatterjee
- The Ethics of the Hindus: S.K. Maitra
- An Outline of Hinduism: T.M.P. Mahadevan
- Classical Indian Ethical Thought: K.N. Tewari
- Ethics in the Gita-An Analytical Study (pp-119-145): Rajendra Prasad
- Ethics in the Vedas, Satya prakash Singh in Historical-Developmental Study of Classical Indian Philosophy,[History of Science, Philosophy and Culture in Indian Civilisation (Vol. XII, Part 2)]: Rajendra Prasad (ed.)
- Ṛta, Satya, Tattva, Tathya, Samiran Chandra Chakraborty in Philosophical Concepts Relevant to Sciences in Indian Tradition,[History of Science, Philosophy and Culture in Indian Civilisation (Vol. VIII, Part 4)]: P.K. Sen (ed.)
- Development of Moral Philosophy in India; Surama Dasgupta
- Ethical Philosophies of India: I.C. Sharma
- Studies on the Purusarthas: P.K. Mahapatra (ed.)
- A Critical Survey of Indian Philosophy: C.D. Sharma
- Indian Philosophy (Vo. I): J.N. Sinha
- Philosophy of Hindu Sadhana: N.K. Brahma

Bengali:

- Nitividya: Mrinal Kanti Bhadra
- Nitividyar Tattvakatha: Somnath Chakraborty
- Nitishastra: Dikshit Gupta
- Nitividya: Sibapada Chakraborty
- Pashchatya Darshaner Itihas (Pratham o dwitiya khanda): S. Radhakrishnan
- Dharma Darshan: A. Bandyopadhyay o K.C. Gupta
- Dharma Darshan: Rabindranath Das
- Dharmadarshanser Katipoy Samasya: Dilip Kumar Mohanto
- Dharma Darshan: Sushil Kumar Chakraborty
- Bharatiya Dharmaniti: Amita Chattopadhyay (Sampadita)
- Bharatiya Darshane Nirishvarvada: B.B. Purakayastha (pp-39-50,56-66)
- Bharatiya Darshaner Drishtite Muktir Swarup: Chandana Das

- Sarvadarshanasamgraha: Satyajyoti Chakraborty (Pratham Khanda)

CC-13: Nyaya Logic and Epistemology –II **Credits 06**

C13T: Nyaya Logic and Epistemology –II

Course Contents:

a) Definiton of anumāna, anumiti and parāmarśa. Analysis of pakṣatā. Definition of vyāpti, Vyāptigraha.
b) Definition of pakṣadharmatā—svārthānumiti and parārthānumiti; Analysis of pañcāvayavī Nyāya. Necessity of parāmarśa. Three kinds of linga or hetu: kevalānvayī, kevalavyātirekī and anvayavyātirekī. Definiton of pakṣa, Sapakṣa and vipakṣa with illustrations. Marks of sadhetu.
c) Hetvābhāsa-two types of definition. Five kinds of hetvābhāsa:
    (1) "Savyābhicāra'' and its three kinds-defined and illustrated;
    (2) "Viruddha" defined and illustrated:
    (3) "Satpratipakṣa" defined and illustrated;
    (4) Three kinds of "Asiddha" enumerated;
        (a) āśrayāsiddha
        (b) svarūpāsiddha and
        (c) vyāpyatvāsiddha. Vyāpyatvāsiddha defined as"sopādhika hetu". Upādhi and its four kinds (definition and illustration)
    (5) "Bādhita" (definition and illustration).

d) "Upamāna pramāṇa": Definition and analysis."Śabda pramāṇa" : Definition and analysis. "Śakti" (the direct signifying power), the padapadārtha- sambandha considered as Īśvara-saṁketa, Controversy between the Mīmāṃsakas and the Naiyāyikas regarding the nature of Śakti as universal or particular.
e) "Śaktigraha" (ascertainment of the meaning-relation), lakṣaṇa, varieties of lakṣaṇa, Analysis of "Gauṇī-vṛtti" (the secondary signifying power of a term), "Vyānjanā-vṛtti" (the suggestive power of a term) analysed as a kind of śakti or lakṣaṇā.
f) The definition of lakṣaṇā, The concept of "yoga-rūḍhi". The conditions of "śābda-bodha", ākānkṣā, yogyatā and sannidhi. Two kinds of statements distinguished—Vaidika and Laukika.
g) "Arthāpatti" as a distinctive pramāṇa: Controversy between the Mīmāṃsakas and the Naiyāyikas.
h) The theory of prāmāṇya: the issue between svataḥ-prāmāṇyavāda and parataḥ-prāmāṇyavāda regarding utpatti and jñapti; The Prābhākara theory of akhyāti.

Suggested Readings:

English:

- Tarkasamgraha with Dipika: Gopinath Bhattacharya
- Tarkasamgraha: M.R. Bodas & Y.V. Athalye (tr. &ed.)
- The Elements of Indian Logic and Epistemology: Chanrodaya Bhattacharya
- A Primer of Indian Logic: Kuppuswami Shastri
- Fundamental Questions of Indian Metaphysics & Logic: S.K. Maitra

- The Nyaya Theory of Knowledge: S.C. Chatterjee

Bengali:

- Tarkasamgraha with Dipika: Narayan Chandra Goswami
- Tarkasamgraha with Dipika: Indira Mukhopadhyay
- Tarkasamgraha with Dipika: Panchanan Shastri
- Tarkasamgraha with Dipika: Kanailal Poddar

CC-14: Ethics (Western) **Credits 06**

C14T: Ethics (Western)

Course Contents:

a) Nature and Scope of Ethics, Classification of Ethics: **a:** Prescriptive, **b:** Meta Ethics, **c:** Applied Ethics.
b) Moral and Non-moral actions, Object of Moral Judgement - Motive and Intention
c) Moral Theories: Plato and Aristotle
d) Standards of Morality: Hedonism - Ethical, Psychological. Utilitarianism: Act utilitarianism, Ruleutilitarianism. Deontological Theories: Act - Deontological Theories, Rule-Deontological Theories - Kant's Theory.
e) Theories of Punishment
f) Environmental Ethics: Its nature, Concepts of Anthropocentrism and Non anthropocentrism, value beyond sentient beings, reverence for life.

Suggested Readings:

English:

- History of Philosophy-Eastern and Western: (Vol. I & II): S. Radhakrishnan
- Principles of Ethics: P.B. Chatterjee
- A Manual of Ethics: J.S. Mackenzie
- Ethics: W. Frankena
- An Introduction to Ethics: W. Lillie
- Ethics-Theory and Practice: J. Thiroux (Chs II & III)
- Ethics-Theory and Practice: Y.V. Satyanaryana
- Moral Reasons: J. Nuttal
- Human Conduct: J. Hospers
- Ethics-The Fundamentals: Julia Driver
- An Introduction to Kant's Ethics: R. Sullivan
- Nicomachean Ethics: Aristotle
- Philosophical Ethics-An Introduction to Moral Philosophy: T.L. Beauchamp (ed.)
- Virtue Ethics: Rosalind Hursthouse (Ch. III)
- Karma,Causation and Retributive Morality: Rajendra Prasad

Bengali:

- Nitividya: Mrinal Kanti Bhadra
- Nitividyar Tattvakatha: Somnath Chakraborty

- Nitishastra: Dikshit Gupta
- Nitividya: Samarendra Bhattacharya
- Nitividya: Sibapada Chakraborty
- Pashchatya Darshaner Itihas (Pratham o dwitiya khanda): S. Radhakrishnan
- Dharma Darshan: A. Bandyopadhyay o K.C. Gupta
- Dharma Darshan: Rabindranath Das
- Dharmadarshanser Katipoy Samasya: Dilip Kumar Mohanto
- Dharma Darshan: Sushil Kumar Chakraborty
- Bharatiya Dharmaniti: Amita Chattopadhyay (Sampadita)
- Bharatiya Darshane Nirishvarvada: B.B. Purakayastha
- Bharatiya Darshaner Drishtite Muktir Swarup: Chandana Das
- Sarvadarshanasamgraha: Satyajyoti Chakraborty (Pratham Khanda)
- Islami Darshan: Hasan Ayub
- Quran Sharif: Maulana Mobarak Qarim Zahar (Anudita)
- Quran Sharif: Osman Ghani (Anubad O bhasya)
- Islamer Chinta o Chetanar Kramabikash (dasham Khanda): Osman Gani
- Pabitra Bible (Puratn o Natun Niyam): Bharater Bible Society
- Bauddhadharmer Itihas: Mani Kuntala Halder
- Bauddhadharma o Darshan: Sukomal Chowdhury

Discipline Specific Elective (DSE)

DSE-1: Philosophy of Language (Indian) **Credits 06**

DSE1T: Philosophy of Language (Indian)

Course Contents:

a) Definition and classification of pada
b) Introduction of concepts of āsatti, yogyatā, tātparya, ākāṁṣā
c) Different types of lakṣaṇā
d) śābdabodha
e) anvitābhidhānvāda and abhihitānvayavāda.

Suggested Readings:

English:

- Tarkasaṁgraha: Annaṁbhatta
- Tarkasamgraha: M.R. Bodas & Y.V. Athalye (tr. &ed.)
- The Elements of Indian Logic and Epistemology: Chandrodaya Bhattacharya
- A Primer of Indian Logic: Kuppuswami Shastri
- Fundamental Questions of Indian Metaphysics & Logic: S.K. Maitra
- The Nyaya Theory of Knowledge: S.C. Chatterjee

Bengali:

- Tarkasamgraha with Dipika: Narayan Chandra Goswami
- Tarkasamgraha with Dipika: Indira Mukhopadhyay
- Tarkasamgraha with Dipika: Panchanan Shastri
- Tarkasamgraha with Dipika: Kanailal Poddar

DSE-2: Ethics (Applied ethics) **Credits 06**

DSE2T: Ethics (Applied ethics)

Course Contents:

a. Nature and scope of applied ethics.
b. Killing: Suicide, Euthanasia, Animal killing.
c. Poverty, Affluence and Morality.
d. War and Violence: Terrorism.
e. Right: Nature and Value of Human Rights—Discrimination on the basis of race, caste and religion.
f. The Ethics of Care.
g. Value beyond sentient beings, Reverence for life, Deep Ecology, Concepts of Kinship Ethics.
h. Ecological Concern in Indian thoughts: Jaina and Bauddha views.

Suggested Readings:

- Ethics-The Fundamentals: Julia Driver
- Ethics-Theory and Practice: J. Thiroux (Chs II & III)
- Ethics-Theory and Practice: Y.V. Satyanaryana
- Moral Reasons: J. Nuttal
- Moral Reasons: James Rachels
- Philosophical Ethics-An Introduction to Moral Philosophy: T.L. Beauchamp (ed.)
- Elements of Moral Philosophy: James Rachels
- Theories of Rights: J. Waldron (ed.)
- Human Rights: Alan Gewirth
- Modern Moral Philosophy: W.D. Hudson
- Ethics Since 1900: Mary Warnock
- Introductory Ethics: Fred Feldman
- Ethics: W. Frankena
- Identity and Violence: Amartya Sen
- Twentieth Century Ethics: Roger Hancock
- Aspects of Hindu Morality: Saral Jhingram
- Practical Ethics: Peter Singer (Chs V,VII,VIII,X)
- Applied Ethics: Peter Singer (ed.)
- A Companion to Ethics: Peter Singer (Chs 14,19,22)
- A Companion to Bio-Ethics: Peter Singer & H. Kuhse (eds.)
- Human Rights-An Introduction: D.J. O'Byrne
- Man and Nature: G.F. MacLean (ed.)
- Human Rights, Gender and the Environment: Manisha Preya, Krishna Menon, Madhulika Banerjee
- Gender: G. Geetha
- A Short Introduction to Feminist Theory: Rinita Mazumdar
- Feminist Thought: Shefali Moitra
- Justice and Care: Essential Readings in Feminist Ethics: Virginia Held (ed.)
- Language, Truth and Logic: A.J. Ayer
- The language of Morals: R.M. Hare
- Nitishastra: Dikshit Gupta

- Vyavaharik Nitivijnan: N. Nandy & M. Bal
- Nitividya: Sanjib Ghosh
- Nitividyar Tattvakatha: Somnath Chakraborty
- Tattvagata Nitividya o Vyavaharik Nitividya: Samarendra Bhattacharya
- Vyavaharik Nitividya-Peter Singer: Pardip Kumar Roy (tr.)
- Prayogik Nitividya: A.S.M. Abdul Khalek
- Nitibidya- Shibapada Chakraborty

Or

DSE-2: Philosophy of Language (Western) **Credits 06**

DSE2T: Philosophy of Language (Western)

Course Contents:

a) Syntax, Semantics, Pragmatics.
b) Word-meaning, Definitions.
c) Vagueness.
d) Sentence-meaning.
e) Testability and Meaning.

Suggested Readings:

English:

- The Philosophy of Language : A.P. Martinich (ed.)
- An Introduction to Philosophical Analysis—John Hospers
- The Problem of Knowledge: A.J. Ayer
- Language, Truth and Logic: A.J. Ayer
- Readings in Philosophical Analysis: J. Hospers
- The Central Questions of Philosophy: A.J. Ayer
- Theory of Knowledge: A.J. Woozley
- An Introduction to Philosophy: Shibapada Chakraborty

Bengali:

- Darshanik Jijnasa (Bagarthatattva): Ramaprasad Das
- Darshanik Jijnasa (Jnanatattva-Jnaner Svarup): Ramaprasad Das
- Darshanik Jijnasa (Jnanatattva): Ramaprasad Das
- Darshanik Jijnasa (Paratattva o Bhauto Jagater Jnana): Ramaprasad Das
- Darshanik Bishlesaner Ruparekha (Pratham O dvitiya khanda): Samarikanta Samanta
- Paschatya darshaner Ruparekha: Ramaprasad Das o Shibapada Chakraborty

DSE-3:
(Any one text from following four texts of Western philosophy and Indian philosophy)

[***DSE-3A:*** *An Enquiry Concerning Human Understanding - D. Hume*
Or
DSE-3B: *The Problems of Philosophy-- Bertrand Russell.*
Or
DSE-3C: *Vedāntasāra: Sadananda Yogindra Saraswati*

Or
DSE-3D: *Śrimadbhagabadgīta*]

DSE-3A: An Enquiry Concerning Human Understanding - D. Hume Credits 06

DSE3AT: An Enquiry Concerning Human Understanding - D. Hume

Course Contents:

a) Chapter 1 - 3 (15)
b) Chapter 4 - 6 (15)
c) Chapter 7- 9 (15)
d) Chapter 10 -12(15)

Suggested Readings:

- An Enquiry Concerning Human Understanding-D. Hume: J.N. Mohanty (intr.)
- The Philosophy of David Hume: Pabitra Kumar Roy
- The Philosophy of David Hume: N.K. Smith
- Hume's Theory of Causality: Tapan Kumar Chakraborty
- Hume: V.C. Chappell (ed.)
- Hume-er Enquiry-Ekti Upasthapana: Ramaprasad Das
- Hume -er Darshan – Prahlad Kumar Sarkar (Ed.)

Or

DSE-3B: The Problems of Philosophy-- Bertrand Russell Credits 06

DSE3BT: The Problems of Philosophy-- Bertrand Russell

Course Contents:

a) Chapter 1 - 3 (15)
b) Chapter 4 - 6 (15)
c) Chapter 7- 9 (15)
d) Chapter 10 - 12(15)

Suggested Readings:

- Russell and Moore – An Analytical Heritage: A.J. Ayer
- Russell: A.J. Ayer
- Russell : Mark Sanisbury
- The Philosophy of B. Russell : Schlipp (ed)
- Russell – A Short Introduction: A.C. Grayling
- Darshaner Samasya: Debika Saha
- Darshan Samasya: Sushil Kumar Chakrabarty

Or

DSE-3C: Vedāntasāra: Sadananda Yogindra Saraswati **Credits 06**

DSE3CT: Vedāntasāra: Sadananda Yogindra Saraswati

Course Contents:

a) Mangalācaraṇa
b) Vedānter Paricaya
c) From anubandha catuṣtaya to relation between Iśvara and Prājña
d) Origin of Sthūla Bhūta to Brahma- sākṣātkāra
e) Śravana o ṣaḍbidhalinganirupaṇa to jibanmuktir śeṣ phala

Suggested Readings:

- Vedantasara : Upendranath Mukhopadhaya
- Vedantasara: Medha Caitanya
- Vedantasara: Kalibar Vedanta Vagish
- Vedantasara: Bipadbhanjan Pal
- Vedantasara- Advaitavada :Ashutosh Shastri
- Vedantasara: Swami Nikhilananda (Eng Version)
- A History of Indian Philosophy S.N. Dasgupta

Or

DSE-3D: Śrimadbhagabadgīta **Credits 06**

DSE3DT: Śrimadbhagabadgīta

Course Contents:

a) Karmayoga (third chapter)
b) Guṇatrayabibhāga (fourteenth chapter)

Suggested Readings:

- Śrimadbhagabadgīta: Madhusudan Saraswati
- Śrimadbhagabadgīta: Atul Chandra Sen
- Śrigīta: Jagadish Chandra Ghosh
- Gitanibandha: Sri Aurobindo
- Śrimadbhagabadgīta: Swami Jagadiswarananda (Tran.)
- Ethics in the Gita- An Analytical Study : Rajendra Prasad
- Central Theme of Gita : Swami Ranganathananda

DSE-4:
(Any one philosophical system from following philosophical systems of contemporary Indian thought)

[**DSE-4A:** Swami Vivekananda
Or
DSE-4B: Rabindranath Tagore
Or

DSE-4C: Sri Aurobindo
Or
DSE-4D: M.K. Gandhi]

DSE-4A: Swami Vivekananda **Credits 06**

DSE4AT: Swami Vivekananda

Course Contents:

a) Real nature of man.
b) Nature of Religion.
c) Ideal of Universal Religion.
d) Concept of Practical Vedanta.

Suggested Readings:

- Contemporary Indian Philosophy: T.M.P. Mahadevan & G.V. Saroja
- Contemporary Indian Philosophy: Basant Kumar Lal
- Contemporary Indian Philosophy: Binoy Gopal Roy
- Practical Vedanta (Vol.II,pp-291-358): Swami Vivekananda
- Swami Vivekananda as a Philosopher: J.L. Shaw
- The Philosophy of Swami Vivekananda: Pradip Kumar Sengupta
- The Complete Works of Swami Vivekananda (Vol.I,pp-333-343 & II,pp-70-87,375-396): Mayavati Memorial Edition
- The Philosophy of Vivekananda: Govinda Dev

Or

DSE-4B: Rabindranath Tagore **Credits 06**

DSE4BT: Rabindranath Tagore

Course Contents:

a) Reality and God.
b) Nature of Man.
c) Surplus in man.
d) Nature of Religion.
e) Tagore's Humanism.

Suggested Readings:

- Contemporary Indian Philosophy: T.M.P. Mahadevan & G.V. Saroja
- Contemporary Indian Philosophy: Basant Kumar Lal
- Contemporary Indian Philosophy: Binoy Gopal Roy
- Religion of Man: Rabindranath Tagore
- Philosophy of Rabindranath Tagore: S. Radhakrishnan
- Rabindra Rachanabali (Khanda 12,pp-532-545,567-614): Janmashatbarshiki Samskaran

- Rabindra Darsan: Sachindranath Gangopadhyay, Pabitra Kumar Roy, Nripendranath Bandyopadhyay.
- The Philosophy of Rabindranath Tagore : Binay Gopal Roy

Or

DSE-4C: Sri Aurobindo **Credits 06**

DSE4CT: Sri Aurobindo

Course Contents:

a) Reality as Sat-Cit-Ānanda
b) Nature of Creation, the World process: Descent or involution, Maya and Lila, Ascent or evolution.
c) Integral Yoga.

Suggested Readings:

- Contemporary Indian Philosophy: T.M.P. Mahadevan & G.V. Saroja
- Contemporary Indian Philosophy: Basant Kumar Lal
- Contemporary Indian Philosophy: Binoy Gopal Roy
- Life Divine: Sri Aurobindo
- Synthesis of Yoga: Sri Aurobindo
- Integral Yoga: Sri Aurobindo
- Among the Great: Dilip Kumar Roy (Chapter on Sri Auribinda)
- Towards Supermanhood-The Philosophy of Sri Aurobindo: P.B. Chatterjee
- The Philosophy of Sri Aurobindo: Ramnath Sharma
- An Introduction to the Philosophy of Sri Aurobindo: S.K. Maitra
- Guide to Sri Aurobindo's Philosophy: K.D. Acharya
- Future Evolution of Man-The Divine Life Upon Earth: Sri Aurobindo
- Sri Aurobindo-The Prophet of Life Divine: Haridas Choudhuri
- Sri Aurobindo's Concept of the Superman: Chittaranjan Goswami
- Visva-Vivek: Asit kumar Bandyopadhyay, Sankari Prasad Basu, Sankar
- Manavjatir Bhabiswat Bibartan: Sri Aurobindo Ghosh
- Sri Aurobindo Katha: manmatho Mukhopadhyaya
- Divya Jivan: Srimat Anirban
- Yogo-samannay: Srimat Anirban
- Sri Aurobindo Janmo Satabarshiki Smarak Grantha: Sri Aurobindo Patha Mandir

Or

DSE-4D: M.K.Gandhi **Credits 06**

DSE4DT: M.K.Gandhi

Course Contents:

a) God and Truth.
b) Nature of Man.
c) Non-Violence
d) Satyāgraha.

e) Swaraj
f) Theory of Trusteeship

Suggested Readings:

- Contemporary Indian Philosophy: T.M.P. Mahadevan & G.V. Saroja
- Contemporary Indian Philosophy: Basant Kumar Lal
- Contemporary Indian Philosophy: Binoy Gopal Roy
- Hind Swaraj: M.K. Gandhi
- Trusteeship; M.K. Gandhi
- Selections from Gandhi: N.K. Bose
- Contemporary Indian Philosophy: S,Radhakrishnan& J.H. Murihead (eds.)
- The Evolution of Political Philosophy of Gandhi: Buddhadeb Bhattacharya
- Social and Political Thought of Gandhi: Jayantanuja Bandyopadhyay
- The Philosophy of Mahatma Gandhi: D.M. Dutta
- The Philosophy of Sarvodaya: K.S. Bharathi
- Gandhi's Political Philosophy: Bhikhu Parekh
- Sarvodaya Andoloner Itihas: Gurudas Bandyopadhyay
- Gandhi Parikrama: Sailesh Kumar Bandyopadhyay
- Gandhi Rachanasambhar: M.K. Gandhi

Skill Enhancement Course (SEC)

SEC-1: Computer Application **Credits 02**

SEC1T: Computer Application

Course Contents:

a) Computer and its Basic Organisation, Working with Flow Charts
b) Working with tools in MS Word
c) Introduction to spreadsheets (MS Excel)
d) First step to Multimedia Presentation (MS Power point)
e) Internet and E mail services
f) Computer virus, Ethical hacking.

Suggested Readings:

- Understanding Information Technology 7: Vijay Kumar Pandey, Arya Publishing Company
- Computer Fundamentals: P.K. Sinha
- Computer Fundamentals and Programming: P.Dey& M.Ghosh
- Microsoft Word [Version 97, 2000, 2002 (XP)]: Mahbabur Rahaman

Or

SEC-1: Philosophy of Human Rights **Credits 02**

SEC1T: Philosophy of Human Rights

Course Contents:

a) Definition and Nature of Human Rights

b) The Idea of Human Rights: Its Origins and Historical Developments during Ancient period, Modern period and Contemporary period
c) The Idea of Natural Law and Natural Rights: Thomas Hobbes and John Locke.
d) The Natural Rights Tradition: Some Reactions from Jeremy Bentham, Edmund Burke and Thomas Paine
e) Natural Right, Fundamental Right and Human Right
f) Preamble, Fundamental Rights and Duties (Indian Constitution)
g) Contemporary Perspectives: Joel Feinberg—Basic Rights

Suggested Readings:

- Patrick Hayden (ed.): The Philosophy of Human Rights, Paragon House, St. Paul, First Edition,
- Morton E. Winston (ed.): The Philosophy of Human Rights, Wadsworth Publishing Co. Belmont, California,
- Jeremy Waldron (ed.): Theories of Rights, Oxford University Press, Oxford, 1984
- Ashwani Peetush and Jay Drydyk: Human Rights*: India and West*, Oxford University Press, New Delhi,
- James Nickel: Making Sense of Human Rights, Blackwell Publishing, Oxford,
- Henry Shue: Basic Rights: Subsistence, Affluence and U. S. Foreign Policy, Princeton University Press, Princeton,
- Gary, B. Herbert: Philosophical History of Human rights, Transaction Publishers, New Jersey
- Michael Freeden: Rights, Worldview Publications, New Delhi, 1998.
- Lynn Hunt: Inventing Human Rights: A History, Norton & Company, New York,
- Jack Donnelly: Universal Human rights in Theory and Practice, Manas Publications, New Delhi,

SEC-2: Value Education **Credits 02**

SEC2T: Value Education

Course Contents:

a) Meaning, Characteristics, significance and objectives of Value education
b) Values in different contexts: Individual, Social, Cultural, Moral and Global and Spiritual.
c) Meaning and Characteristics of Peace education
d) Aims and Objectives of Peace Education
e) Types of peace education
f) Peace and Value education in Global Perspective

Suggested Readings:

- Introduction to Peace Studies: David P. Barash Belmont

- ‘International Relations’, in The English Writings of Rabindranath Tagore: A Miscellany, (ed) Sisir Kumar Das: Rabindra Nath Tagore New Delhi: Sahitya Akademi.
- Handbook of Peace and Conflict Studies: Charles Webel and Johan Galtung(eds.), Routledge, London and New York,
- Peace and Value Education: Babu Muthuja,
- Philosophy of Value: Aditya Mohanty

Or

SEC -2: Man and Environment **Credits 02**

SEC2T: Man and Environment

Course Contents:

a) Classical Indian attitude to Environment

a. The Upanisadic world-view,
b. Tagore’s understanding of nature,
c. The post-Upanisadic view of nature

b) Respect for Nature

a. The attitude of respect,
b. Bio-centric outlook to nature,
c. Ethical standards and rules that follow from the attitude of respect to nature,
d. The idea of inherent worth of nature.

c) Intrinsic Value of nature

a. Moore’s talk of ‘intrinsic properties’,
b. Chilsom’s idea of intrinsic value,
c. Attfield on the intrinsic value of nature,
d. Callicott’s idea of intrinsic value of nature,
e. Rolston III on intrinsic value of nature,
f. intrinsic value and objective value

d) Deep ecology and its third world critique

a. Arne Naess on Deep Ecology,
b. Ramchandra Guha’s critique of Deep Ecology

e) Eco-feminism

a. Understanding nature and the feminine,
b. Dualisms in Western tradition,
c. Masculinity, humanity and nature.

Suggested Readings

- John Passmore, ‘Attitudes to Nature’, Environmental Ethics (ed.) Robert Elliot, Oxford University Press, Oxford,
- Rabindranath Tagore, Sadhana (first Chapter), Macmillan, New York,
- Paul Taylor, Respect for Nature: A Theory of Environmental Ethics (Select Parts), Princeton University Press, Princeton,

- Robert Elliot, 'Intrinsic value, Environmental Obligation and Naturalness', Monist,
- Arne Naess, 'The Shallow and the Deep, Long-Range Ecology Movements: A Summary', Inquiry,
- Val Plumwood, Nature, Self and Gender: Feminism, Environmental Philosophy and the Critique of Rationalism, Environmental Ethics (ed.) Robert Elliot, Oxford University Press, Oxford,
- Nirmalya Narayan Chakraborty, Paribesh o Naitikata, Progressive Book Forum, Kolkata.

Generic Elective (GE)
[Interdisciplinary for other department]

GE-1: Ethics: Indian and Western **Credits 06**

GE1T: Ethics: Indian and Western

Course Contents:

a) Four Purusarthās – dharma, artha, kāma and mokṣa and their interrelation. Karma (Sakāma & Niṣkāma), Cārvāka Ethics.
b) Buddhist Ethics: The Four Noble Truths and the Eight-Fold Path.
c) Moral and Non-Moral Actions, Object of Moral Judgement.
d) Teleological Ethics: Utilitarianism (Bentham and Mill). Deontological Ethics: Kant's Moral Theory.
e) Theories of Punishment.

Suggested Readings:

- The Fundamentals of Hinduism-A Philosophical Study: S.C. Chatterje
- Nitividya: Shibapada Chakrabarty
- Nitividyar Tattvakatha: Somnath Chakrabarty
- Nitisastra: Dikshit Gupta
- An Introduction to Ethics: W. Lillie

Or

GE-1: Western Logic **Credits 06**

GE1T: Western Logic

Course Contents:

a) Introductory topics: Sentence, proposition, argument, truth and validity.
b) Aristotelian classification of categorical propositions, distribution of terms. Existential Import,
c) Boolean interpretation of categorical propositions. Immediate inference. Immediate inference based on the square of opposition, conversion, obversion and contraposition.
d) Categorical syllogism: Figure, mood, rules for validity, Venn Diagram method of testing validity, fallacies.

e) Symbolic Logic: Use of symbols, Truth-functions: Negation, Conjunction, disjunction, implication, equivalence.
f) Tautology, Contradiction, Contingent statement forms. Construction of truth-table, using truth-tables for testing the validity of arguments and statement forms.
g) Mill's methods of experimental inquiry.

Suggested Readings:

- Introduction to Logic (13th edn): I.M. Copi and C. Cohen
- Paschatya Darshan O Yuktivijnan: Ramaprasad Das
- Paschatya Darsan O Yuktivijnan: Samir Kumar Chakrabarty

GE-2: Feminism **Credits 06**

GE2T: Feminism

Course Contents:

a) Original Development of Feminist Thought.
b) Philosophical basis of Feminism.
c) Different Branches of Feminism.
d) Important issues of Feminism: FeministEthics. some basic concepts of Feminism: Sexism, Patriarchy and Androcentricism. TheEthics of Care.

Suggested Readings:

- Feminist Thought: Androcentrism,Communication and Objectivity: Shefali Moitra,Munshiram Monoharlal Publishers Pvt. Ltd.,2002, NewDelhi
- Understanding Gender: Kamla Bhasin, Women Unlimited,2001,New Delhi
- Handbook of Feminist Theory : Lisa Disch And Mary Hawkesworth, Oxford University Press,2016
- Practical Ethics: Peter Singer
- Applied Ethics: Peter Singer
- Redefining Ethics As Care: Bidisha Mukherjee, Papyrus,Kolkata 2008
- The Ethics Of Care : Virginia Held
- The Core Of Care Ethics : S.Collins, P.Macmillan Publishers, 2015
- In a Different Voice : Gilligan,C., Harvard University Press, 1982
- Naitikata O Narivada : Shefali Moitra
- Nitividya: Samarendra Bhattacharya

Or

GE-2: Philosophy of Mind **Credits 06**

GE2T: Philosophy of Mind

Course Contents:

a) Sensation: What is sensation? Attributes of sensation.

b) Perception: What is perception? Relation between sensation and perception, Gestalt theory of perception, illusion and hallucination.
c) Consciousness: Conscious, Subconscious, Unconscious,Evidence for the existence of the Unconscious, Freud's theory of dream.
d) Memory: Factors of memory, Laws of association, Forgetfulness. Learnung: The trialand Error theory, Pavlov's Conditioned Response theory, Gestalt theory.
e) Intelligence: Measurement of Intelligence, I.Q., Testof Intelligence, Binnet-Simon test.

GE-3: Theory of Inference in Nyāya **Credits 06**

GE3T: Theory of Inference in Nyāya

Course Contents:

a. Definition & classification of Anumiti.
b. Importance of Paňcabayabinyāya.

Suggested Readings:

- Nyāya Theory of Knowledge: S.C. Chatterjee
- Six ways of Knowing: D.M. Dutta
- Bhāṣāpariccheda Siddhāntamuktāvalisahita: Paňcānan Shastri
- Tarkasamgraha with Dīpika: Annambhatta, translated by Narayan Chandra Goswami.

Or

GE-3: Theory of God in Nyāya Metaphysics **Credits 06**

GE3T: Theory of God in Nyāya Metaphysics.

Course Contents:

a. Relevance of the acceptance of God in Nyāya.
b. Arguments in favour of the existence of God.

Suggested Readings:

- Udayanācāryakṛita Nyāyakusumānjali: Shyamapada Misra
- Nyāyatattvaparikramā: Kalikrishna Bandopadhyaya

GE- 4: Environmental Ethics **Credits 06**

GE4T: Environmental Ethics

Course Contents:

a. Anthropocentrism & Non-anthropocentrism.
b. Holism.

Suggested Readings:

- The Economy of the Earth: Philosophy, Law and the Envirnment, Second Edition-Mark Sagoff.
- Ethics and the Environment: An Introduction-Dale Jamieson.
- Falita Nītiśastra, First edition – Dr. Santosh Kumar Pal.

Or

GE- 4: Termination of Life & Ethics **Credits 06**

GE4T: Termination of Life & Ethics

Course Contents:

a. Euthanasia.
b. Abortion.

Suggested Readings:

- Practical Ethics, Second Edition, Cambridge University Press- Peter Singer.
- A Companion to Bio-ethics, Blackwell Publisher – Peter Singer and Helga Kuhse.

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year B.A. (General)
in

Philosophy

Under Choice Based Credit System (CBCS)
[w.e.f 2018-2019]

VIDYASAGAR UNIVERSITY

BA(General) in Philosophy

[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
1	I	SEMESTER-I					CA	ESE	TOTAL
		Core-1 (DSC-1A)		Indian Philosophy	6	5-1-0	15	60	75
		Core-2 (DSC-2A)		Other Discipline(Discipline-2)/TBD	6	5-1-0	15	60	75
		AECC (core)		English-1	6	5-1-0	15	60	75
		AECC-1 (Elective)		English/MIL	2	1-1-0	10	40	50
				Semester - I : Total	**20**				**275**
	II	SEMESTER-II							
		Core-4 (DSC-1B)		Western Philosophy	6	5-1-0	15	60	75
		Core-5 (DSC-2B)		Other Discipline(Discipline-2)//TBD	6	5-1-0	15	60	75
		AECC (core)		Mil-1	6	5-1-0	15	60	75
		AECC-2 (Elective)		Environmental Studies	4		20	80	100
				Semester - 2 : Total	**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
2	III	SEMESTER-III					CA	ESE	TOTAL
		Core-7 (DSC-1C)		Logic	6	5-1-0	15	60	75
		Core-8 (DSC-2C)		Other Discipline(Discipline-2)//TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC (core)		English-II	6	5-1-0	15	60	75
		SEC-1		SEC-1: Philosophy of Human Rights Or Ethics in Practice	2	1-1-0	10	40	50
				Semester - 3 : Total	**20**				**275**
	IV	SEMESTER-IV							
		Core-10 (DSC-1D)		Contemporary Indian Philosophy	6	5-1-0	15	60	75
		Core-11 (DSC-2D)		Other Discipline(Discipline-2)/TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC (core)		MIL-II	6	5-1-0	15	60	75
		SEC-2		SEC-2: Philosophical Analysis **Or** Man and Environment	2	1-1-0	10	40	50
				Semester - 4 : Total	**20**				**275**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
3	V	SEMESTER-V					CA	ESE	TOTAL
		DSE-1A		Discipline-1(Philosophy)/TBD	6	5-1-0	15	60	75
		DSE-2A		Other Discipline(Discipline-2)/TBD	6	4-0-4/ 5-1-0	15	60	75
		GE-1		TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-3		SEC- 3: Philosophy in Practice Or Value Education	2	1-1-0	10	40	50
				Semester - 5 : Total	**20**				**275**
	VI	SEMESTER-VI							
		DSE-1B		Discipline-1(Philosophy)/TBD	6	5-1-0	15	60	75
		DSE-2B		Other Discipline(Discipline-2)/TBD	6	4-0-4/ 5-1-0	15	60	75
		GE-2		TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-4		SEC -4: Computer Applications Or Logical Reasoning and Application	2	1-1-0	10	40	50
				Semester - 6 : Total	**20**				**275**
				Total in all semester:	**122**				**1700**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **CP**=Core Practical , **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies

List of Core & Elective courses

Core Courses (CC)

DSC-1A: Indian Philosophy
DSC-1B: Western Philosophy
DSC-1C: Logic
DSC-1D: Contemporary Indian Philosophy

Discipline Specific Electives (DSE)

DSE-1: Philosophy of Religion
Or
DSE-1: Emerging Trends of Thoughts
DSE-2: Tarkasaṁgraha with Dīpikā
Or
DSE-2: Feminism

Skill Enhancement Courses (SEC)

SEC-1: Philosophy of Human Rights
Or
SEC-1: Ethics in Practice
SEC-2: Philosophical Analysis
Or
SEC -2: Man and Environment
SEC- 3: Philosophy in Practice
Or
SEC -3: Value Education
SEC -4: Computer Applications
Or
SEC -4: Logical Reasoning and Application

Generic Elective (GE)
[Interdisciplinary for other department]

GE-1: Western Philosophy
Or
GE-1: Indian Philosophy
Or
GE-1: Philosophy of Religion
GE-2: Social –Political Philosophy- I
Or
GE-2: Philosophy of Mind
Or
GE-2: Applied Ethics and Philosophy of Religion

Core Courses (CC)

DSC-1A (CC-1): Indian Philosophy **Credits 06**

DSC1AT: Indian Philosophy

Course Contents:

1. Introduction:
(a) General Features of Indian Philosophy

2. Cārvāka:
(b) *pratyakṣa* (perception) as the only Source of Knowledge
(c) Refutation of *anumāna* (inference) and *śabda* (testimony) as Sources of Knowledge
(d) *jaḍavāda* and *dehātmavāda*

3. Jainism:
(a) *anekāntavāda*
(b) *syādvāda* and *nayavāda*

4. Buddhism: (a) Four Noble Truths
(a) (b) *pratītyasamutpāda*
(b) *kṣaṇabhaṅgavāda*
(c) *nairātmyavāda*

5. Nyāya–Vaiśeṣika:
(a) *pramāṇa*: *pratyakṣa* (perception), *anumāna* (inference), *upamāna* (comparison) and *śabda* (testimony)
(b) *Saptapadārtha* (Seven Categories)

6. Sāṁkhya:
(a) *Satkāryavāda* (Theory of Causality)
(b) *Pariṇāmavāda* (Theory of Evolution)

7. Yoga :
(a) *cittavṛttinirodha*
(b) *aṣṭāṅgayoga*

8. Mīmāṁsā
(a) *arthāpatti*
(b) *anupalabdhi*

9. Advaita Vedānta:
(a) (a)Brahman, *jīva* and *jagat*

Suggested Readings:

- S. C. Chatterjee & D. M. Dutta: *An Introduction to Indian Philosophy*
- C. D. Sharma : *A Critical Survey of Indian Philosophy*

- Haridas Bandyaopadhyay : *Bhāratīya Darśaner Marmakathā*
- J. N. Mohanti : Classical Indian Philosophy
- Niradbaran Chakraborty : *Bhāratīya Darśan*
- Karuna Bhattacharya : *Nyāya-Vaiśeṣika Darśan*
- Panchanan Shastri : *Cārvāka Darśan*
- Panchanan Shastri : *Bauddha Darśan*
- Rajat Bhattacharya : *Sāṁkhyakārikā* O *Sāṁkhyatattvakumudī*
- Niradbaran Chakraborty : *Bhāratīya Darśan*
- Deepak Kumar Bagchi : *Bhāratīya Darśan*
- Debabrata Sen : *Bhāratīya Darśan*
- Pradyot Kumar Mandal : *Bhāratīya Darśan*
- Kanakprabha Bandyopadhyay : *Sāṁkhyapātañjaladarśan*
- Tarakishor Sharma Choudhury : *Pātañjaladarśan*
- Gobindagopal Mukhopadhyay : *Yoger Kathā : Patañjalir Dṛṣṭite*
- Purnachandra Vedanta Chunchu : *Pātañjal Darśan*

DSC-1B (CC-2): Western Philosophy **Credits 06**

DSC1BT: Western Philosophy

Course Contents:

1. Metaphysics: Nature of Metaphysics, Elimination of Metaphysics

2. Realism: Naïve Realism, Scientific Realism, Representative Realism

3. Idealism: Subjective Idealism, Objective Idealism

4. Critical Theory of Kant

5. Theories of Causation: Regularity Theory and Entailment Theory

6. Substance: Views of Descartes, Spinoza, Locke and Berkeley

7. Relation between Mind and Body: Interactionism and Parallelism

8. Theories of Evolution: Mechanistic and Emergent

Suggested Readings:

- Falkenberg : History of Western Philosophy
- Sibapada Chakraborty : General Philosophy
- Sibapada Chakraborty : *An Introduction to General Philosophy*
- Ramchandra Pal : *Darśan Parichaya*
- Rama Prasad Das & Sibapada Chakraborty : *Pāścātya Darśaner Rūprekhā*
- Niradbaran Chakraborty : *Pāścātya Darśaner Bhūmikā*

DSC-1C (CC-3): Logic **Credits 06**

DSC1CT: Logic

Course Contents:

1. Basic Concept of Logic: (a) Nature and Scope of Logic, (b) Sentence, Proposition and Statement , (c) Inference and Argument,
2. Types of Argument and Inference:
(a) Deductive Argument and Inductive Argument, (b) Immediate inference and Mediate inference, (c) Categorical Syllogism, (d) Truth Functional Argument and Quantificational Argument
3. Opposition of Propositions: Rules and Fallacies
4. Immediate Inference: Rules and Fallacies
5. Categorical Syllogisms: Rules and Fallacies, Venn diagram
6. Truth functional Argument: Rules and Fallacies
7. Inductive Argument: Rules and Fallacies
8. Analogical Reasoning

9. Science and Hypothesis

Suggested Readings:

• M. Copi, C. Cohen, P. Jetli & M. Prabhakar : Introduction to Logic (14th Edition)
• R. S. Agarwal: A Modern Approach to Logical Reasoning, Paperback, 2007
• Bo Bennett : Logically Fallacious: The Ultimate Collection of Over 300 Logical Fallacies (Academic Edition)

DSC-1D (CC-4): Contemporary Indian Philosophy **Credits 06**

DSC1DT: Contemporary Indian Philosophy

Course Contents:

Philosophical Thoughts of Rabindranath Tagore, Swami Vivekananda, Sri Aurobindo, S. Radhakrishnan, Md. Iqbal and Mahatma Gandhi

1. **Rabindranath Tagore**
(a)Nature of man : The Finite Aspect of Man, the Infinite Aspect of Man ,the Finite-Infinite Aspect of Man, (b) Nature of Religion, (c) Problem of Evil
(f) Surplus in man

2. **Swami Vivekananda**
(a)Practical Vedānta, (b) Universal Religion, (c) Yoga

3. **Sri Aurobindo**
(a)Nature of Reality, (b) Human Evolution– its different stages,
(c) Integral Yoga

4. **S. Radhakrishnan**
(a)Nature of Man, (b) Nature of Religious Experience, (c) Nature of Intuitive Apprehension
5. **Md. Iqbal**
(a)Nature of the Self, (b) Nature of the World, (c) Nature of God

6.Mahatma Gandhi
(a) God and Truth, (b) Ahimsa, (c) Trusteeship

Suggested Readings:
• B. K. Lal : *Contemporary Indian Philosophy*
• D. M. Dutta : *Chief Currents of Contemporary Philosophy*
• Binay Gopal Roy : *Contemporary Indian Philosophers*
• Swami Vivekananda : *Complete Works of Swami Vivekananda* (Vol. II)

Discipline Specific Electives (DSE)

DSE-1: Philosophy of Religion **Credits 06**

DSE1T: Philosophy of Religion

Course Contents:

1. Nature and Scope of Philosophy of Religion:
(a) Religion, Dharma, Dhamma,
(b) Philosophy of Religion, Comparative Religion and Theology

2. Origin and Development of Religion

3. Fundamental Features of Major Religions:
Hinduism, Christianity, Islam, Buddhism: Basic Tenets, Prophets (if any), Incarnation, Bondage and Liberation

4. Arguments for the Existence of God (Indian and Western):
Sāṁkhya-Yoga Arguments, Nyāya Arguments, Cosmological Arguments, Teleological Arguments, Ontological Arguments

5. Arguments against the Existence of God:
Sociological Arguments, Freudian Arguments, Buddhist Arguments
6. Religious Pluralism & Mysticism

7. Monotheism, Polytheism, Henotheism

8. Immanence and Transcendence of God

Suggested Readings:

1. J. Hick : *Philosophy of Religion*
2. P. B. Chatterjee : *Studies in Comparative Religion*
3. Edward : *Philosophy of Religion*
4. Swami Vivekananda: *A Study of Religion*
5. Kalidas Bhattacharyya : *Alternative Religions*
6. Amlan Datta : *Dharma O Yukti*
7. D. Mahanta: Dharma Darśaner Katipay Samasyā
8. Kalyan Gupta & Amitava Chakraborty : *Dharma Darsana*
9. M.M.Sharif : *A History of Muslim Philosophy*
10. M. Fakhry : *A History of Islamic Philosophy*
11. S. R. Saha (ed) : *Religions of the People of India*
12. R. K. M. Institute of Culture : *The Religion of the World*
13. Osman Ghani : *Ilamer Chita O Chetanar Kramabikash* (Dasham Khanda)
14. Hasan Ayub : *Islami Darshan*
15. R. S. Franks : *The Doctrine of Trinity*
16. K. N. Tiwari : *Comparative Religion*
17. Pijush Kanti Ghosh : *Dharma Darshan*
18. N. Arabinda Basu and Nibedita Chakraborty: *Dharma Darsan Parichaya*
19. A. Bandyopadhyay & K.C. Gupta : *Dharma Darśan*
20. Susil Kumar Chakraborty : *Dharma Darśan*
21. Samarendra Bhattacharya : *Dharma Darśan*

Or

DSE-1: Emerging Trends of Thoughts **Credits 06**

DSE1T: Emerging Trends of Thoughts

Course Contents:

A. Bioethics

1. Introduction to Bioethics
2. Understanding Ethics and Bioethics
3. Human Dignity and Human rights
4. Principles of benefits and harm

B. Autonomy, consent and privacy

1. Autonomy and individual responsibility
2. Consent
3. Persons without the capacity to consent
4. Respect for human vulnerability and personal integrity
5. Privacy and confidentiality

C. Health and Responsibility

1. Social responsibility and health
2. Sharing of benefits
3. Protecting future generations
4. Protection of the environment, the biosphere and bio-diversity.

Suggested Readings:

1. Bioethcs: An Anthology,Kuhse,H and Singer,P(2008)2ND Ed.,Blackwels
2. The Cambridge Textbook of Bioethics,Singer,P.A. and Viens,A.M(2008), Cambridge University Press
3. Principles issues and cases, Vaughn, L(2012),Oxford University Press
4. Human Dignity, Human Rights and Responsibility – The New Language of Global Bioethics and Biolaw, Barilan,Y.M (2014), USA:MIT

DSE-2: Tarkasaṁgraha with Dīpikā **Credits 06**

DSE2T: Tarkasaṁgraha with Dīpikā

Recommended Topics:

1. *Saptapadārtha*

Suggested Readings:

1. Annaṁbhaṭṭa ***:*** *Tarkasaṁgraha with Dīpikā*
2. Gopinath Bhattacharyya (English trans. & elucidation) *Tarkasaṁgrahadīpikā on Tarkasaṁgraha*, Progressive Publishers, Calcutta
3. Narayan Chandra Goswami : *Tarkasaṁgraha of Annambhatta* (Bengali trans. & elucidation)
4. Anamika Roychoudhury : *Tarkasaṁgraha* (Bengali trans. & elucidation)

Or

DSE-2: Feminism **Credits 06**

DSE2T: Feminism

Course Contents:

A. Original Development of Feminist Thought.
B. Philosophical basis of Feminism.
C. Different Branches of Feminism.
D. Important issues of Feminism: FeministEthics. some basic concepts of Feminism: Sexism, Patriarchy and Androcentricism. TheEthics of Care.

Suggested Readings:

1. Feminist Thought: Androcentrism,Communication and Objectivity: Shefali Moitra,Munshiram Monoharlal Publishers Pvt. Ltd.,2002, NewDelhi

2. Understanding Gender: Kamla Bhasin, Women Unlimited,2001,New Delhi
3. Handbook of Feminist Theory : Lisa Disch And Mary Hawkesworth, Oxford University Press,2016
4. Practical Ethics: Peter Singer
5. Applied Ethics: Peter Singer
6. Redefining Ethics As Care: Bidisha Mukherjee, Papyrus,Kolkata 2008
7. The Ethics Of Care : Virginia Held
8. The Core Of Care Ethics : S.Collins, P.Macmillan Publishers, 2015
9. In a Different Voice : Gilligan,C., Harvard University Press, 1982
10. Naitikata O Narivada : Shefali Moitra
11. Nitividya: Samarendra Bhattacharya

Skill Enhancement Course (SEC)

SEC-1: Philosophy of Human Rights **Credits 02**

SEC1T: Philosophy of Human Rights

Course Contents:

1. Definition and Nature of Human Rights

2. The Idea of Human Rights: Its Origins and Historical Developments during Ancient period, Modern period and Contemporary period
3. The Idea of natural Law and Natural Rights: Thomas Hobbes and John Locke.
4. The Natural Rights Tradition: Some Reactions from Jeremy Bentham, Edmund Burke and Thomas Paine

5. Natural Right, Fundamental Right and Human Right

6. Preamble, Fundamental Rights and Duties (Indian Constitution)

7. Contemporary Perspectives: Joel Feinberg—Basic Rights

Suggested Readings:

1. Patrick Hayden (ed.): *The Philosophy of Human Rights*, Paragon House, St. Paul, First Edition, 2001.
2. Morton E. Winston (ed.): *The Philosophy of Human Rights*, Wadsworth Publishing Co. Belmont, California, 1989.
3. Jeremy Waldron (ed.): *Theories of Rights*, Oxford University Press, Oxford, 1984
4. Ashwani Peetush and Jay Drydyk: *Human Rights: India and West*, Oxford University Press, New Delhi, 2015.
5. James Nickel: *Making Sense of Human Rights*, Blackwell Publishing, Oxford, 2007.
6. Henry Shue: *Basic Rights: Subsistence, Affluence and U. S. Foreign Policy*, Princeton University Press, 1980
7. Gary, B. Herbert: *Philosophical History of Human rights*, Transaction Publishers, New Jersey, 2002.

8. Michael Freeden: *Rights*, Worldview Publications, New Delhi, 1998.
9. Lynn Hunt: *Inventing Human Rights*: A History, Norton & Company, New York, 2007.
10. Jack Donnelly: *Universal Human rights in Theory and Practice*, Manas Publications, New Delhi, 2013,
11. Benulal Dhar: *The Philosophical Understanding of Human Rights*, D. K. Print World, New Delhi, 2013.
12. William A. Edmundson: *An Introduction to Rights*, Cambridge University Press, Cambridge, 2012.
13. Carl Wellman: *The Moral Dimensions of Human Rights*, Oxford University Press, Oxford, 2011.
14. Benulal Dhar, *Manvadhikar Ki Ebong Kena* (PragatiPrakashak, Kolkata, 2016)
15. J. K. Das: *Human Rights Law and Practice*, (PHI Learning, 2016
16. Durga Das Basu : *Introduction to the Constitution of India*, (Lexis Nexis, 2016)
17. Justice Ruma Paul & M.P Jain: *Indian Constitutional Law* (Lexis Nexis, 2016)
18. L. K. Thakur, *Comparative International human Rights*, Authors Press, Delhi, 2001

Or

SEC-1: Ethics in Practice **Credits 02**

SEC1T: Ethics in Practice

Course Contents:

1. Morality and Ethics
2. Motive and Intention
3. Moral action and Moral Judgment
4. Normative Theories: (a) Ethical Egoism & Utilitarianism, (b) Kant's Moral Theory
5. puruṣārtha (Buddha and *āstika* views)
6. Vedic Concepts of *ṛta, yajña, ṛṇa, vidhi* and *niṣedha*
7. Concept of *ahiṁsā* in Yoga
8. Concept of *niṣkāmakarma* preached in *Śrīmadbhagavadgītā*
9. Concept of *pañcaśīla* in Buddhism
10. Jaina Concepts of *pañcamahāvrata, triratna, anuvrata* and *mahāvrata*
11. Awareness, Views and Praxis on Basic Moral Concerns of Environment:
(a) Environmental awareness and Buddhism
(b) Rabindranath Tagore's Environmental Praxis
(c) Land Ethics
(d) Shallow and Deep Ecology

Suggested Readings:

1. W. Frankena: *Ethics*
2. Y. V. Satyanarayan : *Ethics : Theory and Practice*
3. S. K. Maitra : *Ethics of the Hindus*
4. C. Sharma : *The Ethical Philosophy of India*
5. W. Lillie *: An Introduction to Ethics*

6. J. S. Mackenzie : *A Manual of Ethics*
1. P. B. Chatterjee : Principles of Ethics
2. P. Singer : *Practical Ethics*
3. Surama Dasgupta: *Developments of Moral Philosophy in India*
4. K. N. Tewari: *Classical Indian Ethical Thought*
5. S. Radhakrishnan: *The Bhagavadgitā*
6. Ranchor Prime, (1994) *Hinduism and Ecology*, MLBD, Delhi.
7. Peter Harvey : *Buddhist Ethics*
8. Hammalawa Saddhatissa, (2003) *Buddhist Ethics*, Wisdom pub, Boston.

9. K. P. Sinha: Studies in Jainism
10. Dasgupta, Chatterjee & Chatterjee (ed), *Rethinking Tagore's Views on Society, Development*

SEC-2: Philosophical Analysis **Credits 02**

SEC2T: Philosophical Analysis

Course Contents:

1. **Meaning:** (a) Word -meaning and Sentence-meaning, (b) Testability and Meaning
2. Definition
3. Concept and Truth
4. Knowledge: Nature and Source of Knowledge
5. Determinism and Freedom

Suggested Readings :

• Hospers: *An Introduction to Philosophical Analysis* (Chapters—1, 2, 3, 4 & 5)

Or
SEC -2: Man and Environment **Credits 02**

SEC2T: Man and Environment

Course Contents:

A. Classical Indian Attitude to Environment
a) The Upanisadic world-view, b) Tagore's understanding of nature, c) The post-Upanisadic view of nature
B. Respect for Nature
a) The attitude of respect, b) Bio-centric outlook to nature, c) Ethical standards and rules that follow from the attitude of respect to nature,
d) The idea of inherent worth of nature.
C. Intrinsic Value of nature

a) Moore's talk of 'intrinsic properties', b) Chilsom's idea of intrinsic value, c) Attfield on the intrinsic value of nature, d) Callicott's idea of intrinsic value of nature, e) Rolston III on intrinsic value of nature, f)
Intrinsic value and objective value

D. Deep Ecology and its Third World Critique
a) Arne Naess on Deep Ecology, b) Ramchandra Guha's critique of Deep Ecology

E. Eco-feminism
a) Understanding nature and the feminine, b) Dualisms in Western tradition, c) Masculinity, humanity and nature.

Suggested Readings

1. John Passmore, 'Attitudes to Nature', Environmental Ethics (ed.) Robert Elliot, Oxford University Press, Oxford,
2. Rabindranath Tagore, Sadhana (first Chapter), Macmillan, New York,
3. Paul Taylor, Respect for Nature: A Theory of Environmental Ethics (Select Parts), Princeton University Press, Princeton,
4. Robert Elliot, 'Intrinsic value, Environmental Obligation and Naturalness', Monist,
5. Arne Naess, 'The Shallow and the Deep, Long-Range Ecology Movements: A Summary', Inquiry,
6. Val Plumwood, Nature, Self and Gender: Feminism, Environmental Philosophy and the Critique of Rationalism, Environmental Ethics (ed.) Robert Elliot, Oxford University Press, Oxford,
7. Nirmalya Narayan Chakraborty, Paribesh o Naitikata, Progressive Book Forum, Kolkata,

SEC- 3: Philosophy in Practice **Credits 02**

SEC3T: Philosophy in Practice

Course Contents:

1. Common and Differentiating Characteristics of Philosophy and *darśana*

2. Nature of Inquiry in Philosophy and *darśana*

3. Outlines of the types of Inquiry in Philosophy and *darśana*:
(a) Epistemic Inquiry in Philosophy and *darśana,* (b) Metaphysical Inquiry in Philosophy and *darśana,* (c) Axiological Inquiry in Philosophy and *darśana*

4. A few Model World-views and corresponding paths leading to Perfection
(a) Plato's view, (b) Kant's view, (c) Sāṁkhya view and (d) Advaita Vedānta View

5. Methods of Philosophical Discourse
(a) Reasoned Speculation, (b) Conceptual Analysis, (c) Linguistic Analysis, (d) Logical Argumentation, (e) Critical Reflection

6. Methods of *Dārśanika* Discourse (*kathā*)
(a) *chala,* (b) *jāti,* (c) *nigrahasthāna,* (d) *vāda,* (e) *jalpa,* (f) *vitaṇḍā*

Suggested Readings :

1. H. Cappelen: *The Oxford Handbook of Philosophical Methodology*, Oxford University Press,
2. B.K. Matilal: *The Word and The World* , Oxford University Press, 2001
3. Bimal Krishna Matilal: *The Character of Logic in India*
4. Bertrand Russell: *Problems of Philosophy*

5. Paul F. Kisak: *Philosophical Methodology : the Methods of Philosophical Inquiry* CSI Publishing Platform,
6. E. V. Stubley: Philosophic as a Method of Inquiry
7. R. M. Keon: Philosophic Semantics and Philosophic Inquiry
8. The Methods of philosophy is the Methods of Inquiry (https://explicitblog.wordpress.com)
9. Plato : *The Republic*
10. G. E. Moore: *Some Main Problems of Philosophy*, New York
11. Īśvarakṛṣṇa : *Sāṁkhyakārikā*
12. Sadānanda Yogīndra: *Vedāntasāra*

Or

SEC -3: Value Education **Credits 02**

SEC3T: Value Education

Course Contents:

A. Meaning, Characteristics, significance and objectives of Value education
B. Values in different contexts: Individual, Social, Cultural, Moral and Global and Spiritual.
C. Meaning and Characteristics of Peace education
D. Aims and Objectives of Peace Education
E. Types of peace education
F. Peace and Value education in Global Perspective

Suggested Readings:

1. Introduction to Peace Studies: David P. Barash Belmont
2. 'International Relations', in The English Writings of Rabindranath Tagore: A Miscellany, (ed) Sisir Kumar Das: Rabindra Nath Tagore New Delhi: Sahitya Akademi,
3. Handbook of Peace and Conflict Studies: Charles Webel and Johan Galtung(eds.), Routledge, London and New York,
4. Peace and Value Education: Babu Muthuja,
5. Philosophy of Value: Aditya Mohanty

SEC -4: Computer Applications **Credits 02**

SEC4T: Computer Applications

Course Contents:

A. Computer and its Basic Organisation.

B. Working with tools in MS Word

C. Introduction to spreadsheets (MS Excel)

D. First step to Multimedia Presentation (MS Power point)

E. Internet and E mail services

F. Computer virus, Ethical hacking.

Suggested Readings:

1. Understanding Information Technology 7: Vijay Kumar Pandey, Arya Publishing Company
2. Computer Fundamentals: P.K. Sinha
3. Computer Fundamentals and Programming: P.Dey & M.Ghosh
4. Microsoft Word [Version 97, 2000, 2002 (XP)]: Mahbabur Rahaman

Or

SEC -4: Logical Reasoning and Application **Credits 02**

SEC4T: Logical Reasoning and Application

Course Contents:

A. The main objective of logical reasoning.

B. Definitions: Pakṣa, sᾱdhya, hetu, sapakṣa and Vipakṣa.

C.Construction of kevalᾱnvayī, kevalavyᾱtirekī anvayvyᾱtirekī anumiti.

D. Hetvᾱbhᾱsa and its different kinds, detection of hetvᾱbhᾱsa.

E. Reasoning in practice:

(i). Fallacy of relevance, Fallacies of ambiguity, Fallacies of weak induction, Avoiding fallacies
(ii) Logical applications of the concept of pakṣatā
(iii) Functional applications of ordinary operative relations between sense-organs and respective objects .

F. Inductive reasoning in Law

(i) The method of Inquiry in Law
(ii) Causation in Legal reasoning
(iii) Analogical Reasoning in legal argument
(iv) Probability in legal argument

G. Deductive Reasoning in Law

(i) Determining the correct rule of Law
(ii) Identifying, formulating, and applying rules of law.
(iii) The law of libel
(iv) Logic is right reasoning

Suggested Readings:

1. Introduction to Logic (9th Edition) : I. M. Copi & C. Cohen, Prentice Hall of India Pvt. Ltd., New Delhi,
2. The Elements of Logic (5th Edition): S.F.Barker, McGraw- Hill Book Company,
3. Introduction to Logic : P.J. Hurley, Wadsworth
4. Tarkasaṁgraha: Annaṁbhatta
5. Word and the World: B.K. Matilal
6. Tarkasaṁgraha: M.R. Bodas & Y.V. Athalye (tr. &ed.)
7. The Concept of Logical Fallacies: Nandita Bandyopadhaya
8. Tarkasaṁgraha with Dipika: Narayan Chandra Goswami
9. Tarkasaṁgraha with Dipika: Indira Mukhopadhyay
10. Tarkasaṁgraha with Dipika: Panchanan Shastri
11. Tarkasaṁgraha with Dipika: Kanailal Poddar

Generic Elective (GE)
[Interdisciplinary for other Department]

GE-1: Western Philosophy **Credits 06**

GE1T: Western Philosophy

Course Contents:

1. Metaphysics: Nature of Metaphysics, Elimination of Metaphysics
2. Realism: Naïve Realism, Scientific Realism, Representative Realism
3. Idealism: Subjective Idealism, Objective Idealism
4. Critical Theory of Kant
5. Theories of Causation: Regularity Theory and Entailment Theory
6. Substance: Views of Descartes, Spinoza, Locke and Berkeley
7. Relation between Mind and Body: Interactionism and Parallelism
8. Theories of Evolution: Mechanistic and Emergent

Suggested Readings:

1. Falkenberg : History of Western Philosophy

2. Sibapada Chakraborty : General Philosophy
3. Sibapada Chakraborty : *An Introduction to General Philosophy*
4. Ramchandra Pal : *Darśan Parichaya*
5. Rama Prasad Das & Sibapada Chakraborty : *Pāścātya Darśaner Rūprekhā*
6. Niradbaran Chakraborty : *Pāścātya Darśaner Bhūmikā*

Or

GE-1: Indian Philosophy **Credits 06**

GE1T: Indian Philosophy

Course Contents:

1. Introduction:
General Features of Indian Philosophy

2. Cārvāka:
(a) *pratyakṣa* (perception) as the only Source of Knowledge
(b) Refutation of *anumāna* (inference) and *śabda* (testimony) as Sources of Knowledge
(c) *jaḍavāda* and *dehātmavāda*

3. Jainism:
(a) *anekāntavāda*
(b) *syādvāda* and *nayavāda*

4. **Buddhism:**
(a) Four Noble Truths
(b) *pratītyasamutpāda*
(c) *kṣaṇabhaṅgavāda*
(d) *nairātmyavāda*

5. Nyāya–Vaiśeṣika:
(a) *pramāṇa*: *pratyakṣa* (perception), *anumāna* (inference), *upamāna* (comparison) and *śabda* (testimony)
(b) *Saptapadārtha* (Seven Categories)

6. **Sāṁkhya:**
(a) *Satkāryavāda* (Theory of Causality)
(b) *Pariṇāmavāda* (Theory of Evolution)

7. Yoga :
(a) *cittavṛttinirodha*
(b) *aṣṭāṅgayoga*
8. Mīmāṁsā
(a) *arthāpatti*
(b) *anupalabdhi*
9. Advaita Vedānta:
Brahman, *jīva* and *jagat*

Suggested Readings:

1. S. C. Chatterjee & D. M. Dutta: *An Introduction to Indian Philosophy*
2. C. D. Sharma : *A Critical Survey of Indian Philosophy*
3. Haridas Bandyaopadhyay : *Bhāratīya Darśaner Marmakathā*
4. J. N. Mohanti : Classical Indian Philosophy
5. Niradbaran Chakraborty : *Bhāratīya Darśan*
6. Karuna Bhattacharya : *Nyāya-Vaiśeṣika Darśan*
7. Panchanan Shastri : *Cārvāka Darśan*
8. Panchanan Shastri : *Bauddha Darśan*
9. Rajat Bhattacharya : *Sāṁkhyakārikā* O *Sāṁkhyatattvakumudī*
10. Niradbaran Chakraborty : *Bhāratīya Darśan*
11. Deepak Kumar Bagchi : *Bhāratīya Darśan*
12. Debabrata Sen : *Bhāratīya Darśan*
13. Pradyot Kumar Mandal : *Bhāratīya Darśan*
14. Kanakprabha Bandyopadhyay : *Sāṁkhyapātañjaladarśan*
15. Tarakishor Sharma Choudhury : *Pātañjaladarśan*
16. Gobindagopal Mukhopadhyay : *Yoger Kathā : Patañjalir Dṛṣṭite*
17. Purnachandra Vedanta Chunchu : *Pātañjal Darśan*

Or

GE-1: Philosophy of Religion **Credits 06**

GE1T: Philosophy of Religion

Course Contents:

(a) Nature and scope of Philosophy of Religion. Doctrine of karma and rebirth, doctrine of liberation.
(b) Origin and Source of Religion: Animism, Totemism, Freud's theory
(c) National Religion, Universal religion.
(d) The Philosophical teachings of the Holy Quran: God the ultimate Reality, His attributes, His relation to the world and man.
(e) Some basic tenets of Christianity: The doctrine of Trinity, The theory of Redemption
(f) Arguments for the existence of God: Cosmological, Teleological and Ontological arguments,
(g) The Peculiarity of Religious Language: The doctrine of analogy, Religious statements as Symbolic, Religious language as Non-Cognitive (Randal's view).

Suggested Readings:

- Philosophy of Religion: J. Hick
- An Introduction to the Philosophy of Religion: Brian Davies
- Indian Philosophy of Religion: A. Sharma
- Comparative Religion: P.B. Chatterjee
- Comparative Religion: Eric J. Sharpe
- Patterns in Comparative Religion: M. Eliade (Ch I, Sec. I)
- Atheism in Indian Philosophy: D.P. Chattopadhyay
- Essays in Indian Philosophy (pp-145-169): Sukharanjan Saha (ed.)

- Studies in Nyaya-Vaisesika Theism (pp-102-137,139-159): Gopika Mohan Bhattacharya
- The Religions of the World: R.K.M. Institute of Culture
- Encyclopedia Britannica, Vol. I
- Encyclopedia of Islam, Vols. I & II
- Indian Religions: S. Radhakrishnan
- Foundations of Living Faith: H.D. Bhattacharya
- Aspects of Hindu Morality: Saral Jhingram
- A History of Muslim Philosophy (Vols.I &II): M.M. Sharif
- Islam and Secularism: Sayed Muhammad Al-Naquib Al-Attas
- The History of Philosophy in Islam-T.J. de Boer: E. Jones (tr.)
- The Holy Quran: Mohammad Yusuf Ali (tr.)
- The Spirit of Islam: Syed Amir Ali
- The Meaning of the Glorious Koran: M. Pickthall
- A History of Islamic Philosophy: M. Fakhry
- The Spirit of Islam's Message, Muhammad Qamaruddin in Religions of the People of India: S.R. Saha (ed.)
- Cultural Heritage of Islam: Osman Ghani
- Old Testament: R. Kittel (ed.)
- New Testament: Kilpatrick
- The Doctrine of the Trinity: R.S. Franks
- The Doctrine of the Trinity: Loenard Hodgson
- The Idea of the Holy: R. Otto
- A Brief Account of the Religion of the Hindus: Srilekha Dutta in Religions of the People of India: S.R. Saha (ed.)
- Dharma in Hinduism: An Ideal Religion: Tapan Kumar Chakraborty in Religions of the People of India: S.R. Saha (ed.)
- Jainism-A Religion of Non-Theistic Humanism: Tushar Sarkar in Religions of the People of India: S.R. Saha (ed.)
- Essays in Analytical Philosophy (Ch.VII): Gopinath Bhattacharya
- Buddhism in India and Abroad: Anukul Badyopadhyay

GE-2: Social –Political Philosophy- I **Credits 06**

GE2T: Social –Political Philosophy- I

Course Contents:

(a) Nature & Scope of Social Philosophy.Nature & Scope of Political Philosophy.Relation between Social Philosophy and Political Philosophy.
(b) Primary Concepts: Society, Community, Association, Institution.
(c) Social Groups: Its Different Forms. Family: Its Different Forms.
(d) Social Class and Caste: Principles of Class and Caste; Marxist conception of class; Class Attitudes and Class consciousness

Or

GE-2: Philosophy of Mind **Credits 06**

GE2T: Philosophy of Mind

Course Contents:

(a) Sensation: What is sensation? Attributes of sensation.
(b) Perception: What is perception? Relation between sensation and perception, Gestalt theory of perception, illusion and hallucination.
(c) Consciousness: Conscious, Subconscious, Unconscious,Evidence for the existence of the Unconscious, Freud's theory of dream.
(d) Memory: Factors of memory, Laws of association, Forgetfulness. Learnung: The trialand Error theory, Pavlov's Conditioned Response theory, Gestalt theory.
(e) Intelligence: Measurement of Intelligence, I.Q., Testof Intelligence, Binnet-Simon test.

Or

GE-2: Applied Ethics and Philosophy of Religion **Credits 06**

GE2T: Applied Ethics and Philosophy of Religion

Course Contents:

A. Concepts of Applied Ethics.
B. Killing: Suicide, Euthanasia.
C. Famine, Affluence and Morality.
D. Environmental Ethics: Value Beyond Sentient Beings, Reverence for life, Deep Ecology.
E. Nature & Concerns of Philosophy of Religion. Argument for the existence of God: Cosmological argument, Ontological argument and Teleological argument.
F. Problem of Evil and Suffering.
G. Grounds for disbelief in God: Sociological theory of Durkheim, Freudian Theory, CārvākaView.

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year B.A. (HONOURS)
in
ENGLISH

Under Choice Based Credit System (CBCS)
w.e.f 2018-2019

VIDYASAGAR UNIVERSITY
BA (Honours) in English
[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
	Semester-I								
1	I	Core-1		**C1T**: British Poetry and Drama: Beginning to 14th Century and History of English Language	6	5-1-0	15	60	75
		Core-2		**C2T**: British Poetry and Drama: Renaissance to 17th and 18th Centuries	6	5-1-0	15	60	75
		GE-1		TBD	6	5-1-0/ 4-0-4	15	60	75
		AECC-1 (elective)		English/MIL	2	1-1-0	10	40	50
	Semester –I: total				**20**				**275**
	Semester-II								
	II	Core-3		**C3T:** British Literature (fiction and non-fiction): 18th Century	6	5-1-0	15	60	75
		Core-4		**C4T:** British Romantic Literature (1798-1832)	6	5-1-0	15	60	75
		GE-2		TBD	6	5-1-0/ 4-0-4	15	60	75
		AECC-2 (elective)		ENVS	4		20	80	100
	Semester-II : total				**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
	Semester-III								
2	**III**	Core-5		**C5T:** British Literature: 19th Century (1832-1900)	6	5-1-0	15	60	75
		Core-6		**C6T:** British Literature: The Early 20th Century	6	5-1-0	15	60	75
		Core-7		**C7T:** American Literature	6	5-1-0	15	60	75
		GE-3		TBD	6	5-1-0/ 4-0-4	15	60	75
		SEC-1		**SEC-1:** English Language Teaching **Or** Soft Skills **Or** Translation Studies	2	1-1-0	10	40	50
		Semester – III : total			**26**				**350**
	Semester-IV								
	IV	Core-8		**C8T:** European Classical Literature	6	5-1-0	15	60	75
		Core-9		**C9T:** Modern European Drama	6	5-1-0	15	60	75
		Core-10		**C10T:** Popular Literature	6	5-1-0	15	60	75
		GE-4		TBD	6	5-1-0/ 4-0-4	15	60	75
		SEC-2		**SEC-2:** Creative Writing **Or** Business Communication **Or** Technical Writing	2	1-1-0	10	40	50
		Semester – IV : total			**26**				**350**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
		Semester-V							
3	**V**	Core-11		**C11T**: Postcolonial Literatures	6	5-1-0	15	60	75
		Core-12		**C12T**: Women's Writing	6	5-1-0	15	60	75
		DSE-1		DSE-1: Nineteenth Century European Realism	6	5-1-0	15	60	75
		DSE-2		DSE-2: World Literatures	6	5-1-0	15	60	75
		Semester –V : total			**24**				**300**
	VI	**Semester-VI**							
		Core-13		**C13T**: Indian Classical Literature	6	5-1-0	15	60	75
		Core-14		**C14T**: Indian Writing in English	6	5-1-0	15	60	75
		DSE-3		DSE-3: Science Fiction and Detective Literature Or Literature and Cinema	6	5-1-0	15	60	75
		DSE-4		DSE - 4: Partition Literature Or Travel Writing	6	5-1-0	15	60	75
		Semester – VI : total			**24**				**300**
Total in all semester:					**142**				**1900**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **CP**=Core Practical ,**L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies ,

List of Core Courses and Electives

Core Course (CC)

CC-1: British Poetry and Drama: Beginning to 14th Century and History of English Language
CC-2: British Poetry and Drama: Renaissance to 17th and 18th Centuries
CC-3: British Literature (fiction and non-fiction): 18th Century
CC-4: British Romantic Literature (1798-1832)
CC-5: British Literature: 19th Century (1832-1900)
CC-6: British Literature: The Early 20th Century
CC-7: American Literature
CC-8: European Classical Literature
CC-9: Modern European Drama
CC-10: Popular Literature
CC-11: Postcolonial Literatures
CC-12: Women's Writing
CC-13: Indian Classical Literature
CC-14: Indian Writing in English

Discipline Specific Electives (DSE)

DSE-1: Nineteenth Century European Realism
DSE-2: World Literatures
DSE-3: Science Fiction and Detective Literature
Or
DSE-3: Literature and Cinema
DSE-4: Partition Literature
Or
DSE-4: Travel Writing

Skill Enhancement Course (SEC)

SEC-1: English Language Teaching
Or
SEC-1: Soft Skills
Or
SEC-1: Translation Studies
SEC-2: Creative Writing
Or
SEC-2: Business Communication
Or
SEC-2: Technical Writing

Generic Electives (GE)

[Interdisciplinary for other department]

GE-1: Academic Writing and Composition
GE-2: Media and Communication Skills
Or
GE-2: Text and Performance
GE-3: Language and Linguistics
Or
GE-3: Contemporary India: Women and Empowerment
GE-4: Gender & Human Rights
Or
GE-4: Environment & Literature

Core Courses (CC)

CC-1: British Poetry and Drama: Beginning to 14th Century and History of English Language **Credits 06**

C1T: British Poetry and Drama: Beginning to 14th Century and History of English Language

Course Contents:
Group: A (History of Literature)

- Old English poetry and prose
- Beowulf
- Chaucer: *The Wife of Bath's Prologue*

Group: B (Philology)

- Influences: Greek, Latin, Scandinavian, French

Suggested Topics and Background Prose Readings for Class Presentations Topics:

- Birth of English Literature and Language
- Advent of Christianity and its influence on English Literature
- Influence of Norman conquest and Black death
- Three phases of Chaucer

Suggested Readings:

- C.L.Wren: The English Language
- S.A.J. Bradley: Anglo-Saxon Poetry
- Greenfield & Calder: A New Critical History of Old English Literature
- Neville Coghill (ed.): The Nun's Priest's Tale
- Aditi Choudhury:A History of English Literature(Orient Blackswan)

CC-2: British Poetry and Drama: Renaissance to 17th and 18th Centuries
Credits 06

C2T: British Poetry and Drama: Renaissance to 17th and 18th Centuries

Course Contents:
Poetry:

- Edmund Spenser: Sonnet LXXV "One day I wrote her name"
- William Shakespeare: Sonnet 130 "My mistress' eyes are nothing like the sun"
- John Donne:'Good Morrow'
- Milton: *Paradise Lost Book-I*
- Pope: *Rape of the Lock* (3 cantos)

Play:

- Christopher Marlowe:*Edward II*
- William Shakespeare:*Macbeth*

Literary terms related to poetry and drama:

- Allegory, Ballad, Blank-Verse, Heroic Couplet, Bathos, Comedy, Dramatic Monologue, Elegy, Image, Ode, Carpe-diem, Soliloquy, Symbol, Tragedy, Catharsis, Hamartia, Three Unities, Anagnorisis, Antagonist, Chorus, Denouement, Comic-relief, Aside, Anti-Hero, Catastrophe

Suggested Topics and Background Prose Readings for Class Presentations Topics

- Renaissance Humanism
- The Stage, Court and City
- Religious and Political Thought
- Ideas of Love and Marriage
- The Writer in Society

Suggested Readings:

- Pico Della Mirandola, excerpts from the *Oration on the Dignity of Man*, in *The Portable Renaissance Reader*, ed. James Bruce Ross and Mary Martin McLaughlin (New York: Penguin Books, 1953) pp. 476–9.
- John Calvin, 'Predestination and Free Will', in *The Portable Renaissance Reader*, ed. James Bruce Ross and Mary Martin McLaughlin (New York: Penguin Books, 1953) pp. 704–11.
- Baldassare Castiglione, 'Longing for Beauty' and 'Invocation of Love', in Book 4 of *The Courtier*, 'Love and Beauty', tr. George Bull (Harmondsworth: Penguin, rpt. 1983) pp. 324–8, 330–5.
- Philip Sidney, *An Apology for Poetry*, ed. Forrest G. Robinson (Indianapolis: Bobbs-Merrill, 1970) pp. 13–18.

CC-3: British Literature (fiction and non-fiction): 18th Century

Credits 06

CC3T: British Literature (fiction and non-fiction): 18th Century

Course Contents:

Play:

- William Congreve: *The Way of the World*

Prose:

- Jonathan Swift:*Gulliver's Travels* (Books III and IV)
- Addison and Steele: 'Sir Roger at Church'
- Laurence Sterne:*The Life and Opinions of Tristram Shandy, Gentleman*

Suggested Topics and Background Prose Readings for Class Presentations Topics

- The Enlightenment and Neoclassicism
- Restoration Comedy
- The Country and the City
- The Novel and the Periodical Press

Suggested Readings:

- Jeremy Collier, *A Short View of the Immorality and Profaneness of the English Stage* (London: Routledge, 1996).

- Daniel Defoe, 'The Complete English Tradesman' (Letter XXII), 'The Great Law of Subordination Considered' (Letter IV), and 'The Complete English Gentleman', in *Literature and Social Order in Eighteenth-Century England*, ed. Stephen Copley (London: Croom Helm, 1984).
- Samuel Johnson, 'Essay 156', in *The Rambler, in Selected Writings: SamuelJohnson*, ed. Peter Martin (Cambridge, Mass.: Harvard University Press, 2009) pp.194–7; *Rasselas* Chapter 10; 'Pope's Intellectual Character: Pope and Dryden Compared', from *The Life of Pope*, in *The Norton Anthology of English Literature*, vol. 1, ed. Stephen Greenblatt, 8th edn (New York: Norton, 2006) pp. 2693–4, 2774–7.

CC-4: British Romantic Literature (1798-1832) **Credits 06**

CC4T: British Romantic Literature (1798-1832)

Course Contents:
Poetry:

- William Blake: 'The Lamb', 'The Tyger'
- William Wordsworth: 'Tintern Abbey'
- Samuel Taylor Coleridge: 'Christabel' Part-1
- Percy Bysshe Shelley: 'Ozymandias'
- John Keats: 'Ode to a Nightingale'

Novel:

- Mary Shelley:*Frankenstein*
- Jane Austen: *Pride and Prejudice*

Suggested Topics and Background Prose Readings for Class Presentations Topics

- Reason and Imagination
- Conceptions of Nature
- Literature and Revolution
- The Gothic
- The Romantic Lyric

Suggested Readings:

- William Wordsworth, 'Preface to Lyrical Ballads', in *Romantic Prose and Poetry*, ed. Harold Bloom and Lionel Trilling (New York: OUP, 1973) pp. 594–611.
- John Keats, 'Letter to George and Thomas Keats, 21 December 1817', and 'Letter to Richard Woodhouse, 27 October, 1818', in *Romantic Prose and Poetry*, ed. Harold Bloom and Lionel Trilling (New York: OUP, 1973) pp. 766–68, 777–8.
- Jean-Jacques Rousseau, 'Preface' to *Emile or Education*, tr. Allan Bloom (Harmondsworth: Penguin, 1991).
- Samuel Taylor Coleridge, *Biographia Literaria*, ed. George Watson (London: Everyman, 1993) chap. XIII, pp. 161–66.

CC-5: British Literature: 19th Century (1832-1900) **Credits 06**

CC5T: British Literature: 19th Century (1832-1900)

Course Contents:

Poetry:

- Alfred Tennyson: 'Ulysses'
- Robert Browning: 'My Last Duchess', 'The Last Ride Together'
- Mathew Arnold: 'Dover Beach'

Novel:

- Charles Dickens:*Hard Times*

Suggested Topics and Background Prose Readings for Class Presentations Topics

- Utilitarianism
- The 19th Century Novel
- Marriage and Sexuality
- The Writer and Society
- Faith and Doubt
- The Dramatic Monologue

Suggested Readings:

- Karl Marx and Friedrich Engels, 'Mode of Production: The Basis of Social Life', 'The Social Nature of Consciousness', and 'Classes and Ideology', in *A Reader in Marxist Philosophy*, ed. Howard Selsam and Harry Martel (New York: International Publishers,1963) pp. 186–8, 190–1, 199–201.
- Charles Darwin, 'Natural Selection and Sexual Selection', in *The Descent of Man* in *The Norton Anthology of English Literature*, 8th edn, vol. 2, ed. Stephen Greenblatt (New York: Northon, 2006) pp. 1545–9.
- John Stuart Mill, *The Subjection of Women* in *Norton Anthology of English Literature*, 8th edn, vol.2, ed. Stephen Greenblatt (New York: Norton, 2006) chap. 1,pp.1061–9.

CC-6: British Literature: The Early 20th Century **Credits 06**

C6T: British Literature: The Early 20th Century

Course Contents:

Poetry:

- W.B. Yeats: 'The Second Coming', 'The Wild Swans at Coole'
- T.S. Eliot 'The Love Song of J. Alfred Prufrock'

Fiction:

- Joseph Conrad: *The Secret Sharer*
- Katherine Mansfield: 'The Fly'

Suggested Topics and Background Prose Readings for Class Presentations Topics

- Modernism and non-European Cultures
- The Women's Movement in the Early 20th Century

- Psychoanalysis and the Stream of Consciousness
- The Uses of Myth
- The Avant Garde

Suggested Readings:

- Sigmund Freud, 'Theory of Dreams', 'Oedipus Complex', and 'The Structure of the Unconscious', in *The Modern Tradition*, ed. Richard Ellman et. al. (Oxford: OUP, 1965) pp. 571, 578–80, 559–63.
- T.S. Eliot, 'Tradition and the Individual Talent', in *Norton Anthology of English Literature*, 8th edn, vol. 2, ed. Stephen Greenblatt (New York: Norton, 2006) pp. 2319–25.
- Raymond Williams, 'Introduction', in *The English Novel from Dickens to Lawrence* (London: Hogarth Press, 1984) pp. 9–27.
- Borris Ford, *The Pelican Guide to English Literature*, vol.8.

CC-7: American Literature **Credits 06**

C7T: American Literature

Course Contents:

Poetry:

- Robert Frost: 'The Road not Taken'
- Langston Hughes: 'Harlem to be Answered'
- Walt Whitman: 'O Captain, My Captain'

Stories:

- Edgar Allan Poe: 'The Purloined Letter'

Novel:

- Mark Twain: *The Adventures of Tom Sawyer*

Play:

- Tennessee Williams: *A Streetcar Named Desire*

Suggested Topics and Background Prose Readings for Class Presentations Topics

- The American Dream
- Social Realism and the American Novel
- Folklore and the American Novel
- Black Women's Writings
- Questions of Form in American Poetry

Suggested Readings:

- Hector St John Crevecouer, 'What is an American', (Letter III) in *Letters from an American Farmer* (Harmondsworth: Penguin, 1982) pp. 66–105.
- Frederick Douglass, *A Narrative of the life of Frederick Douglass* (Harmondsworth: Penguin, 1982) chaps. 1–7, pp. 47–87.
- Henry David Thoreau, 'Battle of the Ants' excerpt from 'Brute Neighbours', in *Walden* (Oxford: OUP, 1997) chap. 12.

- Ralph Waldo Emerson, 'Self Reliance', in *The Selected Writings of Ralph Waldo Emerson*, ed. with a biographical introduction by Brooks Atkinson (New York: The Modern Library, 1964).
- Toni Morrison, 'Romancing the Shadow', in *Playing in the Dark: Whiteness and Literary Imagination* (London: Picador, 1993) pp. 29–39.

CC-8: European Classical Literature **Credits 06**

C8T: European Classical Literature

Course Contents:

- Homer: *The Iliad*, tr. E.V. Rieu (Harmondsworth: Penguin,1985)(Book I).
- Sophocles: *Oedipus the King*, tr. Robert Fagles in *Sophocles: The Three Theban Plays* (Harmondsworth: Penguin, 1984).
- Plautus:*Pot of Gold*, tr. E.F. Watling (Harmondsworth: Penguin, 1965).
- Ovid Selections from *Metamorphoses* 'Bacchus', (Book III), 'Pyramus and Thisbe' (Book IV), tr. Mary M. Innes (Harmondsworth: Penguin, 1975).

Suggested Topics and Background Prose Readings for Class Presentations Topics

- The Epic
- Comedy and Tragedy in Classical Drama
- The Athenian City State
- Catharsis and Mimesis
- Satire
- Literary Cultures in Augustan Rome

Suggested Readings:

- Aristotle, *Poetics*, translated with an introduction and notes by Malcolm Heath, (London: Penguin, 1996) chaps. 6–17, 23, 24, and 26.
- Plato, *The Republic*, Book X, tr. Desmond Lee (London: Penguin, 2007).
- Horace, *Ars Poetica*, tr. H. Rushton Fairclough, Horace: Satires, Epistles and ArsPoetica (Cambridge Mass.: Harvard University Press, 2005) pp. 451–73.

CC-9: Modern European Drama **Credits 06**

C9T: Modern European Drama

Course Contents:

- Henrik Ibsen: *Ghosts*
- Bertolt Brecht:*The Good Woman of Szechuan*
- Samuel Beckett:*Waiting for Godot*

Suggested Topics and Background Prose Readings for Class Presentations

Topics

- 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

Suggested Readings:

- 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.
- Bertolt Brecht, 'The Street Scene', 'Theatre for Pleasure or Theatre for Instruction', and 'Dramatic Theatre vs Epic Theatre', in *Brecht on Theatre: The Development ofan Aesthetic*, ed. and tr. John Willet (London: Methuen, 1992) pp. 68–76, 121–8.
- George Steiner, 'On Modern Tragedy', in *The Death of Tragedy* (London: Faber, 1995) pp. 303–24.

CC-10: Popular Literature **Credits 06**

C10T: Popular Literature

Course Contents:

- Lewis Carroll: *Through the Looking Glass*
- Agatha Christie: *The Murder of Roger Ackroyd*
- Shyam Selvadurai: *Funny Boy*
- Sukumar Ray: *AbolTabol* (Translated by Sukanta Chowdhuri)/Autobiographical Notes on Ambedkar (For the Visually Challenged students)

Suggested Topics and Background Prose Readings for Class Presentations Topics

- Coming of Age
- The Canonical and the Popular
- Caste, Gender and Identity
- Ethics and Education in Children's Literature
- Sense and Nonsense
- The Graphic Novel

Suggested Readings:

- Chelva Kanaganayakam, 'Dancing in the Rarefied Air: Reading Contemporary Sri Lankan Literature' (*ARIEL*, Jan. 1998) rpt, Malashri Lal, Alamgir Hashmi, and Victor J. Ramraj, eds., *Post Independence Voices in South Asian Writings* (Delhi: Doaba Publications, 2001) pp. 51–6
- Sumathi Ramaswamy, 'Introduction', in *Beyond Appearances?: Visual Practices andIdeologies in Modern India* (Sage: Delhi, 2003) pp. xiii–xxix.
- Leslie Fiedler, 'Towards a Definition of Popular Literature', in *Super Culture:American Popular Culture and Europe*, ed. C.W.E. Bigsby (Ohio: Bowling Green University Press, 1975) pp. 29–38.
- Felicity Hughes, 'Children's Literature: Theory and Practice', *English Literary History*, vol. 45, 1978, pp. 542–61.

CC-11: Postcolonial Literatures **Credits 06**

C11T: Postcolonial Literatures

Course Contents:
Poetry:

- Pablo Neruda: 'Tonight I can Write' 'The Way Spain Was'
- Derek Walcott: 'A Far Cry from Africa' 'Names'
- Mamang Dai: 'Small Towns and the River' 'The Voice of the Mountain'

Novel:

- Chinua Achebe: *Things Fall Apart*

Stories:

- Bessie Head: 'The Collector of Treasures'
- Ama Ata Aidoo: 'The Girl who can'

Suggested Topics and Background Prose Readings for Class Presentations

Topics

- De-colonization, Globalization and Literature
- Literature and Identity Politics
- Writing for the New World Audience
- Region, Race, and Gender
- Postcolonial Literatures and Questions of Form

Suggested Readings:

- Franz Fanon, 'The Negro and Language', in *Black Skin, White Masks,* tr. Charles Lam Markmann (London: Pluto Press, 2008) pp. 8–27.
- Ngugi waThiong'o, 'The Language of African Literature', in *Decolonising the Mind* (London: James Curry, 1986) chap. 1, sections 4–6.
- Gabriel Garcia Marquez, the Nobel Prize Acceptance Speech, in *Gabriel GarciaMarquez: New Readings*, ed. Bernard McGuirk and Richard Cardwell (Cambridge:Cambridge University Press, 1987).

CC-12: Women's Writing **Credits 06**

C12T: Women's Writing

Course Contents:
Poetry:

- Emily Dickinson: 'I cannot live with you', 'I'm wife; I've finished that'
- Sylvia Plath: 'Daddy'
- Eunice De Souza: 'Advice to Women',

Fiction:

- Mahashweta Devi 'Draupadi', tr. Gayatri Chakravorty Spivak (Calcutta: Seagull, 2002)
- Toni Morrison: *Beloved*

Non-Fiction:

- Baby Kamble: *Our Wretched Life*
- Rassundari Debi Excerpts from *Amar Jiban* in Susie Tharu and K. Lalita, eds., *Women's Writing in India*, vol. 1 (New Delhi: OUP, 1989) pp. 191–2.

Suggested Topics and Background Prose Readings for Class Presentations

Topics

- The Confessional Mode in Women's Writing
- Sexual Politics
- Race, Caste and Gender
- Social Reform and Women's Rights

Suggested Readings:

- Virginia Woolf, *A Room of One's Own* (New York: Harcourt, 1957) chaps. 1 and 6.
- Simone de Beauvoir, 'Introduction', in *The Second Sex*, tr. Constance Borde and ShielaMalovany-Chevallier (London: Vintage, 2010) pp. 3–18.
- Kumkum Sangari and Sudesh Vaid, eds., 'Introduction', in *Recasting Women:Essays in Colonial History* (New Delhi: Kali for Women, 1989) pp. 1–25.
- Chandra Talapade Mohanty, 'Under Western Eyes: Feminist Scholarship and Colonial Discourses', in *Contemporary Postcolonial Theory: A Reader*, ed. Padmini Mongia (New York: Arnold, 1996) pp. 172–97.

CC-13: Indian Classical Literature **Credits 06**

C13T: Indian Classical Literature

Course Contents:

- Kalidasa. *Abhijnana Shakuntalam,* tr. Chandra Rajan, in *Kalidasa: The Loom of Time* (New Delhi: Penguin, 1989).

- 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.
- Sudraka. *Mrcchakatika*, tr. M.M. Ramachandra Kale (New Delhi: Motilal Banarasidass, 1962).

Suggested Topics and Background Prose Readings for Class Presentations

Topics

- The Indian Epic Tradition: Themes and Recensions
- Classical Indian Drama: Theory and Practice
- Alankara and Rasa
- Dharma and the Heroic

Suggested Readings:

- Bharata, *Natyashastra*, tr. Manomohan Ghosh, vol. I, 2nd edn (Calcutta: Granthalaya, 1967) chap. 6: 'Sentiments', pp. 100–18.
- Iravati Karve, 'Draupadi', in *Yuganta*: *The End of an Epoch* (Hyderabad: Disha, 1991) pp. 79–105.
- 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 *Orientalismand the Postcolonial Predicament: Perspectives on South Asia*, ed. Carol A.Breckenridge and Peter van der Veer (New Delhi: OUP, 1994) pp. 158–95.

CC-14: Indian Writing in English **Credits 06**

C14T: Indian Writing in English

Course Contents:
Poetry:
- R.K. Narayan: *Swami and Friends*
- H.L.V. Derozio: 'The Harp of India'
- Kamala Das: 'Introduction'
- Nissim Ezekiel: 'The Night of the Scorpion'

Fiction:
- Mulk Raj Anand: 'Two Lady Rams'
- Salman Rushdie: 'The Free Radio'

Drama:
- Girish Karnad: *Tughlaq*

Suggested Topics and Background Prose Readings for Class Presentations

Topics
- Indian English
- Indian English Literature and its Readership
- Themes and Contexts of the Indian English Novel
- The Aesthetics of Indian English Poetry
- Modernism in Indian English Literature

Suggested Readings:
- Raja Rao, Foreword to *Kanthapura* (New Delhi: OUP, 1989) pp. v–vi.
- Salman Rushdie, 'Commonwealth Literature does not exist', in *Imaginary Homelands* (London: Granta Books, 1991) pp. 61–70.
- Meenakshi Mukherjee, 'Divided by a Common Language', in *The Perishable Empire* (New Delhi: OUP, 2000) pp.187–203.
- Bruce King, 'Introduction', in *Modern Indian Poetry in English* (New Delhi: OUP, 2nd edn, 2005) pp. 1–10.

Discipline Specific Electives (DSE)

DSE-1: Nineteenth Century European Realism **Credits 06**

DSE1T: Nineteenth Century European Realism

Course Contents:

- Fyodor Dostoyvesky: *Crime and Punishment*, tr. Jessie Coulson London: Norton, 1989).
- Gustave Flaubert: *Madame Bovary*, tr. Geoffrey Wall (London: Penguin, 2002).

Suggested Topics and Background Prose Readings for Class Presentations

Topics

- History, Realism and the Novel Form
- Ethics and the Novel
- The Novel and its Readership in the 19th Century
- Politics and the Russian Novel: Slavophiles and Westernizers

Suggested Readings:

- Leo Tolstoy, 'Man as a creature of history in *War and Peace*', ed. Richard Ellmann et. al., *The Modern Tradition*, (Oxford: OUP, 1965) pp. 246–54.
- Honore de Balzac, 'Society as Historical Organism', from Preface to *The Human Comedy*, in *The Modern Tradition*, ed. Ellmann et. al (Oxford: OUP, 1965) pp. 265– 67.
- Gustav Flaubert, 'Heroic honesty', Letter on *Madame Bovary*, in *The Modern Tradition*, ed. Richard Ellmann et. al. (Oxford: OUP, 1965) pp. 242–3.
- George Lukacs, 'Balzac and Stendhal', in *Studies in European Realism* (London, Merlin Press, 1972) pp. 65–85.

DSE-2: World Literatures **Credits 06**

DSE2T: World Literatures

Course Contents:

- V.S. Naipaul: *Bend in the River* (London: Picador, 1979).
- Julio Cortazar: 'Blow-Up', in *Blow-Up and other Stories* (New York: Pantheon, 1985).
- Judith Wright: 'Bora Ring', in *Collected Poems* (Sydney: Angus & Robertson, 2002) p. 8.

Suggested Topics and Background Prose Readings for Class Presentations

Topics

- The Idea of World Literature
- Memory, Displacement and Diaspora
- Hybridity, Race and Culture
- Adult Reception of Children's Literature
- Literary Translation and the Circulation of Literary Texts
- Aesthetics and Politics in Poetry

Suggested Readings:

- Sarah Lawall, 'Preface' and 'Introduction', in *Reading World Literature: Theory, History, Practice*, ed. Sarah Lawall (Austin, Texas: University of Texas Press, 1994) pp. ix–xviii, 1–64.
- David Damrosch, *How to Read World Literature?* (Chichester: Wiley-Blackwell, 2009) pp. 1–64, 65–85.
- Franco Moretti, 'Conjectures on World Literature', *New Left Review*, vol.1 (2000), pp. 54–68.
- Theo D'haen et. al., eds., 'Introduction', in *World Literature: A Reader* (London: Routledge, 2012).

DSE-3: Science Fiction and Detective Literature **Credits 06**

DSE3T: Science Fiction and Detective Literature

Course Contents:

- Wilkie Collins: *The Woman in White*
- Arthur Conan Doyle: *The Hound of the Baskervilles*

Suggested Topics and Readings for Class Presentation Topics

- Crime across the Media
- Constructions of Criminal Identity
- Cultural Stereotypes in Crime Fiction
- Crime Fiction and Cultural Nostalgia
- Crime Fiction and Ethics
- Crime and Censorship

Suggested Readings:

- J. Edmund Wilson, 'Who Cares Who Killed Roger Ackroyd?', *The New Yorker*, 20 June 1945.
- George Orwell, *Raffles and Miss Blandish*, available at: <www.george-orwell.org/Raffles_and_Miss_Blandish/0.html>
- W.H. Auden, *The Guilty Vicarage*, available at: <harpers.org/archive/1948/05/the-guilty-vicarage/>
- Raymond Chandler, 'The Simple Art of Murder', *Atlantic Monthly*, Dec. 1944, available at: <http://www.en.utexas.edu/amlit/amlitprivate/scans/chandlerart.html

OR

DSE-3: Literature and Cinema **Credits 06**

DSE3T: Literature and Cinema

Course Contents:

- William Shakespeare, *Romeo and Juliet*, and its adaptations: *Romeo & Juliet* (1968; dir. Franco Zeffirelli, Paramount); and *Romeo + Juliet* (1996; dir. Baz Luhrmann, 20th Century Fox).

- Bapsi Sidhwa, *Ice Candy Man* and its adaptation *Earth* (1998; dir. Deepa Mehta, Cracking the Earth Films Incorp.); and Amrita Pritam, *Pinjar: The Skeleton and Other Stories*, tr. Khushwant Singh (New Delhi: Tara Press, 2009) and its adaptation: *Pinjar* (2003; dir. C.P. Dwivedi, Lucky Star Entertainment).

Suggested Topics and Background Prose Readings for Class Presentations

Topics

- Theories of Adaptation
- Transformation and Transposition
- Hollywood and 'Bollywood'
- The 'Two Ways of Seeing'
- Adaptation as Interpretation

Suggested Readings:

- Linda Hutcheon, 'On the Art of Adaptation', *Daedalus*, vol. 133, (2004).
- Thomas Leitch, 'Adaptation Studies at Crossroads', *Adaptation*, 2008, vol. 1, no. 1, pp. 63–77.
- Poonam Trivedi, 'Filmi Shakespeare', *Litfilm Quarterly*, vol. 35, issue 2, 2007.
- Tony Bennett and Janet Woollacott, 'Figures of Bond', in *Popular Fiction: Technology, Ideology, Production, Reading*, ed. Tony Bennet (London and New York: Routledge, 1990).

Other films that may be used for class presentations:

- William Shakespeare: *Comedy of Errors*, *Macbeth*, and *Othello* and their adaptations: *Angoor* (dir. Gulzar, 1982), *Maqbool* (dir. Vishal Bhardwaj, 2003), *Omkara* (dir. Vishal Bhardwaj, 2006) respectively.
- Jane Austen: *Pride and Prejudice* and its adaptations: BBC TV mini-series (1995), Joe Wright (2005) and Gurinder Chadha's *Bride and Prejudice* (2004).
- *Rudaali* (dir. Kalpana Lajmi, 1993) and *Gangor* or 'Behind the Bodice' (dir. Italo Spinelli, 2010).
- Ruskin Bond: *Junoon* (dir. Shyam Benegal, 1979), *The Blue Umbrella* (dir. Vishal Bhardwaj, 2005), and *Saat Khoon Maaf* (dir. Vishal Bhardwaj, 2011).
- E.M. Forster, *Passage to India* and its adaptation dir. David Lean (1984).

Note:

a) For every unit, 4 hours are for the written text and 8 hours for its cinematic adaptation (Total: 12 hours)

b) To introduce students to the issues and practices of cinematic adaptations, teachers may use the following critical material:

1. Deborah Cartmell and Imelda Whelehan, eds., *The Cambridge Companion to Literature on Screen* (Cambridge: Cambridge University Press, 2007).
2. John M. Desmond and Peter Hawkes, *Adaptation: Studying Film and Literature* (New York: McGraw-Hill, 2005).
3. Linda Hutcheon, *A Theory of Adaptation* (New York: Routledge, 2006).
4. J.G. Boyum, *Double Exposure* (Calcutta: Seagull, 1989).
5. B. Mcfarlens, *Novel to Film: An Introduction to the Theory of Adaptation* (Clarendon University Press, 1996).

DSE - 4: Partition Literature **Credits 06**

DSE4T: Partition Literature

Course Contents:

- Amitav Ghosh: *The Shadow Lines.*
- Dibyendu Palit: 'Alam's Own House', tr. Sarika Chaudhuri, *Bengal Partition Stories*: *An Unclosed Chapter*, ed. Bashabi Fraser (London: Anthem Press, 2008) pp. 453– 72.
- Manik Bandhopadhya, 'The Final Solution', tr. Rani Ray, *Mapmaking: Partition Stories from Two Bengals*, ed. Debjani Sengupta (New Delhi: Srishti, 2003) pp. 23–39.
- Sa'adat Hasan Manto, 'Toba Tek Singh', in *Black Margins: Manto*, tr. M. Asaduddin (New Delhi: Katha, 2003) pp. 212–20.
- Jibananda Das, 'I Shall Return to This Bengal', tr. Sukanta Chaudhuri, in *Modern Indian Literature* (New Delhi: OUP, 2004) pp. 8–13.

Suggested Topics and Readings for Class Presentation Topics

- Colonialism, Nationalism, and the Partition
- Communalism and Violence
- Homelessness and Exile
- Women in the Partition

Background Readings and Screenings

- Ritu Menon and Kamla Bhasin, 'Introduction', in *Borders and Boundaries* (New Delhi: Kali for Women, 1998).
- Sukrita P. Kumar, *Narrating Partition* (Delhi: Indialog, 2004).
- Urvashi Butalia, *The Other Side of Silence: Voices from the Partition of India* (Delhi: Kali for Women, 2000).
- Sigmund Freud, 'Mourning and Melancholia', in *The Complete Psychological Works of Sigmund Freud*, tr. James Strachey (London: Hogarth Press, 1953) pp. 3041–53.

Films

Garam Hawa (dir. M.S. Sathyu, 1974).
Khamosh Paani: Silent Waters (dir. Sabiha Sumar, 2003).
Subarnarekha (dir. Ritwik Ghatak, 1965)

Or

DSE - 4: Travel Writing **Credits 06**

DSE4T: Travel Writing

Course Contents:

- Ibn Batuta: 'The Court of Muhammad bin Tughlaq', Khuswant Singh's *City Improbable: Writings on Delhi*, Penguin Publisher

- Mark Twain: *The Innocent Abroad* (Chapter VII , VIII and IX) (Wordsworth Classic Edition)
- William Dalrymple: *City of Dijnn* (Prologue, Chapters I and II) Penguin Books
- Rahul Sankrityayan: *From Volga to Ganga* (Translation by Victor Kierman) (Section I to Section II) Pilgrims Publishing

Suggested Topics and Background Prose Readings for Class Presentations

Topics:

- Travel Writing and Ethnography
- Gender and Travel
- Globalization and Travel
- Travel and Religion
- Orientalism and Travel

Suggested Readings:

- Susan Bassnett, 'Travel Writing and Gender', in *Cambridge Companion to Travel Writing*, ed. Peter Hulme and Tim Young (Cambridge: CUP,2002) pp, 225-241
- Tabish Khair, 'An Interview with William Dalyrmple and Pankaj Mishra' in *Postcolonial Travel Writings: Critical Explorations*, ed. Justin D Edwards and Rune Graulund (New York: Palgrave Macmillan, 2011), 173-184
- Casey Balton, 'Narrating Self and Other: A Historical View', in *Travel Writing: The Self and The Other* (Routledge, 2012), pp.1-29
- Sachidananda Mohanty, 'Introduction: Beyond the Imperial Eyes' in *Travel Writing and Empire* (New Delhi: Katha, 2004) pp. ix –xx.

Skill Enhancement Courses (SEC)

SEC-1: English Language Teaching **Credits 02**

SEC-1: English Language Teaching

Course Contents:

- Knowing the Learner
- Structures of English Language
- Methods of Teaching English Language and Literature
- Materials for Language Teaching
- Assessing Language Skills
- Using Technology in Language Teaching

Suggested Readings:

- Penny Ur, *A Course in Language Teaching: Practice and Theory* (Cambridge: CUP, 1996).
- Marianne Celce-Murcia, Donna M. Brinton, and Marguerite Ann Snow, *Teaching English as a Second or Foreign Language* (Delhi: Cengage Learning, 4th edn, 2014).

- Adrian Doff, *Teach English: A Training Course For Teachers (Teacher's Workbook)* (Cambridge: CUP, 1988).
- *Business English* (New Delhi: Pearson, 2008).
- R.K. Bansal and J.B. Harrison, *Spoken English: A Manual of Speech and Phonetics* (New Delhi: Orient BlackSwan, 4th edn, 2013).
- Mohammad Aslam, *Teaching of English* (New Delhi: CUP, 2nd edn, 2009).

Or

SEC-1: Soft Skills **Credits 02**

SEC1T: Soft Skills

Course Contents:

What is soft skill? Teamwork, Adaptability, Leadership, Problem solving

Development of Sooft skills: Precis; Comprehension; Essays.

Suggested Readings:

- *English and Soft Skills.* S.P. Dhanavel. Orient BlackSwan
- *English for Students of Commerce:* Precis, Composition, Essays, Poems eds. Kaushik,et al.

Or

SEC-1: Translation Studies **Credits 02**

SEC1T: Translation Studies

Course Contents:

1. Introducing Translation: a brief history and significance of translation in a multi linguistic and multicultural society like India.
2. Exercises in different Types / modes of translation, such as:
    a) Semantic / Literal translation
    b) Free / sense/ literary translation
    c) Functional / communicative translation

3.

a) Introducing basic concepts and terms used in Translation Studies through relevant tasks, for example: Equivalence, Language variety, Dialect, Idiolect, Register, Style, Mode, Code mixing / Switching.
b) Translation in Practice.

Resources for Practice:

Dictionaries
Encyclopedias
Thesauri
Glossaries
Software of translation

Suggested Readings:

- Baker, Mona, *In Other Words: A Coursebook on Translation*, Routledge, (Useful exercises for practical translation and training)
- ---------- (Ed.) *Routledge Encyclopedia of Translation Studies*. London and New York: Routledge, 2001. (Readable entries on concepts and terms) Sherry Simon, Gender in translation: Cultural Identity and the Politics of Transmission. New York: Routledge,
- Catford, I.C. *A Linguistic Theory of Translation*. London: OUP, 1965. Frishberg, Nancy J. *Interpreting: An Introduction*. Registry of Interpreters,.
- Gargesh, Ravinder and Krishna Kumar Goswami. (Eds.). *Translation and Interpreting: Reader and Workbook*. New Delhi: Orient Longman,.
- House, Juliana. *A Model for Translation Quality Assessment*. Tubingen: Gunter Narr,
- Lakshmi, H. *Problems of Translation*. Hyderabad: Booklings Corporation,.
- Newmark, Peter. *A Textbook of Translation*. London: Prentice Hall,
- Nida, E.A. and C.R. Taber. *The Theory and Practice of Translation.* Leiden: E.J. Brill,
- Toury, Gideon. *Translation Across Cultures*. New Delhi : Bahri Publications Private Limited,

SEC-2: Creative Writing **Credits 02**

SEC2T: Creative Writing

Course Contents:

Unit 1:
What is Creative Writing?
Unit 2:
The Art and Craft of Writing
Unit 3:
Modes of creative Writing
Unit 4:
Writing for the Media
Unit 5:
Preparing for Publication

Suggested Readings:

- Creative writing: A Beginner's Manual by Anjana Neira Dev and Others, Published by Pearson, Delhi.

Or

SEC-2: Business Communication **Credits 02**

SEC2T: Business Communication

Course Contents:

- Introduction to the essentials of Business Communication: Theory and practice
- Writing a project report
- Writing reports on field work/visits to industries, business concerns etc. /business negotiations.
- Summarizing annual report of companies
- E-correspondence
- Spoken English for business communication (Viva for internal assessment)

Suggested Readings:

- Scot, O.; Contemporary *Business Communication*. Biztantra, New Delhi.
- Lesikar, R.V. & Flatley, M.E.; *Basic Business Communication Skills for Empowering the Internet Generation*, Tata McGraw Hill Publishing Company Ltd. New Delhi.
- Ludlow, R. & Panton, F.; *The Essence of Effective Communications*, Prentice Hall of India Pvt. Ltd., New Delhi.
- R. C. Bhatia, *Business Communication*, Ane Books Pvt Ltd, New Delhi

Or

SEC-2: Technical Writing **Credits 02**

SEC2T: Technical Writing

Course Contents:

1. Communication: Language and communication, distinct features of writing.
2. Writing Skills; Selection of topic, thesis statement, developing the thesis introductory, developmental, transitional and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing.
3. Technical Writing: Scientific and technical subjects; formal and informal writings; formal writings/reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes; common errors to be avoided.

Suggested Readings:

- M. Frank. Writing as thinking: *A guided process approach, Englewood Cliffs,* Prentice Hall Reagents.
- L. Hamp-Lyons and B. Heasely: Study Writing; *A course in written English.* For academic and professional purposes, Cambridge Univ. Press.
- R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.
- Daniel G. Riordan & Steven A. Panley: *"Technical Report Writing Today"* - Biztaantra.
- Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today,* 8th Edition

Generic Elective (GE)
[Interdisciplinary for other department]

GE- 1: Academic Writing and Composition **Credits 06**

GE1T: Academic Writing and Composition

Course Contents:

- Introduction to the Writing Process
- Introduction to the Conventions of Academic Writing
- Writing in one's own words: Summarizing and Paraphrasing
- Critical Thinking: Syntheses, Analyses, and Evaluation
- Structuring an Argument: Introduction, Interjection, and Conclusion
- Citing Resources; Editing, Book and Media Review

Suggested Readings:

- Liz Hamp-Lyons and Ben Heasley, *Study writing: A Course in Writing Skills for Academic Purposes* (Cambridge: CUP, 2006).
- Renu Gupta, *A Course in Academic Writing* (New Delhi: Orient BlackSwan, 2010).
- Ilona Leki, *Academic Writing: Exploring Processes and Strategies* (New York: CUP, 2nd edn, 1998).
- Gerald Graff and Cathy Birkenstein, *They Say/I Say: The Moves That Matter in Academic Writing* (New York: Norton, 2009).

GE- 2: Media and Communication Skills **Credits 06**

GE2T: Media and Communication Skills

Course Contents:

1. Introduction to Mass Communication

1. Mass Communication and Globalization
2. Forms of Mass Communication

Topics for Student Presentations:

a. Case studies on current issues Indian journalism
b. Performing street plays
c. Writing pamphlets and posters, etc.

2. Advertisement

1. Types of advertisements
2. Advertising ethics
3. How to create advertisements/storyboards

Topics for Student Presentations:

a. Creating an advertisement/visualization
b. Enacting an advertisement in a group
c. Creating jingles and taglines

3. Media Writing

1. Scriptwriting for TV and Radio
2. Writing News Reports and Editorials
3. Editing for Print and Online Media

Topics for Student Presentations:

a. Script writing for a TV news/panel discussion/radio programme / hosting radio programmes on community radio
b. Writing news reports/book reviews/film reviews/TV program reviews/interviews
c. Editing articles
d. Writing an editorial on a topical subject

4. Introduction to Cyber Media and Social Media

1. Types of Social Media
2. The Impact of Social Media
3. Introduction to Cyber Media

Or

GE-2: Text and Performance **Credits 06**

GE2T: Text and Performance

Course Contents:

1. Introduction

1. Introduction to theories of Performance
2. Historical overview of Western and Indian theatre
3. Forms and Periods: Classical, Contemporary, Stylized, Naturalist

Topics for Student Presentations:

a. Perspectives on theatre and performance
b. Historical development of theatrical forms
c. Folk traditions

2. Theatrical Forms and Practices

1. Types of theatre, semiotics of performative spaces, e.g. proscenium 'in the round', amphitheatre, open-air, etc.
2. Voice, speech: body movement, gestures and techniques (traditional and contemporary), floor exercises: improvisation/characterization

Topics for Student Presentations:

a. On the different types of performative space in practice
b. Poetry reading, elocution, expressive gestures, and choreographed movement

3. Theories of Drama

1. Theories and demonstrations of acting: Stanislavsky, Brecht
2. Bharata

Topics for Student Presentations**:**

a. Acting short solo/ group performances followed by discussion and analysis with application of theoretical perspectives

4. Theatrical Production

1. Direction, production, stage props, costume, lighting, backstage support.
2. Recording/archiving performance/case study of production/performance/impact of media on performance processes.

Topics for Student Presentations:

a. All aspects of production and performance; recording, archiving, interviewing performers and data collection.

GE- 3: Language and Linguistics **Credits 06**

GE3T: Language and Linguistics

Course Contents:

1. Language: language and communication; language varieties: standard and non-standard language; language change.
   Mesthrie, Rajend and Rakesh M Bhatt. 2008. *World Englishes: The study of new linguistic varieties.*Cambridge: Cambridge University Press.
2. Phonology and Morphology: Akmajian, A., R. A. Demers and R, M. Harnish, *Linguistics: An Introduction to Language and Communication,* 2nd ed.
   Fromkin, V., and R. Rodman, *An Introduction to Language*, 2nd ed. (New Yourk: Holt, Rinehart and Winston, 1974) Chapters 3, 6 and 7
3. Syntax : categories and constituents phrase structure; maxims of conversation.
   Akmajian, A., R. A. Demers and R, M Harnish, Llinguistics: An Introduction to Language and Communication, 2nd ed. (Cambridge, Mass,: MIT Press, 1984; Indian edition, Prentice Hall, 1991) Chapter 5 and 6.

Or

GE- 3: Contemporary India: Women and Empowerment **Credits 06**

GE3T: Contemporary India: Women and Empowerment

Course Contents:

1. Social Construction of Gender (Masculinity and Feminity) Patriarchy in Indian History.
2. Women and Law
   Women and the Indian Constitution
   Personal Laws(Customary practices on inheritance and Marriage) (Supplemented by workshop on legal awareness)
3. Women and Environment
   State interventions, Domestic violence, Female foeticide, sexual harassment
   Female Voices: *Sultana's Dream* or Bama : Karuk ku

GE- 4: Gender & Human Rights **Credits 06**

GE4T: Gender & Human Rights

Course Contents:

1. Poetry: Meena Kandasamy "Aggression" Temsula Ao "Laburnum for My Head"
2. Drama: Manjula Padmanabhan *Lights Out*
3. Essay: Virginia Woolf "Professions for Women", *Women's Rights are Human Rights.* Section V "The Human Rights Framework in Practice"

Or

GE - 4: Environment & Literature **Credits 06**

GE4T: Environment & Literature

Course Contents:

Introduction (Nature in Oriental & Western Thought, Deep Ecology, Third World Environmentalism)

1. G M Hopkins. 'Binsey Poplars'
2. Mahasweta Devi. 'Pterodactyl'
3. Ruskin Bond. 'Dust on the Mountains'.

Suggested Readings:

- Vasudha Narayanan 'Water, Wood, and Wisdom: Ecological Perspectives from the Hindu Traditions'
- Allen Carlson. *Environmental Aesthetics*
- Preeti Ranjan Ghosh. "Towards an Understanding of Environmental Aesthetics: Some Reflections", The Philosophical Quarterly, 1998
- Beth Fowkes Tobin. *Colonizing Nature*
- Vasudha Narayanan. *Water, Wood and Wisdom*
- Vandana Shiva. *Women in Nature*

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year B.A. (General)
in

ENGLISH

Under Choice Based Credit System (CBCS)
w.e.f 2018-2019

VIDYASAGAR UNIVERSITY
BA (General) in English
[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
1	**I**			**SEMESTER-I**			**CA**	**ESE**	**TOTAL**
		Core-1 (DSC-1A)		Poetry & Short Story	6	5-1-0	15	60	75
		Core-2 (DSC-2A)		Other Discipline(Discipline-2)/TBD	6		15	60	75
		AECC-1 **(Core)[Language Core]**		English-I	6	5-1-0	15	60	75
		AECC-1 **(Elective)**		English/MIL	2	1-1-0	10	40	50
				Semester - I : Total	20				275
				SEMESTER-II					
	II	Core-3 (DSC-1B)		Essay, Drama & Novel	6	5-1-0	15	60	75
		Core-4 (DSC-2B)		Other Discipline(Discipline-2)/TBD	6		15	60	75
		AECC-2 **(Core)[Language Core]**		MIL-I	6	5-1-0	15	60	75
		AECC-2 (**Elective)**		Environmental Studies	4		20	80	100
				Semester - 2 : Total	22				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
2	**III**			**SEMESTER-III**			**CA**	**ESE**	**TOTAL**
		Core-5 (DSC-1C)		Contemporary India: Women and Empowerment	6	5-1-0	15	60	75
		Core-6 (DSC-2C)		Other Discipline (Discipline-2)/TBD	6		15	60	75
		AECC-3 **(Core)[Language Core]**		English-II	6	5-1-0	15	60	75
		SEC-1		**SEC-1:** Soft Skills **Or** Film Studies	2	1-1-0	10	40	50
				Semester - 3 : Total	20				275
				SEMESTER-IV					
	IV	Core-7 (DSC-1D)		Academic Writing and Composition	6	5-1-0	15	60	75
		Core-8 (DSC-2D)		Other Discipline (Discipline-2) /TBD	6		15	60	75
		AECC-4 **(Core)[Language Core]**		MIL-II	6	5-1-0	15	60	75
		SEC-2		**SEC-2:** Creative Writing **Or** Technical Writing	2	1-1-0	10	40	50
				Semester - 4 : Total	20				**275**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
3	**V**			**SEMESTER-V**			**CA**	**ESE**	**TOTAL**
		DSE-1A		Any one from Discipline -1(English)	6	5-1-0	15	60	75
		DSE-2A		Other Discipline(any one from Discipline -2) / TBD	6		15	60	75
		GE-1		TBD	6		15	60	75
		SEC-3		**SEC-3:** Translation Studies **Or** English Language Teaching	2	1-1-0	10	40	50
				Semester - 5 : Total	20				**275**
				SEMESTER-VI					
	VI	DSE-1B		Any one from Discipline -1(English)	6	5-1-0	15	60	75
		DSE-2B		Other Discipline (any one from Discipline -2) / TBD	6		15	60	75
		GE-2		TBD	6		15	60	75
		SEC-4		**SEC-4:** Business Communications **Or** Spoken English	2	1-1-0	10	40	50
				Semester - 6 : Total	20				**275**
				Total in all semester:	**122**				**1700**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **CP**=Core Practical , **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies ,

List of Core Courses and Electives

Core Course (CC)

DSC-1A: Poetry & Short story
DSC-1B: Essay, Drama & Novel
DSC-1C: Contemporary India: women and empowerment
DSC-1D: Academic Writing and Composition

Discipline Specific Electives (DSE)

DSE-1: British Literature
Or
DSE-1: Indian Literature in Translation
DSE-2: Partition Literature
Or
DSE-2: Nation, Culture and India

Skill Enhancement Course (SEC)

SEC-1: Soft Skills
Or
SEC-1: Film Studies
SEC-2: Creative Writing
Or
SEC-2: Technical Writing
SEC-3: Translation Studies
Or
SEC-3: English Language Teaching
SEC-4: Business Communications
Or
SEC-4: Spoken English

Generic Electives (GE)
[Interdisciplinary for other department]

GE-1: Gender & Human Rights
Or
GE-1: Contemporary India: Women and Empowerment
Or
GE-1: Academic Writing and Composition
GE-2: Environment & Literature
Or
GE-2: Novel and Prose
Or
GE-2: Language and Linguistics

AECC(Core)[Language Core]-English
English (AECC-Core L1 &L2)

CL-1(English): British Poetry -1
Or
CL-1(English): Language, Variety and Stylistics
CL-2(English): British Poetry - 2
Or
CL-2(English): Language, Imagination & Creativity

Core Courses (CC)

DSC-1A (CC-1): Poetry & Short story **Credits 06**

DSC1AT: Poetry & short Story

Course Contents:

1. a) William Shakespeare: Sonnet 116
   b) William Wordsworth: "A Slumber did my Spirit Seal"
2. a) John Keats – "Bright Star"
   b) Wilfred Owen – "Strange Meeting"
3. Charles Lamb – "Dream Children"
4. H. E. Bates – "The Ox"

DSC-1B(CC-2): Essay, Drama & Novel **Credits 06**

DSC1BT: Essay, Drama & Novel

Course Contents:

1. George Orwell – "Shooting an Elephant'
2. R. K. Narayan – "A Library without Books"
3. George Bernard Shaw – *Arms and the Man*
4. J. B. Priestley – *An Inspector Calls*
5. Ernest Hemingway – *The Old Man and the Sea*

DSC-1C (CC-3): Contemporary India: women and empowerment **Credits 06**

DSC1CT: Contemporary India: women and empowerment

Course Contents:

1. Social Construction of Gender:

1. Masculinity, Femininity
2. Patriarchy
3. Sex & Gender
4. Gender Socialization
5. Gender discrimination
6. Gender stereotyping

Texts: (any one)

Nivedita Menon : *Sexualities*: *Issues in Contemporary Indian Feminisms* (selections)

Nivedita Menon : *Gender and Politics in India* (Selections)

2. History of Women's Movements in India (Pre- and Post-Independence):

1. Women and Nationalism
2. Women and Partition
3. Women and Political Participation

Text: (any two)

1. "Letters to a Wife: Satyendranath Tagore's Letters to Jynadanandini Tagore" from *Epistolary Cultures in 19th century Bengal*, Stree Samya, Kolkata,

2. Gholam Murshed "Chapter Four" from *The Reluctant Debutante.*
3. Urvashi Butalia 'Beginnings' from *The Other Side of Silence*
4. Jashodhara Bagchi and Shubharanjan Dasgupta. *The Trauma and The Triumph: Gender and Partition in Eastern India,*Vol I ("Introduction")

3. Women and Law:

1. Women and the Indian Constitution
2. Personal Laws
3. Customary practices on inheritance and Marriage

Text: (Selections from any one text)

1. Flavia Agnes. Ed. *Women and Law in India: An Omnibus* Comprising
2. Flavia Agnes. *Enslaved Daughters* (selections).
3. Sudhir Chandra. *Hindu Women and Marriage Law*
4. Monomoyee Basu. *Law and Gender Inequality.*

4. Women and Violence:

1. State interventions
2. Domestic violence
3. Female *foeticide*
4. Sexual harassment

Texts: (any one)

1. Rokeya Sakhawat Hussain – *Sultana's Dream*
2. Bama Faustina Soosairaj – *Karukku*

Suggested Readings:

- David Glover. *Gender*. New York: Routledge New Critical Idiom Series.
- *The Social Construction of Gender* (A Gender & Society Reader) by Judith Lorber (Editor), Susan A. Farrell (Editor)
- Veena Oldenburg. *Dowry Murders: The Imperial Origins of a Cultural Crime*
- Attia Hussein. *Translating Partition.* New Delhi: Katha
- Brinda Bose. *Translating Desire.* New Delhi: Katha
- Radha Kumar. *The History of Doing: The Women's Movement in India*
- Kalpana Kannabiran. *Women and Law Critical Feminist Perspectives*
- Carolyn Merchant. *Earthcare: Women and the Environment.*

DSC-1D (CC- 4): Academic Writing and Composition Credits 06

DSC1DT: Academic Writing and Composition

Course Contents:

1. Introduction to the Writing Process: Conventions of Academic Writing, Writing in one's own words – Summarizing and Paraphrasing
2. Critical Thinking: Syntheses, Analyses, and Evaluation
3. Structuring an Argument: Introduction, Interjection, and Conclusion
4. Citing Resources, Editing, Book and Media Review

Suggested Readings:

- Liz Hamp-Lyons and Ben Heasley, *Study writing: A Course in Writing Skills for Academic Purposes* (Cambridge: CUP, 2006).
- Renu Gupta, *A Course in Academic Writing* (New Delhi: Orient BlackSwan, 2010).
- IlonaLeki, *Academic Writing: Exploring Processes and Strategies* (New York: CUP, 2nd edn, 1998).
- Gerald Graff and Cathy Birkenstein, *They Say/I Say: The Moves That Matter in Academic Writing* (New York: Norton, 2009).
- John M. Swales. *Academic Writing for Graduate Students*

DISIPLINE SPECIFIC ELECTIVE (DSE)

DSE -1: British Literature **Credits 06**

DSE1T: British Literature

Course Contents:

1. William Shakespeare – *As you Like It*
2. Thomas Hardy- Ah, Are Digging on My Grave?
3. Robert Lynd- On Not Being a Philosopher

Or

DSE- 1: Indian Literature in Translation **Credits 06**

DSE1T: Indian Literature in Translation

Course Contents:

1. Rabindranath Tagore – *The Wife's Letter* (Translation of *Steer Patra*)
2. Vijay Tendulkar – *Silence: The Court is in Session* (Translation of *Shantata*: *Court ChaluAhe*)
3. Mahasweta Devi- 'Draupadi'

DSE-2 : Partition Literature **Credits 06**

DSE2T: Partition Literature

Course Contents:

1. Sa'adat Hasan Manto, 'Toba Tek Singh', in *Black Margins: Manto*, tr. M. Asaduddin (New Delhi: Katha, 2003) pp. 212–20.
2. Jibananda Das, 'I Shall Return to This Bengal', tr. SukantaChaudhuri, in *Modern Indian Literature* (New Delhi: OUP, 2004) pp. 8–13.

Or

DSE-2 : Nation, Culture and India **Credits 06**

DSE2T: Nation, Culture and India

Course Contents:

1. AmartyaSen – "Secularism and its Discontents" (from *The Argumentative Indian*) 10
2. Rabindranath Tagore – "Nationalism and India" (from Nationalism) 15

SKILL ENHANCEMENT COURSE (SEC)

SEC-1: Soft Skills **Credits 02**

Course Contents:

1. Teamwork
2. Emotional Intelligence
3. Adaptability
4. Leadership
5. Problem solving

Suggested Readings

- *English and Soft Skills.* S.P. Dhanavel. Orient BlackSwan
- *English for Students of Commerce: Precis, Composition, Essays, Poems* eds. Kaushik, et al.

Or

SEC-1: Film Studies **Credits 02**

Course Contents:

1. Evolution of the Cinema: Silent Film, Talkie, Colour Film, Digital Age, 3D Films.
2. Response and Review: (Illustrative film shows & appreciation programme to be arranged)

Suggested Readings:

- James Monako. *How To Read a Film.* New York: OUP, 2009.
- Andrew Dix. *Beginning Film Studies.* Manchester *university Press, 2008.*
- Satyajit Ray. *Our Films, Their Films.* Orient Blackswan, 2001.
- Satyajit Ray. *Deep Focus: Reflection on Indian Cinema.* Ed. Sandip Ray. Harper Collins India. 2011.

SEC-2: Creative Writing **Credits 02**

Course Contents:

Unit 1.

What is Creative Writing?

Unit 2.

The Art and Craft of Writing

Unit 3.

Modes of creative Writing

Unit 4.
Writing for the Media

Suggested Readings:

- Anjana Neira Dev and Others, *Creative writing: A Beginner's Manual* (Delhi: Pearson, 2009).
- Mary Lee Marksberry. *Foundation of Creativity* (New York : Harper and Row, 1963)

Or

SEC-2: Technical Writing **Credits 02**

Course Contents:

1. Communication: Language and communication, differences between speech and writing, distinct features of speech, distinct features of writing.
2. Writing Skills: Selection of topic,developmental, transitional and concluding paragraphs, descriptive, narrative, expository and argumentative writing.
3. Technical Writing: Formal and informal writings, formal writings/reports, letters, memorandum, notices, agenda, minutes, common errors to be avoided.

Suggested Readings

- M. Frank. Writing as thinking: A guided process approach, Englewood Cliffs, Prentice Hall Reagents.
- L. Hamp-Lyons and B. Heasely. Study Writing: A course in written English. For academic and professional purposes, Cambridge Univ. Press.
- R. Quirk, S. Greenbaum, G. Leech and J. Svartik.A comprehensive grammar of the English language, Longman, London.
- Daniel G. Riordan & Steven A. Panley. Technical Report Writing Today Biztaantra. Additional Reference Books
- Daniel G. Riordan, Steven E. Pauley, Biztantra: Technical Report Writing Today, 8th Edition (2004).

SEC-3: Translation Studies **Credits 02**

Course Contents:

1. Introducing Translation: A brief history and significance of translation in a multi lingual and multicultural society like India
2. Exercises in different Types/modes of translation: a. Semantic/Literal b. free sense/literary c. Functional/communicative d. Transcreation.
3. Introducing basic concepts and terms used in Translation Studies through relevant tasks: Equivalence, Language variety, Dialect, Idiolect, Register, Style, Mode, and Code mixing/Switching. b. Defining the process of translation (analysis, transference, restructuring) through critical examination of standard translated literary/non-literary texts.

Suggested Readings:

- Baker, Mona, *In Other Words: A Coursebook on Translation*, Routledge, 2001.

- *Routledge Encyclopedia of Translation Studies*. London and New York: Routledge, 2001.
- 3 Sherry Simon, *Gender in translation: Cultural Identity and the Politics of Transmission*. New York: Routledge, 1996.
- Catford, I. C. *A Linguistic Theory of Translation*. London: OUP, 1965.
- Frishberg, Nancy J. *Interpreting: An Introduction. Registry of Interpreters*, 1990.
- Gargesh, Ravinder and Krishna Kumar Goswami. (Eds.). *Translation and Interpreting: Reader and Workbook*. New Delhi: Orient Longman, 2007.
- House, Juliana. *A Model for Translation Quality Assessment*. Tubingen: Gunter Narr, 1977.
- Lakshmi, H. *Problems of Translation*. Hyderabad: Booklings Corporation, 1993.

Or

SEC-3: English Language Teaching **Credits 02**

Course Contents:

1. Knowing the Learner
Or
1. Structures of the English Language
2. Methods of teaching English Language
3. Assessing Language Skills
4. Materials for Language Teaching
Or
4.Using Technology in Language Teaching

Suggested Readings:

- Penny Ur, A Course in Language Teaching: Practice and Theory (Cambridge: CUP, 1996).
- Marianne Celce-Murcia, Donna M. Brinton, and Marguerite Ann Snow, Teaching English as a Second or Foreign Language (Delhi: Cengage Learning, 4th edn, 2014).
- Adrian Doff, Teach English: A Training Course For Teachers (Teacher's Workbook) (Cambridge: CUP, 1988).
- Business English (New Delhi: Pearson, 2008).
- R. K. Bansal and J. B. Harrison, Spoken English: A Manual of Speech and Phonetics (New Delhi: Orient BlackSwan, 4th edn, 2013).
- Mohammad Aslam, Teaching of English (New Delhi: CUP, 2nd edn, 2009)

SEC-4: Business Communications **Credits 02**

Course Contents:

1. Introduction to the Essentials of Business Communication: Theory and Practice
2. Writing a project report
3. Citing References, using bibliographical and research tools
4. Writing minutes of meetings
5. E-Correspondence
6. Making oral presentations (Viva for internal assessment)
7. Spoken English for Business Communication (Viva for internal assessment)

Suggested Readings:

- Scot, O. Contemporary Business Communication. Biztantra, New Delhi.
- Lesikar, R. V. &Flatley, M. E. Basic Business Communication Skills for Empowering the Internet Generation, Tata McGraw Hill Publishing Company Ltd. New Delhi.

Or

SEC-4: Spoken English **Credits 02**

Course Contents:

1. Differences between speech and writing – distinct features of Oral Communication; Essentials of Good Communication- Barriers
2. Listening: Weak Forms, Stress, Intonation, Voice Modulation, Telephonic Conversation, Rules of Interruption in Civilized discourse
3. Speech & Situation/ Context:
    a. Greeting & Leave Taking
    b. Making & Granting/Refusing Requests
    c. Queries & Giving Information/Direction
    d. Describing objects/process
    e. Narrating events & Commentary
    f. Persuasion & Motivation
    g. Complaints & Apologies
    h. Expressing disapproval
    i. Alerting & Warning

4. Presentation Skills: Interview, Debate, GD, Anchoring, Public Address, Broadcasting

(Intensive learner-centric pedagogic mode and use of Language Lab are desirable for making the course successful. Having explained the preliminaries of each course-content, teachers may put group of learners in a particular situation of conversation and monitor their conversation/ use of language as facilitators.)

Suggested Readings:

- W.S. Allen. Lining English speech. Orient Longman, London, 1968.
- R.K Bansal and J.B Harrison. Spoken English for India. Orient Longman, Madras, 1972.
- Leena Sen. Communication Skills. Prentice Hall of India, New Delhi.

Generic Elective (GE)

[Interdisciplinary for other department]

GE-1: Gender & Human Rights **Credits 06**

GE1T: Gender & Human Rights

Course Contents:

1. Poetry: Meena Kandasamy “Aggression” Temsula Ao “Laburnum for My Head”
2. Drama: Manjula Padmanabhan *Lights Out*
3. Essay: Virginia Woolf “Professions for Women”, *Women’s Rights are Human Rights.* Section V “The Human Rights Framework in Practice”

Or

GE-1: Contemporary India: Women and Empowerment **Credits 06**

GE1T: Contemporary India: Women and Empowerment

Course Contents:

1. Social Construction of Gender (Masculinity and Feminity) Patriarchy
2. History of Women's Movements in India (Pre-independence, post independence)
   Women, Nationalism, Partition
   Women and Political Participation
3. Women and Law
   Women and the Indian Constitution
   Personal Laws (Customary practices on inheritance and Marriage)
   (Supplemented by workshop on legal awareness)
4. Women and Environment
   State interventions, Domestic violence, Female foeticide, sexual harassment
   Female Voices: *Sultana's Dream*
   Dalit Discourse:

Or

GE-1 : Academic Writing and Composition **Credits 06**

GE1T : Academic Writing and Composition

Course Contents:

1. Introduction to the Writing Process
2. Introduction to the Conventions of Academic Writing
3. Writing in one's own words: Summarizing and Paraphrasing
4. Critical Thinking: Syntheses, Analyses, and Evaluation
5. Structuring an Argument: Introduction, Interjection, and Conclusion
6. Citing Resources; Editing, Book and Media Review

Suggested Readings

- Liz Hamp-Lyons and Ben Heasley, *Study writing: A Course in Writing Skills for Academic Purposes* (Cambridge: CUP, 2006).
- Renu Gupta, *A Course in Academic Writing* (New Delhi: Orient BlackSwan, 2010).
- Ilona Leki, *Academic Writing: Exploring Processes and Strategies* (New York: CUP,2nd edn, 1998).
- Gerald Graff and Cathy Birkenstein, *They Say/I Say: The Moves That Matter in Academic Writing* (New York: Norton, 2009).

GE-2: Environment & Literature **Credits 06**

GE2T: Environment & Literature

Course Contents:

Introduction (Nature in Oriental & Western Thought, Deep Ecology, Third World Environmentalism)

1. Gordon J. L. Ramel. 'Daffodils No More'
2. Mahasweta Devi. 'Pterodactyl'
3. Ruskin Bond. 'Dust on the Mountains',

Suggested Readings:

- Vasudha Narayanan 'Water, Wood, and Wisdom: Ecological Perspectives from the Hindu Traditions'
- Allen Carlson. *Environmental Aesthetics*
- Preeti Ranjan Ghosh. "Towards an Understanding of Environmental Aesthetics: Some Reflections", The Philosophical Quarterly, 1998
- Beth Fowkes Tobin. *Colonizing Nature*
- Vasudha Narayanan. *Water, Wood and Wisdom*
- Vandana Shiva. *Women in Nature*

Or

GE-2: Novel and Prose **Credits 06**

GE2T: Novel and Prose

Course Contents:

1. Charles Dickens: Oliver Twist
2. R.K.Narayan: A Library without Books
3. Guy de Maupassant: My Uncle Jules

Or

GE-2: Language and Linguistics **Credits 06**

GE2T: Language and Linguistics

Course Contents:

1. Language: language and communication; language varieties: standard and non-standard language; language change.
2. Phonetics: Overview of Articulatory Phonetics. The Consonants of English. The Vowel Sounds of English
3. Phonology and Phonetic Transcription: The Phonology of English. Transcription of Consonants. Transcription of Vowels
4. Syntax and semantics: categories and constituents of phrase structure; (Noun Phrase & Verbal).

Suggested Reading:

- Roach Peter, *Phonetics* (New Delhi: Oxford University Press, 2001).
- Balasubramanian, T., Textbook of English Phonetics for Indian Students (New Delhi: Laxmi Publications, 2009).
- Mesthrie, Rajend and Rakesh M Bhatt. 2008. *World Englishes: The study of new linguistic varieties.*Cambridge: Cambridge University Press.
- De Saussure, Ferdinand. 1966. *Course in general linguistics.*New York: McGraw Hill Introduction: Chapter 3

- Akmajian, A., R. A. Demers and R, M. Harnish, *Linguistics: An Introduction to Language and Communication,* 2nd ed.
- Fromkin, V., and R. Rodman, *An Introduction to Language,* 2nd ed. (New Yourk: Holt, Rinehart and Winston, 1974) Chapters 3, 6 and 7
- Akmajian, A., R. A. Demers and R, M Harnish, Linguistics: An Introduction to Language and Communication, 2nd ed. (Cambridge, Mass,: MIT Press, 1984; Indian edition, Prentice Hall, 1991) Chapter 5 and 6.

AECC-CORE (AECC-Core)
[Language-Core]

[AECC- Core] English -1

CL-1(English): British Poetry -1 **Credits 06**

1. Shakespeare : Shall l Compare Thee to a Summer's Day,
   John Donne – Batter my Heart
   Milton : On His Blindness
   Pope: Ode on Solitude
2. William Blake: A Poison Tree
   Wordsworth : To the Skylark
   Shelley : To a Skylark
   Keats : Ode to Autumn
3. Rhetoric and Prosody

Suggested Readings:

- Jaydip Sarkar & Anindya Bhattacharya, *A Handbook of Rhetoric and Prosody*, Orient Blackswan, Kolkata, 2017

Or

CL-1(English): Language, Variety and Stylistics **Credits 06**

1. Language & Communication – distinctness of human language
2. Language varieties – Standard & Non-standard Language, Formal & Informal
3. Difference between Declarative and Expressive forms of language – when Statement becomes Expression
4. Register, Collocation and Style

Suggested Readings:

- Rajend Mesthrie and Rakesh M. Bhatt. *World Englishes: The Study of New Linguistic Varieties*
- GB Shaw. 'Spoken English & Broken English'
- Geoffrey N. Leech. *A Linguistic Guide to English Poetry*
- H.G.Widdowson. *Stylistics & the Teaching of Literature*
- *Language Literature and Creativity* Orient Blackswan

CL-2(English): Poetry - 2 **Credits 06**

Course Contents:

1. Alfred L.Tennyson : Break Break Break,
2. Robert Browning: Porphyria's Lover
3. T.S.Eliot: Preludes
4. W.B. Yeats: The Lake Isles of Innisfree

Or

CL-2(English): Language, Imagination & Creativity Credits 06

Course Contents:

Language, Imagination & Creativity

1. Plain Language and Figurative Language (Related Tropes like Metaphor, Conceit, Metonymy)
2. Language and Emotion – Hyperbole, Pathetic Fallacy, Irony, Understatement
3. Escape from Banality – Foregrounding devices like Parallelism & Deviation
4. Avoiding/ Cultivating Ambiguity – Ambiguity: Weakness or Strength

Suggested Readings:

- I. A. Richards. *Practical Criticism* (Part III)
- Geoffrey N. Leech. *A Linguistic Guide to English Poetry*
- Bose & Sterling. *Rhetoric & Prosody*
- William Empson. *Seven Types of Ambiguity*
- Susanta Kumar Bardhan. *Introduction to Stylistics*
- Goeffrey Leech. *A Communicative Grammar of English*

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year B. A (HONOURS)
in

HISTORY

Under Choice Based Credit System (CBCS)
w.e.f 2018-2019

VIDYASAGAR UNIVERSITY

BA (Honours) in History

[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
	Semester-I								
1	I	Core-1		CT1: Greek and Roman Historians	6	5-1-0	15	60	75
		Core-2		CT2: Early Historic India (proto history to 6th century B.C)	6	5-1-0	15	60	75
		GE-1		TBD	6	5-1-0/ 4-0-4	15	60	75
		AECC-1		English/MIL	2	1-1-0	10	40	50
	Semester –I: total				**20**				**275**
	Semester-II								
	II	Core-3		CT3: Mauryan and Gupta Empire	6	5-1-0	15	60	75
		Core-4		CT4: Political History of Early Medieval India (600 AD to 1200 AD)	6	5-1-0	15	60	75
		GE-2		TBD	6	5-1-0/ 4-0-4	15	60	75
		AECC-2		ENVS	4		20	80	100
	Semester-II : total				**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
	Semester-III								
2	**III**	Core-5		CT5: Delhi Sultanate	6	5-1-0	15	60	75
		Core-6		CT6: The Feudal Society	6	5-1-0	15	60	75
		Core-7		CT7: Akbar and the Making of Mughal India	6	5-1-0	15	60	75
		GE-3		TBD	6	5-1-0/ 4-0-4	15	60	75
		SEC-1		TBD	2	1-1-0	10	40	50
		Semester – III : total			**26**				**350**
	Semester-IV								
	IV	Core-8		CT8: Renaissance and reformation	6	5-1-0	15	60	75
		Core-9		CT9: The French Revolution & Nepoleon Bonaparte	6	5-1-0	15	60	75
		Core-10		CT10:19th Century Revolutions in Europe	6	5-1-0	15	60	75
		GE-4		TBD	6	5-1-0/ 4-0-4	15	60	75
		SEC-2		TBD	2	1-1-0	10	40	50
		Semester – IV : total			**26**				**350**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
		Semester - V							
3	**V**	Core-11		CT11: Select Themes in the Colonial Impact on Indian Economy and Society	6	5-1-0	15	60	75
		Core-12		CT12: Peasant and Tribal uprising in colonial India in the 19th Century	6	5-1-0	15	60	75
		DSE-1		TBD	6	5-1-0	15	60	75
		DSE-2		TBD	6	5-1-0	15	60	75
		Semester –V : total			**24**				**300**
		Semester-VI							
	VI	Core-13		CT13: International Relations after the Second World War	6	5-1-0	15	60	75
		Core-14		CT14: Modern Nationalism in India	6	5-1-0	15	60	75
		DSE-3		TBD	6	5-1-0	15	60	75
		DSE-4		TBD	6	5-1-0	15	60	75
		Semester – VI : total			**24**				**300**
Total in all semester:					**142**				**1900**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies ,

List of Core Course (CC)

CC-1: Greek and Roman Historians
CC-2: Early Historic India (proto history to 6th century B.C)
CC-3: Mauryan and Gupta Empire
CC-4: Political History of Early Medieval India (600 AD to 1200 AD)
CC-5: Delhi Sultanate
CC-6: The Feudal Society
CC-7: Akbar and the Making of Mughal India
CC-8: Renaissance and Reformation
CC-9: The French Revolution & Napoleon Bonaparte
CC-10: 19th Century Revolutions in Europe
CC-11: Select Themes in the Colonial Impact on Indian Economy and Society
CC-12: Peasant and Tribal Uprisings in Colonial India in the 19th Century
CC-13: International Relations after the Second World War
CC-14: Modern Nationalism in India

Discipline Specific Electives (DSE)

DSE-1: Europe in the Ancient Regime
Or
DSE 1: Modern Transformation of China (1839-1949)
DSE-2: Modern Transformation of Japan
Or
DSE 2: Women and Social Change in Nineteenth Century
DSE-3: The Russian Revolution
Or
DSE 3: War and Diplomacy, 1914-1945
DSE-4: Pre-colonial South East Asia
Or
DSE-4: Environmental History of India (Early India and Medieval Period)

Skill Enhancement Course (SEC)

SEC 1: Archaeology and Museum Making in Colonial India
Or
SEC 1: Literature and History: Bengal
Or
SEC- 1: Art Appreciation an introduction to Indian art
SEC- 2: The Making of Indian Foreign Policy
Or
SEC -2: Colonial Science in India: Institutions and Practices
Or
SEC -2: Understanding Popular Culture
Or
SEC-2: Understanding Heritage

Generic Electives (GE)

[Interdisciplinary for other Department]

GE- 1: Theories of the Modern State
GE- 2: Science and Empire
GE- 3: Some Perspectives on Women's Rights in
GE- 4: Gender & Education in India
Or
GE-4: History of Indian Journalism

Core Courses (CC)

CC-1: Greek and Roman Historians **Credits 06**

C1T: Greek and Roman Historians

Unit – I
Greek Historiography
Module I
New form of inquiry (historia) in Greece in the sixth century BCE

1.1 Logographers in ancient Greece.
1.2 Hecataeus of Miletus, the most important predecessor of Heredotus
1.3 Charon of Lampsacus
1.4 Xanthus of Lydia

Module II
Herodotus and his Histories

2.1 A traveller's romance?
2.2 Herodotus' method of history writing – his catholic inclusiveness
2.3 Herodotus' originality as a historian – focus on the struggle between the East and the West

Module III
Thucydides: the founder of scientific history writing

3.1 A historiography on Thucydides
3.2 History of the Peloponnesian War - a product of rigorous inquiry and examination
3.3 Thucydides' interpretive ability – his ideas of morality, Athenian imperialism, culture and democratic institutions
3.4 Description of plague in a symbolic way – assessment of the demagogues
3.5 A comparative study of the two greatest Greek historians

Module IV
Next generation of Greek historians

4.1 Xenophon and his History of Greece (*Hellenica)* – a description of events 410 BCE – 362 BCE -- writing in the style of a high-class journalist – lack of analytical skill
4.5 Polybius and the "pragmatic" history
4.3 Diodorus Siculus and his *Library of History* – the Stoic doctrine of the brotherhood of man

Unit II
Roman Historiography
Module I

Development of Roman historiographical tradition

1.1 Quintus Fabius Pictor of late third century BCE and the "Graeci annals" – Rome's early history in Greek.
1.2 Marcus Porcius Cato (234 – 149 BCE) and the first Roman history in Latin – influence of Greek historiography

1.3 Marcus Tullius Cicero and the speculation on the theory of history – distinguishing history from poetry – the genre of moral historiography at Rome

Module II
Imperial historians

2.1 Livy and the History of Rome – a work on enormous scale - Livy's style of writing: honest but uncritical - Livy's comprehensive treatment: details of Roman religion and Roman law

2.2 Tacitus' history of the Roman empire - the greatest achievement of Roman historiography ? His moral and political judgements on the past -- a "philosophical historian"?

Module III
Historical methods in ancient Rome

3.1 Research and accuracy
3.2 Literary artistry
3.3 The use of dramatic elements

Suggested Readings:

The Oxford History of the Classical World, eds., John Boardman et al, Oxford: 1986

- *Cambridge Ancient History*, 2nd ed., Vol. 4, eds., John Boardman et al, Cambridge:1992
- Anton Powell, ed., *The Greek World*, London:1995
- F.M. Cornford, *Thucydides Mythistoricus*, London:1907
- F.E. Adcock, *Thucydides and His History*, Cambridge:1963
- Momigliano, *Studies in Historiography*, New York: 1966
- ---, *Essays in Ancient and Modern Historiography*, Chicago:1977
- H.D. Westlake, *Individuals in Thucydides*, Cambridge:1968
- T.J.Luce, *The Greek Historians*, London and New York:1997
- Stephen Usher, *The Historians of Greece and Rome*, London:1969
- Michael Grant, *The Ancient Historians*, New York:1970
- ---, *Greek and Roman Historians*, London and New York: 1995
- T.A. Dorey, ed., *Latin Historians*, London:1966
- ---, ed., *Tacitus*, London:1968
- D.C. Earl, *The Political Thought of Sallust*, Cambridge:1961
- *Civilization of the Ancient Mediterranean: Greece and Rome*, Vol. 3, eds., Michael Grant and Rachel Kitzinger, New York: 1988

CC-2: **Early Historic India (proto history to 6th century B.C)** **Credits 06**

C2T: Early Historic India (proto history to 6th century B.C)

Unit I
Module- I
Understanding early India

1.1 : Historical theories and interpretations about the Indian past

1.2 The idea of Bharatavarsha: Indian subcontinent with all its diversity and cultural traditions
1.3 An overview of literary and archaeological sources

Module-II
Neolithic to Chalcolithic settlements
2.1 The earliest village farming community in India—transition from pastoral life to the practice of agriculture: Mehrgarh and its various cultural phases
2.2 The first urbanization in the Indian subcontinent—Indus civilization: contemporary perspectives through a historiography
2.3 The early Harappan, Harappan and late Harappan phases: technology, architecture, religion and maritime trade.
2.4 End/transformation of the Indus civilization: different theories.

Module-III
The Aryans in India: Vedic Age

3.1 The historiography of the concept Aryan
3.2 The spread of Aryan settlements in India
3.3 The period of the Vedas, Brahmanas and Upanishads: pastoralism, agriculture and other occupations
3.4 Political development, culture and rituals

Module-IV
North India in sixth century BCE
4.1 Establishment of kingdoms, oligarchies and chiefdoms: sixteen Mahajanapadas
4.2 The autonomous clans
4.3 Rise of Magadhan imperialism

Unit II
Module I
Ideas and institutions in early India
1.1 Varna and Jati: the issue of upward mobility among the Shudras
1.2 Slavery: ancient forms and modern debates
1.3 Untouchables
1.4 Women
1.5 Forms of marriage

Module II
Cults, doctrines and metaphysics
2.1 The religion of the Vedas
2.2 The unorthodox sects – Buddhism, Jainism and the doctrine of the Ajivikas
2.3 Scepticism and materialism

Module III
Aspects of economy in the age of Buddha
3.1 Economic changes: use iron, rural economy, trade and crafts, guilds
3.2 Taxation
3.3 The second urbanization

Module IV
The cultural milieu
4.1 Education
4.2 Language and literature
4.3 Science and technology

Suggested Readings:

- L. Basham, *The Wonder that was India*
- ---, ed., *A Cultural History of India*
- D.D. Kosambi, *An Introduction to the Study of Indian History*
- ---, *Culture and Civilization of Ancient India in Historical Outline*
- Romila Thapar, *Early India from the Origins to c. AD 1300*
- Hermann Kulke and D. Rothermund, *A History of India*
- R.C. Majumdar, ed., *The Vedic Age* (Bharatiya Vidya Bhavan series, Vol. 1)
- ---, ed., *The Age of Imperial Unity* (Bharatiya Vidya Bhavan series, Vol. 2)
- Upinder Singh, *A History of Ancient and Early Medieval India*
- Ranabir Chakravarti, *Exploring Early India: Upto c. AD 1300*
- Jean-Francois Jarrige et al, eds., *Mehrgarh: Field Reports from Neolithic Times to the Indus Civilization*
- Bridget Allchin and F.R. Allchin, *The Rise of Civilization in India and Pakistan*
- B.B. Lal and S.P. Gupta, eds., *Frontiers of the Indus Civilization*
- Gregory L. Possehl, *The Indus Civilization: A Contemporary Perspective*
- ---, ed., *Ancient Cities of the Indus*
- Shereen Ratnagar, *Encounters: The Westerly Trade of the Harappan Civilization*
- Asko Parpola, *Deciphering the Indus Script*
- Nayanjot Lahiri, ed., *The Decline and Fall of the Indus Civilization*
- R.S. Sharma, *Material Culture and Social Formations in Ancient India*
- ---, *Aspects of Political Ideas and Institutions in Ancient India*
- ---, *Sudras in Ancient India: A Social History of the Lower Order Down to c. AD 600*
- Dev Raj Chanana, *Slavery in Ancient India*
- G.S. Ghurye, *Caste, Class and Occupation*
- T.W. Rhys Davids, *Buddhist India*
- Brian K. Smith, *Classifying the Universe: The Ancient Indian Varna System and the Origins of Caste*
- Sukumari Bhattacharji, *Women and Society in Ancient India*
- Patrick Olivelle, ed., *Between the Empires: Society in India 300 BCE to 400 CE*

CC-3: Mauryan and Gupta Empire **Credits 06**

C3T: Mauryan and Gupta Empire

I. Empire Building in India- Mahajanapadas to Kingdom
II. Formation of Mauryan Empire – Polity, Economy, Socio-Cultural Aspects, Downfall
III. Post Mauryan Empire – Sungas & Kanvas, the Indo Greeks, Kushanas &Satavahanas
IV. Imperial Guptas – Classical Age, Polity, Economy, Socio-Cultural Aspects, Downfall

Suggested Readings:

- Romila Thapar, *The Mauriyas Revisited*
- Radhakumud Mookerji, *Chandragupta Mauriya and His Times*,
- Romila Thapar, *Ashoka and the Decline of the Mauriyas*,
- Upindne Singh, *A History of Ancient and Early Medieval India: From the Stone Age to the 12th Century*.
- Brajadulal Chattopadhyaya, *The Making of Early Medieval India*
- Ram Sharan Sharma, *Aspects of Political Ideas and Institutions in Ancient India*
- Romila Thapar, *A History of India*
- D.N. Jha, *Ancient India: In Historical Outlines*
- ----------, *Early India: A Concise History*
- H.C. Raychowdhury, *Political History of Ancient India: From the Accession of Parikshit to the Extinction of the Gupta Dynasty*
- Ashvini Agarwal, *Rise and Fall of the Imperial Guptas*
- Dilip Kumar Ganguly, *The Imperial Guptas and their Times* the Extinction of the Gupta Dynasty.
- Parmeshwari Lal Gupta, *The Imperial Guptas: Cultural History*
- V.R. Ramachandra Dikshitar, *The Gupta Polity*
- Rama Shankar Tripathi, *History of Ancient India*

CC-4: Political History of Early Medieval India (600 AD to 1200 AD)

Credits 06

C4T: Political History of Early Medieval India (600 AD to 1200 AD)

Unit I
Module I
Understanding the 'early medieval' phase in the Indian history
1.1 Different perceptions on the early medieval situations
1.2 Literary and archaeological sources
1.3 Development of regional cultures: an overview

Module II
Shift of political power from Pataliputra to Kanauj
2.1 Gauda under Sasanka: the most formidable power in eastern India
2.2 The Gauda-Kanyakubja struggle and the emergence of Harshavardhana
2.3 Military and political supremacy of Kanauj

Module III
An overview of politics in the Deccan and south India
3.1 The Chalukyas of Badami
3.2 Chalukya-Pallava struggle
3.3 Rashtrakuta- Pratihara rivalry
3.4 Rise of the Cholas as the premier power of the south

Module IV
Eastern India
4.1 The Palas and the tripartite struggle
4.2 Expansion of Pala power towards paramountcy

4.3 The Senas of Bengal

Module V
The struggle for empire
5.1 The Ghaznavid raids
5.2 The Ghurids
5.3 Qutb-ud-din Aibak's conquests

Unit II
Module I
Political processes and structure of polity
1.1 Absence of vast territorial empires -- a 'dark period'?
1.2 Emergence of feudal polity -- nature and structure of Indian feudalism
1.3 Zenith of political feudalism: 1000 - 1200 CE
1.4 The concept of segmentary state and the Indian experience

Module II
The urban scenario
2.1 Debates on the decay of urban centres
2.2 A third phase of urbanization?

Module III
Administrative structures
3.1 The Chola experiment -- a centralised state?
3.2 Land revenue system
3.3 Military organisation and administration of justice

Module IV
Towards transition
4.1 Conditions in India during the pre-Sultanate period
4.2 An overview of the cultural scenario

Suggested Readings:

- A.L. Basham, *Studies in Indian History and Culture*
- Hermann Kulke and D. Rothermund, *A History of India*
- Romila Thapar, *Early India from the Origins to c. AD 1300*
- R.S. Sharma and K.M. Shrimali, eds, *A Comprehensive History of India*, Vol. IV, Part I
- K.A. Nilakanta Sastri, *The Colas*
- ---, *A History of South India from the Earliest Times to the Fall of Vijayanagar*
- Upinder Singh, *A History of Ancient and Early Medieval India*
- Ranabir Chakravarti, *Exploring Early India: Upto c. AD 1300*
- Harbans Mukhia, ed., *The Feudalism Debate*
- Brajadulal Chattopadhyaya, *The Making of early Medieval India*
- ---, *Studying Early India*
- ---, *ed., A Social History of Early India*
- ---, *Aspects of Rural Settlements and Rural Society in Early Medieval India*
- Daud Ali, *Courtly Culture and Political Life in Early Medieval India*
- Burton Stein, ed., *Essays on South India*
- ---, *Peasant State and Society in Medieval South India*

- Kesavan Veluthat, *The 'Early Medieval' in South India*
- ---, *Political Structure in Early Medieval South India*
- Andre Wink, *The Making of the Indo-Islamic World: Vol. I: Early Medieval India and the Expansion of Islam 7th-11th Centuries*
- R.S. Sharma, *Indian Feudalism AD 300-1200*
- ---, *Urban Decay in India AD 300-1000*
- ---, *Early Medieval Indian Society*
- D.N. Jha, ed., *The Feudal Order*
- R.N. Nandi, *State Formation, Agrarian Growth and Social Change in Feudal South India c. AD 600-1200*

CC-5: Delhi Sultanate **Credits 06**

C5T : Delhi Sultanate

I. Interpreting the Delhi Sultanate – A Survey of Sources: literary and archaeological.

II. Foundation, Consolidation and Challenges to the Delhi Sultanate
(a) The State in the Thirteenth & Fourteenth Century – The Mameluks, Khaljis and Tughlaqs – Theories of Kingship – Ruling Elites, Ulama& the Political Authority
(b) Mongol Threat –Timur's Invasion
(c) Revival and Disintegration – Foundation of the Mughal Rule

III. Emergence of Regional States: Vijayanagara, Bahmani Kingdom, Bengal

IV.Society and Economy – Iqta System, Agricultural Production, Technology, Monetization, market, growth of urban centres; trade and commerce; Indian Ocean trade

V. Religion, Society and Culture
a) Sufism – silsilas, doctrines and practice – Socio-cultural impact
b) Bhakti movements in south and north India – Kabir, Nanak and Sant tradition
c) Art, architecture and literature – Consolidation of regional identities.

Suggested Readings:
- Mohammad Habib and K A Nizami ed. *Comprehensive History of India, Vol.V, The Delhi Sultanate*
- K A Nizami,*Some Aspects of Religion and Politics in India in the Thirteenth Century*
- A B M Habibullah, *The Foundation of Muslim Rule in India*
- Satish Chandra, *Medieval India, From the Sultanat to the Mughals, Vol.I*
- Peter Jackson, *The Delhi Sultanate. A Political and Military History*
- TapanRaychaudhuri and Irfan Habib ed. *Cambridge Economic History of India, Vol.I*
- Irfan Habib, *Medieval India. Study of A Civilization*
- MohibulHasan, *Historians of Medieval India*
- S A A Rizvi, *A History of Sufism in India, Vol.I*
- Burton Stein, *Vijaynagara* (New Cambridge History of India)
- Vipul Singh, *Interpreting Medieval India, Vol. I*

- Abdul Karim, *BanglarItihas.SultaniAmal*
- Sukhamay Mukhopadhyay, *Banglar Ithaser Dusho Bachar. Swdhin Sultander Amal*
- Aniruddha Ray, *Madhya juger Bharater Itihas. SultaniAmol*
- Aniruddha Ray, *MadhyajugerBharatiyaShahar*

CC-6 : The Feudal Society **Credits 06**

C6T: The Feudal Society

1. **Muhammad and Charlemagne**: Islam and the Holy Roman Empire—coronation of Charlemagne—Frankish institutions—the Carolingian Renaissance—treaty of Verdun—dissolution of the Carolingian Empire—the Saxon Empire. (7 lectures)
2. **Europe besieged**: invasions of Norsemen, Magyars, Arabs and Saracens. (3 lectures)
3. **Feudal Society and Economy (c.800—c.1100)**: Feudalism—origin and features; manorialism—chivalry and romanticism—emergence of towns—trade and commerce—guilds. (8 lectures)
4. **Emergence of National Kingship**: Germany and Hohenstaufens—France under Valois. (4 lectures)
5. **Religion and Culture**: Cluniac Reforms—Investiture Contest—Monasticism—popular religion and heresy—Crusades—the order of 'Warrior Monks': the Knights Templar, the Knights Hospitallers and the Teutonic Knights—Schoolmen—Universities—Twelfth-century Renaissance. (8 lectures)

Suggested Readings:

- Ashton, T.H. and Philipin, C.H.E. (eds.), *The Brenner Debate: Agrarian Class Structure and Economic Development in Pre-Industrial Europe*, CUP, 2005.
- Baidya, J. *Madhyayugiya Europe* (800-1250), New Kalpana Parakashani, 2009.
- Bloch, M.L.B. *Feudal Society.* Chicago: University of Chicago Press, 1961.
- Cameron, E. (ed.), *Early Modern Europe*: *An Oxford History*, OUP, 2004 (NE)
- Chakravorty, B., Chakraborty S., Chattopadhyay, K. *Europe-e Yugantar*, Nababharati, 2007.
- Charles, A. N. *Humanism and the Culture of the Renaissance, OUP,* 1996.
- Collins, R., Early *Medieval Europe, 300-1000.* New York: St. Martin's Press, 1991.
- Collins, R. *Charlemagne,* Toronto: University of Toronto Press, 1998.
- Davis, R. H.C. *A History of Medieval Europe: from Constantine to Saint Louis.* London; New York: Longman, 1988.
- Dutta, N. *Madhyayug theke Europer Adhunikatay Uttaran*, Mitram, 2007.
- Dutta, N.C. *Madhyayuger Europe*, *Vols. 1,2* , Pashchimbanga Pustak Parshad, 1972,
- Hall, A.R. *The Scientific Revolution 1500-1800* (2nd edn.), London, 1962.
- Havighurst, A.F. (ed.), *The Pirenne Thesis: Analysis, Criticism, and Revision.* Lexington, MA: Heath, 1976.
- Hilton, R. *Transition from Feudalism to Capitalism*, Aakar Books, 2006.
- Jones, G. *A History of the Vikings.* New York: Oxford University Press, 1968.

- Luscombe, David & Riley-Smith, Jonathan (eds.), *The New Cambridge Medieval History, IV, c.1024—c.1198, Part 2*, CUP, 2004.
- Mallik, S. *Yugasandhikshane Europe (1400-1700)*, Sobha, Kolkata, 2012.
- McEvedy, C. *The New Penguin Atlas of Medieval History.* New York: Penguin Books, 1992.
- Norwich, J.J. *Byzantium: the Decline and Fall*, London: Viking, 1995.
- Rice, E.F., Grafton, A. *The Foundations of Early Modern Europe, 1460-1559*, W.W. Norton & Company, 2004.
- Roy, M. *Europer Roopantar* (1500-1700), Progressive Book Forum, 2004.
- Roy, P. *Madhyayuger Europe (Rahstra, Samaj, Samskriti)*, Progressive Publishers, 1995.
- Roy, P., Das, S. *Uttoroner Pathe Europe*, Progressive Publishers, 2004.
- Thompson, J.W. Jonson, E.N. *An Introduction to Medieval Europe*, *300—1500*, New York, 1937.
- Tierney, B. *Western Europe in the Middle Ages, 300-1475.* 6th edn., Boston: McGraw-Hill College, 1999.
- Treadgold, W., T. *A History of the Byzantine State and Society.* Stanford, Calif.: Stanford University Press, 1997.

CC-7: Akbar and the Making of Mughal India **Credits 06**

C7T: Akbar and the Making of Mughal India

I. Sources and Historiography- Persian chronicles and tradition of history writing
II. Establishment of Mughal Rule in India
III. Formation of Imperial authority & Consolidation under Akbar-Campaigns and Conquests: tactics and technology-Evolution of administrative institutions: zabt, mansab, jagir, madad-i-maash-Revolts and resistance
IV. Expansion and integration- Incorporation of Rajputs and other indigenous groups in Mughal nobility- North-West frontier, Gujarat, Deccan and Bengal
V. Rural Society and Economy- Land rights and land revenue, zamindars and peasants-Agricultural production; crop patterns- Trade routes, overseas trade; Rise of Surat
VI. Religion and Culture- Religious tolerance and Sulh-i-kul, Din-i-ilahi, Sufi mystical and intellectual interventions-Development of Mughal painting and architecture

Suggested Readings:

- Vincent A. Smith, *Akbar, the Great Mogul: 1542-1605*
- George Bruce Malleson, *Akbar and the Rise of the Mughal Empire*
- Andre Wink, *Akbar*
- John F. Richards, *The Mughal Empire (The New Cambridge History of India)*
- Munis D. Faruqui, *The Princes of the Mughal Empire, 1504-1719*
- Andrew de la Garza, *The Mughal Empire at War: Babur, Akbar and the Indian Military Revolution, 1500-1605*
- Ishwari Prasad, *The Mughal Empire*
- Shireen Moosvi, *The Economy of the Mughal Empire*
- Jadunath Sarkar, *Fall of the Mughal Empire*, 3 Vols.
- Satish Chandra, *Medieval India: From Sultanat to the Mughals,* Part-II
- ----------, *Historiography, Religion, and State in Medieval India*
- ----------, *Parties and Politics at the Mughal Court, 1707-1740*

- ----------, *Essays on Medieval Indian History*
- ----------, *Mughal Religious Policies, the Rajpuths and the Deccan*
- ----------, *Social Change and Development in Medieval Indian History*
- Annemarie Schimmel, *The Empire of the Great Mughals: History, Art and Culture*
- Catherine B. Asher, *Architecture of Mughal India (The New Cambrdige History of India)*
- Michael Fisher, *A Short History of the Mughal Empire*
- Harbans Mukhia, *The Mughals of India*

CC-8: Renaissance and Reformation Credits 06

C8T: Renaissance and Reformation

1. Political and social background – political system in early modern Europe – collapse of feudalism – and the changing economic life in the 15th and 16th century – commerce and navigation – monarchies and city states – features of the early modern state – the printing revolution.
2. Italian city states, the merchants, the church and the social context of the renaissance – origins of humanism – rediscovery of the classes – the impact of humanism on art, education and political thought – Machiavelli and the idea of a modern state.
3. The background to the reformation – intellectual and popular anti-clericalism – Martin Luther and the reformation – reformation in the national context: France, Switzerland and England – the distinctiveness of the English reformation – Radical reformation – the Anabaptists, etc. - counter reformation.
4. Renaissance science and the emergence of a secular culture

Suggested Readings:

- William Roscoe Estep, *Renaissance and Reformation*
- Bard Thompson, *Humanists and Reformers: A History of the Renaissance and Reformation*
- Jo Eldridge Carmey, *Renaissance and Reformation, 1500-1620: A Biographical Dictionary*
- David L. Morse and William M. Thompson eds., *History of Political Ideas,* Vol V *(Renaissance and Reformation)*
- James A. Patrick ed. , *Renaissance and Reformation*, Vol. 1
- Steven E. Ozment, *Religion and Culture in the Renaissance and Reformation*
- Jonathan W. Zophy, *A Short History of Renaissance and Reformation Europe*
- Dorothy Mills, *Renaissance and Reformation Times*
- Tom Monaghan, *Renaissance, Reformation and the Age of Discovery, 1450-1700*
- William Gilbert, *The Renaissance and the Reformation*
- Charles G. Nauert, *Humanism and the Culture of Renaissance Europe*
- Norman F. Cantor and Michael S. Werthman, *Reniassance, Reformation and Absolutism: 1450-1650*
- Lisa Mullins, *Science in the Renaissance*
- Marie Boas Hall, *The Scientific Renaissance 1450-1630*
- Vickey Herold, *Science during the Renaissance*
- Aldo Altamore and Giobvanni Antonini, *Galileo and the Renaissance Scientific Discourse*

- Stephen Pumfrey, Paolo L. Rossi, *Science, Culture and Popular Belief in Renaissance Europe*

CC-9: The French Revolution & Napoleon Bonaparte Credits 06

C9T : The French Revolution & Napoleon Bonaparte

I. Historiography of the French Revolution
II. Crisis of the Ancien Regime
III. Intellectual impetus
IV. Socio-economic background
V. Phases of the French Revolution – 1788-99
VI. Rise of Napoleon – Empire building & consolidation
VII. Impact of the French Revolution and Napoleon Bonaparte outside France
VIII. Fall of Napoleon & Restoration of old order – Vienna Congress (1815)& Metternich

Suggested Readings:

- Owen Connelly, *The Wars of the French Revolution and Napoleon, 1792-1815*
- Charles D. Hazen, *The French Revolution and Napoleon*
- Martyn Lyons, *Napoloan Bonaparte and the Legacy of the French Revolution*
- Jeremy Klar, *The French Revolution, Napoloan and the Republic*
- John C. Davenport, *The French Revolution and the Rise of Napoloan*
- David Andress, *The Oxford Handbook of the French Revolution*
- J. Holland Rose, *The Revolutionary and Napoleonic Era, 1789-1815*
- William Doyel, *The Oxford History of the French Revolution*
- Alexis de Tocqueville, *The Old Regime and the Revolution*
- Eric Hobsbawm, *Age of Revolution: 1789-1848*
- Francois Furet, *Interpreting the French Revolution*
- Gary Kates, *The French Revolution: Recent Debates and New Controversies*
- Pieter Geyl, *Napoleon: For and Against*

CC-10: 19th Century Revolutions in Europe Credits 06

C10T: 19th Century Revolutions in Europe

I. The Greek War of Independence, the Revolutions of 1830, the Revolutions of 1848 – A possible turning point?
II. The Age of Nationalism: The Second Empire in France and Louis Napoleon; Unification of Italy and Germany; The Third Republic and the Paris Commune;
III. Russia—Tsarist autocracy and reforms, the emergence of the revolutionary movement; the Eastern Question—the Crimean War, the Treaty of Paris, Balkan nationalism.
IV. Society and Economy in Nineteenth Century Europe: industrial transformation in Britain; difference in industrialisation process between England and the Continental powers – France, Germany and Russia – the emergence of the working class and its movements – The impact of ideology: Louis Blanc,
V. Nationalism in Eastern and South Western Europe: Czech, Hungarian and Serbian.

Suggested Readings:

- Kahan, *Liberalism in Nineteenth Century Europe*
- Jonathan Sperber, *The European Revolutions, 1848-1851*
- Stefan Berger, *A Companion to Nineteenth Century Europe: 1789-1914*
- Michael Rapport, *Nineteenth Century Europe*
- Linda L. Clark, *Women and Achievement in Nineteenth Century Europe*
- Harry Hearder, *Europe in the Nineteenth Century*
- Tom Kemp, *Industrialization in Nineteenth Century Europe*
- T.C.W. Blanning, *The Nineteenth Century: Europe 1789-1914*
- Hannu Salmi, *19th Century Europe: A Cultural History*

CC-11: Select Themes in the Colonial Impact on Indian Economy and Society

Credits 06

C11T: Select Themes in the Colonial Impact on Indian Economy and Society

1. Colonial State institutions and ideologies: Colonial Economic interests, Company's Commerce, Mercantilism to Free trade, Deindustrialisation and Drain of Wealth.
2. Land Settlements and agricultural change— Commercialisation of Agriculture.
3. Modern Industrialisation —- Long term Constraints
4. Census and Caste — Colonial ethnology — Sanskritisation, Westernisation and Social reform— Brahma Samaj & Parthana Samaj
5. Reformism and Revivalism:The Aryadharma and Ramkrishna Vivekananda Movement.
6. Islamic reform in India: The Reformers and the Orthodox

Suggested Readings:

- Tirthankar Roy, *Economic History of India, 1857-19147*
- K. N. Raj, *Essays on the Commercialization of Indian Agriculture*
- Sekar Bandyopadhyay, *Caste, Culture and Hegemony: Social Dominance in Colonial Bengal*
- Thomas R. Trautmann, *Aryans and British India*
- Mushirul Hasan, *Writing India: Colonial Ethnography in the Nineteenth Century*
- G. S. Ghurye, *Caste and Race in India*
- Dipankar Gupta, *Caste in Question: Identity or Hierarchy*
- Nicholas B. Dirks, *Caste of Mind: Colonialism and the Making of Modern India*
- Shriram Maheswari, *The Census Administration under the Raj and After*
- C. A. Bayly, *Indian Society and the Making of the British Empire*
- Douglas M. Peers, *India under Colonial Rule, 1700-1885*
- B. R. Tomlinson, *The Economy of Modern India, 1860-1970*
- Gurilym Beckerlegge, *The Ramakrishna Mission: The Making of Modern Hindu Movement*
- Jayasree Mukherjee, *The Ramakrishna-Vivekananda Movement: Impact on Indian Society and Politics, 1893-1922*
- Neilesh Bose, *Recasting the Region: Language, Culture and Islam in Colonial Bengal*
- Shireen Maswood, Amit Dey and Ritwika Biswas, *Between Tradition and Modernity: Aspects of Islam in South Asia*

- Barbara D. Metcalf, *Islam in South Asia in Practice*
- ----------, *Islamic Revival in British India: Deoband 1860-1900*
- Kenneth W. Jones, *Socio-Religious Reform Movements in British India, Part 3, Vol. 1*
- H.O. Pearson, *Islamic Reform and Revival in Nineteenth Century India.*

CC-12: Peasant and Tribal Uprisings in Colonial India in the 19th Century

Credits 06

C12T: Peasant and Tribal Uprisings in Colonial India in the 19th Century

The Early 19th century

1. The early colonial rule and revenue operations, revenue demands and settlements – "restorative rebellions" – peasant –landlord combination against colonial rule in north and south India;
2. Peasant movements in Bengal and Malabar – religious appeal for the liberation of a region or an ethnic group under a new form of government. .
3. Tribal movements in pre-1857 western and eastern India – Ho, Tamar, (1820-1832), Kol and Bhumij (1825-1835) revolts , Kherwar movement of the Santals (1833), Santhal Revolt (1855), Bhil revolt (1819-1840), Kolis (1824-1848), Khasis (1829-30), Koyas (1840-1858), Konds (1846-1855)

The Late 19th century

4. Tribal movements – Nalkdas of Panch Mahal (1858-59), (Bokta risings of 1858-95, millenarian movement of the Mundas (1895-1900), Kuch Nagas of Kachhar (1882),
5. Peasant movements in late 19th century – conflict between landlords and tenants – resistance to taxation – emergence of substantial peasantry – the role of moneylenders and struggle against them.
6. The revolutionary potential of Indian peasantry – Barrington Moore Jr. and Eric Stokes - Classification of types of revolt and movements – Kathleen Gough, AR Desai, DN Dhanagare and Ranajit Guha.

Suggested Readings:

- Mridula Mukherjee, *Peasants in India's Non-violent Revolution: Practice and Theory*
- Ranajit Guha, *Elementary Aspects of Peasant Insurgency in Colonial India*
- Sekar Bandyopadhyay, *From Plassey to Partition: A History of Modern India*
- Binoy Bushan Choudhuri, *Peasant History of Late Pre-Colonial and Colonial India*
- Bipan Chandra, *India's Struggle for Independence, 1857-1947*
- R. Desai, *Sate and Society in India: Essays in Dissent*
- D. N. Dhanagare, *Peasant Movements in India, 1920-1950*
- D. N. Dhanagare, *Rural Transformation in India: Challenges and Prospects*
- Sugata Bose, *Peasant, Labour and Colonial Capital: Rural Bengal since 1770*
- Shyam Charan Dube, *Antiquity to Modernity in Tribal India: Tribal Movements in India*

- Eric Stokes, *The Peasant and the Raj: Studies in Agrarian Society and Peasant Rebellion in Colonial India*
- Barrington Moore Jr., *Social Origins of Dictatorship and Democracy: Lord and Peasant in the making of the Modern World*
- Sanjukta Das Gupta, *Adivasi and the Raj*
- Suchibrata Sen, *The Santals Crisis: Identity and Integration*
- Sunil Kumar Sen, *Peasant Movements in India: Mid Nineteenth and Twentieth Centuries*
- David Ludden, *An Agrarian History of South Asia*, Part 4, Vol. 4.

CC–13 : International Relations after the Second World War Credits 06

C13T : International Relations after the Second World War

Unit I:
Nurnberg Trials, Germany 1945 – 46
Ruins of Europe and Japan; Charter of the United Nations at San Francisco Conference, 1945; Peace Settlement after the Second World War; Beginning of the Cold War: 1947

Unit II
Conflict between Superpowers
USA and Soviet Union; Soviet Communism and the Russian leader Joseph Stalin; Soviet Union and Europe in Cold War 1945 – 1953; Military and Defense Alliances and Peace Pacts –Berlin after 1945- Fall of the Berlin Wall & German Re-Unification---- European Coal and Steel Community (ECSC); European Economic Community & European Atomic Energy Committee (Euratom)

Unit III
Decolonization and the emergence of the Third world
National Movements in Asia & Africa---Third World Organizations-OPEC, ASEAN, SAARC; West Asian Crisis--- Palestine Problem; Suez Crisis, Iran- Iraq conflicts, Gulf War ; Arab- Israel wars- activities of the PLO, Afghan Problem

Unit IV
Disintegration and Decline of the Soviet Union
Glasnost and Perestroika – Crisis of Socialist regimes in other East European Countries: Poland, Germany, Czechoslovakia, Hungary – Response of the USA; Rise of a Unipolar World system, Globalization ---: Progress and development in science and technology--- Civil Rights Movement; Apartheid in South Africa-- Terrorism

Suggested Readings:

1. Adam Ulam, Expansion and Coexistence: A History of Soviet Union Policy 1917 – 1973, second edition, New York: Praeger Publishers, 1974
2. J L Gaddis, The United Nations and the Origins of the Cold War. Columbia: Columbia University Press, 2000
3. L J Halle. The Cold War as History. New York: Harper and Row, 1967
4. P. Calvocoressi. World Politics since 1945. London: Rouledge, 2008
5. William R Keylor. The Twentieth Century World and Beyond: An International History since 1900. Oxford: OUP, 2001
6. Norman Lowe, Mastering Modern World History, Hampshire, Palgrave Macmillan 2013.
7. Kathleen A. Laughlin and Jacqueline L. Castledine, Breaking the wave : women, their organizations, and feminism, 1945-1985 New York : Routledge, 2011.
8. Wini Breines, Trouble Between Us: an Uneasy History of White and Black Women in the Feminist Movement New York : Oxford University Press, 2006.
9. Gail Collins, When Everything Changed: the Amazing Journey of American Women from 1960 to the Present, New York : Little, Brown and Co., 2009.
10. P. Eric Louw , The Rise, Fall, and Legacy of Apartheid, Praeger, 2004
11. Ryan M. Irwin Gordian Knot: Apartheid and the Unmaking of the Liberal World Order, Oxford University Press, 2012
12. Mark Newman , The Civil Rights Movement , Edinburgh University Press, 2004

CC- 14: Modern Nationalism in India **Credits 06**

C14T: Modern Nationalism in India

1. Emergence of Nationalism in India and its historiography.
2. Anti-partition movement in 1905.
3. Gandhian Mass Movements— Non cooperation, Civil Disobedience , Quit India, Movement.
4. Roots of Communalism and Communal Award
5. Demand for Pakistan : Pakistan Movement from Cripps Mission to Cabinet Mission Plan.
6. Partition and its Aftermath.

Suggested Readings:

- Bipan Chandra and others, *India's Struggle for Independence*.
- Sumit Sarkar, *Modern India, 1885-1947*.
- Bipan Chandra, *Nationalism and Colonialism in Modern India*.
- Sekhar Bandyopadhyay, *Plassey to Partition and after*.
- Christopher Jaffrelot, *The Hindu Nationalist Movement and Indian Politics 1925 to the 1990s*, London, 1996.
- Ayesha Jalal, *The Sole Spokesman: Jinnah, the Muslim League and the Demand for Pakistan*
- Joya Chatterjee, *Bengal Divided: Hindu Communalism and Partition, 1932-1947*.
- Ramchandra Guha, *Makers of Modern India.*
- Ramchandra Guha, *Makers of Modern Asia*.

- Ishita Banerjee-Dube, *A History of Modern India*.
- Samar Kumar Mallick, *Adhunik Bharater Dersho Bachor*.
- Sumit Sarkar, *Adhunik Bharat* (Bengali Translation)
- Bipan Chandra, *Bharater Swadhinata Sangram* (Bengali Translation).
- A. R. Desai, *Social Background of Indian Nationalism* (also see the Bengali version of this book).

Discipline Centric Electives (DSE)

DSE- 1 : Europe in the Ancient Regime **Credits 06**

DSE1T : Europe in the Ancient Regime

1) Political system in 18th century Europe: The empires, monarchies and republics – the holy Roman empire and the Russian empire – constitutional monarchy in Britain – the monarchical order in Spain, Prussia, Scandinavian countries, Poland and France – the republican order in the United provinces, Switzerland and Venice.
2) The Overseas empires and the Trading Companies – Spanish, French, Dutch and English overseas settlements.
3) Enlightened Despotism – Russia under Catherine – Austria and Hungary under Joseph II – Prussia under Frederick the Great.
4) Society and the Economy – Agriculture and Commerce – Aristocracy and the Bourgeoisie – the towns and the cities – the artisans and peasants – free peasants and serfs.
5) European Enlightenment – Scientific revolution and seventeenth century origins – England and Holland – the nature of God controversy – the French enlightenment – the enlightenment public sphere – the enlightenment critique of old regime – the idea of progress.

Suggested Readings:

- M. S. Anderson, *Europe in the Eighteenth Century*
- A. Cobban, *History of Modern France*, Vol. I
- William Doyle, *The Old European Order: 1660 – 1800*
- Carlo Cipolla, *Before the Industrial Revolution: European Society and Economy, 1000–1700*
- Carlo Cipolla, *Fontana Economic History of Europe: The emergence of industrial Societies*
- J. H. Plumb, *England in the Eighteenth Century*
- Nicholas Henshall, *The Myth of Absolutism: Change & Continuity in Early Modern European Monarchy*
- Peter Gay, *The Enlightenment: An Interpretation*
- Paul Hazard, *European Thought in the Eighteenth Century*
- David Ogg, *Europe of the Ancien Regime* (Fontana History of Europe)

OR

DSE-1 : Modern Transformation of China (1839-1949) Credits 06

DSE1T : Modern Transformation of China (1839-1949)

1. **Pre-colonial China**: Structure of the traditional Chinese society; Taoism, Confucius, the peasantry and the gentry; State and bureaucracy, economic structure.

2. **Foreign Contact and Anglo-Chinese Relations:** The Tribute System; the Canton Trade and its collapse; Background and Impact of First and Second Anglo-Chinese Wars (Opium Wars), 'Open Door' policy.
3. **Rebellion and Restoration**: Taiping rebellion—background and causes, nature, failure; Tung-chih Restoration and the Self-strengthening Movement – causes, feature and impact.

4. **Movements**, **Reform and Restoration in China**: The Reform Movement of 1898; Boxer Rebellion—causes, nature and failure; Chinese Revolution of 1911—role of Dr. Sun Yat-sen; Yuan Shih-Kai and Warlordism; May 4th Movement; the rise of the Kuo-Min Tang Party; the First United Front; Chiang Kai-shek; financial imperialism in China.

5. **Formation of Communist Republics in China**: Foundation of the Communist Party; Mao Tse-Tung and the making of the Red Army; the Second United Front; Long March and the Yenan experiment; the Chinese Revolution (1949)—ideology, causes and significance; the establishment of the People's Republic of China.

Suggested Readings:

- Harold M. Vinacke, *History of the Far East in Modern Times*, Kalyani Publishers, New Delhi, 1985.
- R. S. McCordock, British Far Eastern Policy, 1894 – 1900, New York, 1931.
- Nathaniel Peffer, *The Far East: A Modern History*, The University of Michigan Press, 1958.
- John K Fairbank (ed.), *The Cambridge History of China vol. X,* Cambridge University Press, 1978.
- J. Chesneaux et al : *China from Opium War to 1911 Revolution,* Random House, USA, 1988.
- Imanuel Shu, *The Rise of Modern China*, Oxford University Press, USA, 1999.
- Lucien Bianco, *Origins of the Chinese Revolutions1915-1949,* Stanford University Press, 1971.
- P. H. Clyde & B. F. Beers, Far East, Prentice Hall Press, 1975.
- D. Chowdhury, *Adhunik Juge Purba Asia-r Sankhipta Itihas*
- Haraprasad Chattopadhyay, *Chiner Itihas*
- M.K Chattopadhyay, *Chin o Japaner Itihas*
- S Guharoy, *Adhunik Purba Asia : Chin o Japaner Itihas*
- Subodh Mukhopadhyay, *Adhunik Purba Asia.*

DSE-2 : Modern Transformation of Japan **Credits 06**

DSE2T : Modern Transformation of Japan

1. **Pre-Meiji Japan**: Tokugawa Shogunate—the feudal society and the government, economic condition; encounter with the West; the Perry Mission; the opening up of Japan to the West; the crisis and fall of the Shogunate.

1. **Meiji Restoration**: Causes, Nature; Process of modernization—social, economic, political and military reforms; Meiji Constitution; rise of political parties.

3. **Popular and Democratic Movements**: Satsuma Rebellion and Popular Rights Movement. (3 lectures)
4. **Emergence of Japan as an Imperial Power**: Sino-Japanese War (1894-'95); Anglo-Japanese Alliance; the Russo-Japanese War.

5. **Japan through the two World Wars**: Japan and World War I; Twenty-One Demands; Washington Conference; Manchurian Crisis—the role of the League of Nations; the failure of the democratic system; the rise of militarism in the 1930s and 1940s; Japan and World War II – from Pearl Harbour to Hiroshima-Nagasaki.

Suggested Readings:

- Harold M. Vinacke, *History of the Far East in Modern Times*, Kalyani Publishers, New Delhi, 1985.
- R. S. McCordock, British Far Eastern Policy, 1894 – 1900, New York, 1931.
- Nathaniel Peffer, *The Far East: A Modern History*, The University of Michigan Press, 1958.
- P. H. Clyde & B. F. Beers, Far East, Prentice Hall Press, 1975.
- Y. B. Jansen, (ed.), *The Cambridge History of Japan vols. V-VI* , Cambridge University Press,
- Andrew Gordon, *A Modern History of Japan From Tokugawa Times to Present* , Oxford University Press, 2013.
- E H Norman & L T Woods, *Japan`s Emergence as Modern State,* UBC Press, 2000.
- D. Chowdhury, *Adhunik Juge Purba Asia-r Sankhipta Itihas*
- Haraprasad Chattopadhyay, *Japaner Itihas*
- M.K Chattopadhyay, *Chin o Japaner Itihas*
- S Guharoy, *Adhunik Purba Asia : Chin o Japaner Itihas*
- Subodh Mukhopadhyay, *Adhunik Purba Asia.*

OR

DSE-2 : Women and Social Change in Nineteenth Century **Credits 06**

DSE2T : Women and Social Change in Nineteenth Century

1. Introduction – Socio-economic changes and women in contemporary Europe – Women's role as wife and mother – 'Angel in the House' in mid-nineteenth century– Emergence of'New Women'–Contagious Diseases Act, 1860 –its criticism –Suffragists' movements.

2. Women Question and social reform in nineteenth century India–Tension between

tradition and modernity –Efforts to modernize women's role: Rammohun Roy, Ishwarchandra Vidyasagar, Keshub ChandraSen, Dayananda Saraswati, Virasalingm, M G Ranade.

3. Printing and emergence of public space –Reformed culture –Women's writing – Emergence of "new woman" in late nineteenth century –Pandita Ramabai,Sarala Devi, Begum Rokeya – Nationalism, Becoming the mothers' of the nation.

4. Female education–Traditional and Western – Debates over curriculum – Government's role –Spread of female education: Bethune School, Mahakali Pathsala.

5. Emergence of Women's organizations- associations founded by men and those founded and managed by women-Swarna kumari Debi's Sakhi Samity and Sarala Debi's Bharat Stree Mahamandal, emergence of All India Women's Conference.

6. Debate over marriage –Native Marriage Act of 1872; Age of Consent Bill, 1891, The Rukhmabai Case, Child Marriage Restraint Act of 1927.

7. Professional women: Chandramukhi Bose, Kadambini Ganguly and Anandibai Joshi.

Suggested Readings:

- Geraldine Forbes, *Women in Modern India*, New Cambridge History of India, Vol.IV.2
- KumkumSangari and SudeshVaid ed. *Recasting Women, Essays in Colonial History*
- Radaha Kumar, *The History of Doing: An Illustrated Account of Movements for Women's Rights and Feminism in India, 1800-1990*
- Meredith Borthwick, *The Changing Role of Women in Bengal*
- Meera Kosambi, *Crossing the Threshold*
- Sumit Sarkar and Tanika Sarkar ed. *Women and Social Reform*, Vol. 1 & 2
- Tanika Sarkar, *Hindu Wife Hindu Nation*
- Rachel Fuchs, *Women in Nineteenth Century Europe*
- GhulamMurshid, *Adhuniktar Abhimukhe Bangaramani*
- Ghulam Murshid, *RassundarithekeRokeyaNariPragatirEkshoBachhar*
- Bharati Ray, *Feminists of Early India: Saraladevi and Begum Rokeya*
- Bharati Ray (ed.) *Nari O Paribar: Bamabodhini Patrika*

DSE 3 : The Russian Revolution **Credits 06**

DSE 3T : The Russian Revolution

1. The Background: The Economic and Social development of Russia in the 19th century – reform of Alexander II – the evolution of serfdom: Industrialisation and the working class: the Russian intelligentsia and Slavophils, Westernisers, the populists and the social democrats.
2. Nicholas II and the Revolution of 1905 – Russian constitutionalism and modern politics.

3. The Revolutions of 1917
4. The nature of the Bolshevik state and Soviet Democracy – war communism, the new economic policy and the rise of the planned economy.
5. Nationalities and Nationalism in Russia before and after 1917.

Suggested Readings:

1. Christopher Hill, *Lenin and the Russian Revolution*
2. Nicholas Riasanovsky, *The History of Russia*
3. E. H. Carr, *The Russian Revolution*
4. Alec Nove, *An Economic History of the USSR 1917-1991*
5. R. Suny, *Cambridge History of Russia,* Vol. III
6. Marc Ferro, *October, Birth of Society*
7. Marc Ferro, *The February Revolution*
8. D. Lieven, *Cambridge History of Russia,* Vol. II
9. R. T. Manning, *The Crisis of the Old order in Russia*

OR

DSE 3: War and Diplomacy, 1914-1945 **Credits 06**

DSE 3T: War and Diplomacy, 1914-1945

Unit I
Module I

Through war to peace 1914 - 1920

1.1 The condition of Europe in 1914
1.2 The First World War: issues and stakes - appraisals and reappraisals
1.3 The dynamics of the war: Wilson's Fourteen Points
1.4 The Versailles Settlement of 1919: context, provisions and evaluation
1.5 Other treaties
1.6 Aftermath of the war

Module II
Revolution and transformation in Russia

2.1 War- time politics in Russia
2.2 The provisional government under Kerensky
2.3 The Bolshevik Revolution: Lenin and Trotsky
2.4 The new Soviet Order
2.5 From Lenin to Stalin
2.6 Soviet foreign policy 1917-1939

Module III
The inter-war period

3.1 The new balance of power
3.2 League of Nations
3.3 Draft Treaty of Mutual Assistance, 1923
3.4 Geneva Protocol, 1924
3.5 Locarno Treaties, 1925
3.6 Pact of Paris, 1928

Unit II
Module I
Road to another global war
1.1 Economic depression, 1929-32: prelude to the Second World War
1.2 Rise of dictatorship in Germany and Italy - a study in tyranny
1.3 Spain on fire: the Civil War, 1936-39
1.4 Diplomatic moves: the Nazi-Soviet Nonaggression Pact and the Rome-Berlin-Tokyo Axis

Module II
The gathering storm
2.1 A historiography of the Second World War
2.2 Hitler's foreign policy and origins of the war
2.3 With the Old Breed: from the Pacific Theatre to the Eastern and Western fronts
2.3 Reappraisal of the concept of appeasement

Module III
Wartime politics in Europe
3.1 Coming of the Grand Alliance and conferences at Tehran, Yalta and Potsdam
3.2 The Lend-Lease policy of the United States
3.3 The allied victory and the collapse of wartime alliance

Suggested Readings:

- David Thomson, Europe since Napoleon
- Gordon A. Craig, *Germany 1866-1945*
- Ludwig Dehio, *Germany and World Politics in the Twentieth Century* A. J. P. Taylor, *The Struggle for Mastery in Europe, 1848-1918*
- Stephen J. Lee, *European Dictatorships 1918–1945*
- Elizabeth Wiskemann, *The Europe of the Dictators*
- Jesse D. Clarkson, *A History of Russia*
- Christopher Hill , *Lenin and the Russian Revolution*
- J. D. White, *The Russian Revolution: 1917-1921*
- David Shub, *Lenin: A Biography*
- Sidney Fay, *The Origins of the World War I*
- Barbara Tuchman, *The Guns of August: the Outbreak of World War I*
- Margaret MacMillan, *The War that Ended Peace: How Europe Abandoned Peace for the First World War*
- John Keegan, *The First World War*
- James L. Stokesbury, *A Short History of World War I*
- Annika Mombauer, *The Origins of the First World War: Controversies and Consensus*
- Holger Herwig, ed., *The Outbreak of World War I*
- Isaac Deutscher, *Stalin: A Political Biography*
- William L. Shirer, *The Rise and Fall of the Third Reich*
- Alan Bullock , *Hitler: A Study in Tyranny*
- Albert Speer, Inside The Third Reich
- J. P. Taylor, *The Origins of the Second World War*
- Antony Beevor, *The Second World War*

DSE4: Pre-colonial South East Asia **Credits 06**

DSE4T: Pre-colonial South East Asia

1. The state system – mainland SE Asia in the ancient period – early kingdoms and cultural diversity – Indian influence and the Hindu-Khmer of Cambodia, Mons of Burma and Buddhism, Indianised kingdom of Champa in Vietnam, the Chinese in Malaya and Vietnam, Srivijaya kingdom of Sumatra, the Majapahits of Java, Chola-Srivijaya struggle; the intervention of the Cholas (11th century)
2. Economy – wet rice cultivation, upland shifting and cultivation ib the plains and seafaring – sawah agriculture and household based production; trade and markets; structural changes in SE Asian economy between 1st century CE to 1500 CE- Funan (Cambodia), Srivijaya maritime empire, Java. SE Asian maritime economy, international trade and commercial expansion in the mainland, Arabs and Chinese (1100-1300)
3. Religion: Theravada and Mahayana Buddhism in mainland SE Asia – Mon kingdoms and dissemination of Theravada Buddhism; links with Sri Lanka (12th century onwards); Islam in the 9th century in Malayan and Indonesian archipelago – Sufi mystical influence – Indonesian *tarekat* - toleration of non-Muslim practices and beliefs.
4. Europeans – Portuguese in the 16th century; Dutch and English in the 17th century.

Suggested Readings:

- Norman G. Owen, *Routledge Handbook of Southeast Asian History*
- Muthiah Alagappa, *Political Legitimacy in Southeast Asia: The Quest for Moral Authority*
- Peter Church, *A Short History of South East Asia*
- Nicholas Tarling, *The Cambridge History of Southeast Asia,* Vol.2
- Jonathan Rigg, *South East Asia: A Region in Transition*
- Ooi Keat Gin, Hoang Auh Tuan, *Early Modern Southeast Asia, 1350-1800*
- Anthony Reid, *Charting the Shape of Early Modern Southeast Asia*
- ----------, *A History of South East Asia: Critical Crossroads*
- Amitav Acharya, *The Making of Southeast Asia*
- Michael Arthur Aung-Thwin, Kenneth R. Hall, *New Perspectives on the History and Historiographies of South East Asia: Continuing Explorations*
- David G. Marr, Anthony Crothers Milner, *Southeast Asia in the 9th to 14th Centuries*
- Barabara Watson Andaya, Leonard Y. Andaya, *A History of Early Modern Southeast Asia, 1400-1830.*

OR

DSE-4: Environmental History of India (Early India and Medieval Period) **Credits 06**

DSE4T: Environmental History of India (Early India and Medieval Period)

Unit-I

a) Environmental history—Definition, Varieties and Sources
b) India's Ecological Profile-Varied and Vast Landscape

Unit-II

a) Social Uses of Natural Resources

b) Resources- Renewable and Non-renewable Resources
c) Mode of Resource Use in Gathering, Nomadic, Pastoralism, Agriculture and Industrial Mode

Unit-III

a) Eclectic Belief Systems – Sacred Groves – Conservation from Above – Conservation from Below
b) Indus Valley Civilization – Climatic factors for its rise and decline
c) Agricultural Expansion and Deforestation in the Gangetic Valley
d) Changing Perception of Forests in Early India

Unit-IV

a) Expansions of Agrarian Frontiers, establishment of new settlements and trade networks in hilly, jungle and marshland regions during medieval period
b) Changing Human Relations with animals-royal hunts
c) Forest Dwellers and the pastoral communities in the medieval period

Suggested Readings:

1. Cederlof, Gunnel and Sivaramakrishnan, K. Ed. Ecological Nationalisms: Nature, Livelihoods, and Identities in South Asia. New Delhi: Permanent Black, 2005.
2. Chakrabarti, Ranjan. Ed.Situating Environmental History. New Delhi: Manohar, 2007.
3. Gadgil, Madhav and Ramachandra Guha. The Fissured Land: An Ecological History of India. Berkeley: University of California Press, 1993.
4. Rangarajan, Mahesh and Sivaramakrishnan, K. Ed. India`s Environmental History: From Ancient times to the Colonial Period: A Reader. Vol. 1 and 2. Ranikhet: Permanent Black
5. Samuel P. Hays, Explorations in Environmental History, Pitsburg U.S.A,1998
6. Guha Ramachandra and J. Martinez-Alier, Varieties of Environmentalism: Essays - North and South, OUP, New Delhi, 1998.
7. Guha, Ramachandra, Environmentalism: A Global History, OUP, New Delhi, 2000.
8. Odum, Eugene P., Fundamentals of Ecology, London, 1971.
9. Saxena, H.M., Environmental Studies, Rawat Publication, Jaipur & New Delhi, 2006.
10. Smith, G.H. (ed.), Conservation of Natural Resources, New York, 1965.
11. Turk, J. Introduction to Environmental Studies, Chicago, 1985.

Skill Enhancement Course (SEC)

SEC- 1: Archaeology and Museum Making in Colonial India Credits 02

1. The development of archaeological knowledge – early archaeological explorations: Establishment of the Archaeological Survey of India: the archaeological mapping by Alexander Cunningham –Curzon and the new impetus for archaeological conservation: Sir John Marshall and the development of Indian archaeology in the early twentieth century
2. Archaeology as the new foundation for an authentic history of India – Archaeological explorations, excavations and conservation and the creation of heritage sites - A few major sites of archaeological excavations: Public archaeology and popularization of archaeological sites – Archaeology in travel writings – Competing cultural visions around a few major heritage sites.

3. Archaeology and culture – Local historians and archaeological knowledge – the culture of collection and valorization of artifacts-----Collecting and museum making-----the profiles of a few prominent collectors and museum makers
4. Archaeology and the Museum Movement in India-----the Indian Museum----the Provincial museums and the local museums----Background to the formation of the National Museum

Suggested Readings:

- Basham, A. L. (ed.) *A Cultural History of India* (Delhi, 1975).
- Chakrabarty, Dilip, *A History of Indian Archaeology from the Beginning to 1947* (Delhi, 1988).
- Guha Thakurta, Tapati, *Monuments, Objects, Histories: Institutions of Art in Colonial and Post-Colonial India* (Delhi, 2004).
- Guha Thakurta, Tapati, 'The Endangered Yakshi: Careers of an Ancient Art Object in Modern India' in Partha Chatterjee and Anjan Ghosh, eds, *History and the Present*, New Delhi, 2002.
- Kejariwal, O. P., *The Asiatic Society of Bengal and the Discovery of India's Past,* 1784-1813, Delhi, 1988
- Lahiri, Nayanjot, *Marshalling The Past: Ancient India and its Modern Histories*, Permanent Black, 2012
- Roychowdhruy, Madhuparna, Displaying India's Heritage: Archaeology and Museum Movement in Colonial India, Orient Blackswan Publications, Delhi, 2015
- Singh, Upinder, *The Discovery of Ancient India: Early Archaeologists and the Beginnings of Archaeology,* Delhi, 2004

OR

SEC - 1 : Literature and History: Bengal **Credits 02**

1. History and Literature : An Overview
2. Dichotomy between *Itihasa* and History- sense of *itihasa*in pre-colonial period as part of literature. Concept of 'mythic time' and 'historical time'. Beginning of history-writing in Bengal. Elements of literature in it.
3. Novel as a new literary genre – looking at past through literature. Ramesh Chandra Majumdar, Akshay Kumar Maitreya, Raman Pillai, ChanduMenon, PhakirmohanSenapati.
4. Power and Patriotism: Bankim's Nationalism:BandeMataram, Anandamath
   Tagore's Nationalism and Universalism: His Novels: GhareBaire and Char Adhyay
5. Sarat Chandra Chattopadhyay and the Indian Women of Early 20th Century: Some reflections in the novels- Charitrahin and Pother Dabi;
   Difference of Perspective between Bankim and Tagore
5. Narratives of Suffering - Economic and Caste discrimination: Tarashankar and the Social milieu in the pre Independent Bengal with special reference to Ganadevata and Hansuli Banker Uakatha
6. SatinathBhaduri& the Gandhian Movement:DhoraiCharitManas.

Suggested Readings

- Ashin Dasgupta, *Itihas O Sahitya*
- Arabinda Samanta,
- Meenakshi Mukhopadhyay, *UpanyaseAtitItihas O Kalpaitihas*

- Priyadarsee Chakraborty ed., *History in Literature - Literature As History, The Issue Revisited*
- Rabindrab Rochonabali
- Romila Thapar, *Time as a Metaphor of History: Early India*
- Yan Watt, *Rise of the Novel*
- Sisir Kumar Das,*History of Indian Literature: 1911-1956, struggle for freedom : triumph and tragedy*
- *Satinath Bhadurir NirbachitaRochonaboli*
- Sarat Sahitya Samagra, *Vol 1&2*
- Tarasankar Bandyopadhyay,*Hansuli Banker Upakotha*,
- Tarasankar Bandyopadhyay, *Ganadevata*

OR

SEC- 1: Art Appreciation an introduction to Indian art **Credits 02**

I. Prehistoric and protohistoric art: _Rock art; Harappan arts and crafts

II. Indian art (c. 600 BCE – 600 CE):
World Heritage Site Managers, UNESCO World Heritage Manuals [can be downloaded/ accessed at www.unesco.org]. Notions of art and craft_Canons of Indian paintings_Major developments in stupa, cave, and temple art and architecture Early Indian sculpture: style and iconography_Numismatic art

III. Indian Art (c. 600 CE – 1200 CE) :
Temple forms and their architectural features_Early illustrated manuscripts and mural painting traditions Early medieval sculpture: style and iconography_Indian bronzes or metal icons

IV. Indian art and architecture (c. 1200 CE – 1800 CE) :

Sultanate and Mughal architecture_Miniature painting traditions:
ughal, Rajasthani,Pahari Introduction to fort, palace and haveli architecture

V. Modern and Contemporary Indian art and Architecture:
The Colonial Period_Art movements: Bengal School of Art, Progressive Artists Group, etc. Major artists and their artworks_Popular art forms (folk art traditions)

Suggested Readings:
- Neumayer, Erwin, Lines of Stone: The pre-historic rock-art of India, South Asia Books, 1993
- Goswamy, B.N., Essence of Indian Art, Asian Art Museum of San Francisco, 1986
- Huntington, Susan, The Art of Ancient India: Hindu, Buddhist, Jain, Weatherhill, 1985
- Guha-Thakurta, Tapati, The making of a new modern Indian art: Aesthetics and nationalism in Bengal, 1850-1920, Cambridge University Press, 1992
- Mitter, Partha, Indian Art, Oxford History of Art series, Oxford
- University Press, 2001 Dhar, Parul Pandya, ed., 2011, Indian Art History Changing Perspectives, New Delhi: D.K. Printworld and National Museum Institute (Introduction).
- Beach, M.C., The New Cambridge History of India I: 3, Mughal and Rajput Painting, Cambridge University Press, 1992.

- Ray, Niharranjan, An Approach to Indian Art, Calcutta, 1970

SEC- 2 : The Making of Indian Foreign Policy **Credits 02**

1. Historical Factors in India's foreign policy priorities – pan Asianism
2. The State India and the Third World – Non-alignment – Regional Cooperation
3. India and South Asia: Relationship with the Neighbours
4. India and the Great Powers – (a) United States (b) Soviet Union (c) China
5. India and Globalisation – Economic Diplomacy – The Look East Policy and the European Union
6. India's Nuclear Policy

Suggested Readings:

- A. Appadorai, *Domestic Roots of India's Foreign Policy 1947-1972*
- U. S. Bajpai (ed.), *Indian Foreign Policy: The Indira Gandhi Years*
- Jayantanuja Bandyopadhyay, *The Making of Indian Foreign Policy*
- Verinder Grover (ed.), *International Relations and Foreign Policy of India*
- Linda Racioppi, *Soviet Policy Towards South Asia since 1970*

OR

SEC- 2 : Colonial Science in India: Institutions and Practices **Credits 02**

1: Science in Colonial India: Problems and Perspectives
2: Science and Colonial Explorations: Science and Orientalism-Early European Scientists: Surveyors, Botanists, Doctors under the East India Company Service
3: Science in Practice: Botanical Garden, Geological Survey of India, Medical College, Indian Association for the Cultivation of Science.
4: Science and Indigenous Personality: Prafulla Chandra Ray, Jagadish Bose, Mahendra Lal Sarkar, Maghnad Saha, C.V. Raman- Emergence of National Science
5: Colonial Science in India: Science and Indian Nationalism-Response and Resistance-Ideas of Mahatma Gandhi and other Indian Nationalists.

Suggested Readings :

- Deepak Kumar, *Science and the Raj: A Study of British India*, Oxford University Press, New Delhi, 2006
- David Arnold, *Science, Technology and Medicine in Colonial India*, Cambridge University Press, Cambridge, 2000
- Uma Das Gupta ed., *Scienceand Modern India: An Institutional History, c. 1784-1947*, Pearson-Longman, New Delhi, 2011
- Arun Bandyopadhyay, *Science and Society in India, 1750-2000*, Manohar, New Delhi, 2006
- Pratik chakrabarti, *Western Science in Modern India; Metropolitan Methods, Colonial Practices,* Permanent Black, New Delhi, 2004
- S. Irfan Habib,Dhruv Raina and Zaheer Baber, eds., *Social History of Science in Colonial India,* Oxford University Press, New Delhi, 2007
- Satpal Sanwan, Science, *Technology and Colonisation: An Indian Experience, 1757-1857*, Anamika Prakashan, New Delhi, 1991

- J. B. Lourdusamy, *Science and National Consciousness in Bengal: 1870-1930*, Orient Longman, New Delhi, 2004
- Deepak Kumar, *Science and Empire: Essays in Indian Context, 1700-1947*, Anamika Prakashan, New Delhi, 1991
- Chittabrata Palit, *Scienceand Nationalsim in Bengal, 1876-1947*, Institute of Historical Studies, Kolkata, 2004

OR

SEC - 2: Understanding Popular Culture **Credits 02**

I : Introduction: Defining popular culture and understanding it historically

II: Visual expressions Folk art, calendar art, photography

III: Performance: Theatre; music; folk tales/songs/swang and Nautanki: Identifying themes, functionality, anxieties

IV: The audio-visual: cinema and television:
Indian cinema: Mapping the influence of the national struggle for independence (1930s and 40s); Idealized nationalism (1950s), disillusionment and the anti-establishment mood (1970s and 80s); documentary films Expressions of popular culture in television

V: Fairs, Festivals and Rituals:
Disentangling mythological stories, patronage, regional variations

VI: Popular culture in a globalized world:
The impact of the Internet and audio-visual media

Suggested Readings:

- 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

OR

SEC- 2 : Understanding Heritage

I. Defining Heritage
Meaning of ‘antiquity’, ‘archaeological site’, ‘tangible heritage’, 'intangible heritage' and ‘art treasure’

II. Evolution of Heritage Legislation and the Institutional

Framework:
Conventions and Acts— national and international_Heritage-related government departments, museums, regulatory bodies etc. Conservation Initiatives

III. Challenges facing Tangible and Intangible Heritage
Development, antiquity smuggling, conflict (to be examined through specific case studies)

IV. Evolution of Heritage Legislation and the Institutional Framework:
Conventions and Acts — national and international Heritage - related government departments, museums, regulatory bodies etc. Conservation Initiatives

V. Challenges facing Tangible and Intangible Heritage:
Development, antiquity smuggling, conflict (to be examined through specific case studies)

VI. Heritage and Travel:
Viewing Heritage Sites_The relationship between cultural heritage, landscape and travel recent trends

Suggested Readings:

- 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

Generic Electives (GE)

[Interdisciplinary for other Department]

GE-1: Theories of the Modern State **Credits 06**

GE1T: Theories of the Modern State

1. The State Definitions and Elementary Concepts – Sovereignty and autonomy – state and the community – the nation state
2. The Absolutist State: Bodin, Hobbes and Hegel: the state, class and civil society

3. The Liberal State – the state, individualism and citizenship – the constitutional and the contractual state: John Locke – liberalism and the democratic order: Rousseau and the General Will
4. The Liberal State – the utilitarian version: Bentham and John Stuart Mill – John Mill and democracy: the tyranny of the majority
5. The state and class Marxist perspective – the problem of Bonapartism – Max Weber and the bureaucratic order
6. The ideological basis of the Welfare State and its comparison with Communism – John Rawls and the theory of justice

Suggested Readings:

- Perry Anderson, *Lineages of the Absolutist State*
- H. Dickinson, *Liberty and Property*
- C. B. Macpherson, *The Political Theory of Possessive Individualism*
- C. B. Macpherson, *The Life and Times of Liberal Democracy*
- C. B. Macpherson, *Democratic Theory*
- Ralph Miliband, *The State in Capitalist Society*
- Harold Laski, *A Short History of Liberalism*
- Shirley Robin Letwin, *The Pursuit of Certainty: David Hume, Jeremy Bentham, John Stuart Mill and Beatrice Webb*
- James Steintrager, *Bentham*
- R. J. Halliday, *John Stuart Mill*
- Raymond Plant, *Hegel*
- Amy Gutmann, *Liberal Equality*

GE- 2: Science and Empire **Credits 06**

GE 2T: Science and Empire

1. History and Development of Science under the Colonial Empire-Perspectives and Recent Historical Debates/ Discourse/ Trajectories.

2. Science and Colonial Empire: Concepts and Contours-Different Colonial Experiments in India-Fundamental Research in Science in India.

3. Colonial Science: Indian and Western Interaction-Role of Institutions in Promoting Scientific Knowledge (Botanical Garden, Medical Colleges, Calcutta School of Tropical Medicine, Bose Institute, Indian Institute of Science etc.)

4. Science and Empire-Indian Responses and Resistance-Ideas of Mahatma Gandhi and Jawaharlal Nehru.

5. Scientific Activities under the Empire-Social, Political and Cultural Implication and Historical Debates.

Suggested Reading:

- Deepak Kumar, *Science and the Raj: A Study of British India*, Oxford University Press, New Delhi, 2006
- David Arnold, *Science, Technology and Medicine in Colonial India*, Cambridge University Press, Cambridge, 2000
- Deepak Kumar, *Science and Empire: Essays in Indian Context, 1700-1947*, Anamika Prakashan, New Delhi, 1991
- Chittabrata Palit, *Science and Nationalsim in Bengal, 1876-1947*, Institute of Historical Studies, Kolkata, 2004
- Uma Das Gupta ed., *Science and Modern India: An Institutional History, c. 1784-1947*, Pearson-Longman, New Delhi, 2011
- Sumit Sarkar, *Modern Times: Environment, Economy and Culture*, Permanent Black, New Delhi, 2014
- Douglas M. Peers and Nandini Gooptu, *India and the British Empire*, Oxford University Press, New Delhi, 2012
- Michael Mann, *South Asia's Modern History: Thematic Perspectives,* Routledge, London/New Delhi, 2014

GE 3 : Some Perspectives on Women's Rights in India **Credits 06**

GE 3T : Some Perspectives on Women's Rights in India

I. Definition of Human Rights

Human Rights and Women, a survey of the Charter
Interrogating Human Rights vis-à-vis personal laws in India
UN Convention and Indian Context

II. Indian Constitution and Women's Rights

Fundamental Rights and Women
Directive Principles and Women
Major legal cases defending women's rights vis-à-vis the Constitution

III. Preventive Acts

Minimum Wage Act 1948, Family Courts Act 1986, PNDT Act 1994, Latest Measures

IV. Issues of Violence against Women and Remedial Measures

Domestic Violence Act, Prevention of Sexual Harassment at Workplace
Practical application and Problems, Remedial Measures

V. Role of Non-Government Institutions

Non-Government Organizations and Human Rights
Women and Non-Government Organizations – Participations

VI. Present Status
Issues of enabling and empowering modalities – Debate on uniform civil code

Suggested Readings:

- Urvashi Butalia & Tanika Sarkar, (ed.), Women & Hindu Rights, New Delhi, Kali for Women, 1996
- Zoya Hasan (ed.), Forging Identities, Communities & Patriarchies, EPW, December 1995
- Bina Agarwal, Field of Her Own, New Delhi, Kali for Women,

GE - 4 : Gender & Education in India **Credits 06**

GE4T : Gender & Education in India

I. Historiographical Trends

a. Pre-colonial historiographical trends in women's education
b. colonial historiographical trends in women's education
c. Post-colonial historiographical trends in women's education

II. Education in Early and Medieval Times

a. Women's Education in Medieval times
b. Regional trends of Women's education in pre-colonial India
c. Instances of women's education, obstacles

III. Colonial Period

a. Socio-religious reforms
b. Role of Christian missionaries in spreading female education, recent debates
c. Indigenous initiatives at women's education

IV. Role of Schools and Colleges in colonial and post-colonial period

a. Girls School and Colleges, development towards co-education
b. Expansion of infrastructural facilities in education
c. Technical and vocational education for women

V. Contours of female literacy since 1950

a. Interrogating literacy for women
b. Government policies and Schemes
c. Disparities in Literacy: Region, Community, Social and Eco-factors

VI. Present Scenario
a. Education as a tool of Empowerment

Suggested Readings:

- Aparna Basu, Growth of Education and Political Development in India, 1898 – 1920
- Usha Sharma, Women Education in Modern India
- Ramnath Sharma & Rajender Sharma, History of Education in India, Atlantic Publishers, 1996
- Aparna Basu & Bharati Ray (ed.), Women's Struggle. A History of the All India Women's Conference 2002

OR

GE-4 : History of Indian Journalism **Credits 06**

GE4T: History of Indian Journalism

I. History of Indian Journalism: Colonial & Post Colonial Period.
II. Pre-colonial History of written records & modalities of Dissemination
III. Advent of Print media: Imperialist Ideologies
IV. Nationalism & Print Culture: Selective study of prominent newspapers: Tribune, Amrita Bazar Patrika, and Hindustan Times
V. Writing & Reporting Experiences

Suggested Readings:

- Natrajan.J, History of Indian Journalism, Vol. –ii of Press Commission Report, New Delhi, 1954
- Natrajan. J, A history of the Press in India, Asian Publishing House, Bombay, 1962
- Ghosh,Hamendra Prasad, Newspapers in India, University of Calcutta,1952
- Ananda. Prakash, A History of the Tribune, A Centenary Publication by the Tribune Trust, 1986

END

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year B.A. (General)
in
HISTORY

Under Choice Based Credit System (CBCS)
w.e.f 2018-2019

VIDYASAGAR UNIVERSITY

BA (General) in History

[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
1	I			**SEMESTER-I**			**CA**	**ESE**	**TOTAL**
		Core-1 (DSC-1A)		**Ancient India**	6	5-1-0	15	60	75
		Core-2 (DSC-2A)		Other Discipline(Discipline-2)/TBD	6		15	60	75
		AECC-1 (Core)		English-I	6	5-1-0	15	60	75
		AECC-1 (Elective)		English/MIL	2	1-1-0	10	40	50
				Semester - I : Total	**20**				**275**
				SEMESTER-II					
	II	Core-3 (DSC-1B)		**Medieval India**	6	5-1-0	15	60	75
		Core-4 (DSC-2B)		Other Discipline(Discipline-2)/TBD	6		15	60	75
		AECC-2 (Core)		MIL-I	6	5-1-0	15	60	75
		AECC-2 (Elective)		Environmental Studies	4		20	80	100
				Semester - 2 : Total	**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
2	III	SEMESTER-III					CA	ESE	TOTAL
		Core-5 (DSC-1C)		**Selected themes in the Colonial impact on Indian Economy and Society**	6	5-1-0	15	60	75
		Core-6 (DSC-2C)		Other Discipline(Discipline-2)/TBD	6		15	60	75
		AECC-3 (Core)		English-II	6	5-1-0	15	60	75
		SEC-1		SEC- 1 : The Making of Indian Foreign Policy Or SEC-1 : Archaeology and Museum Making in Colonial India	2	1-1-0	10	40	50
				Semester - 3 : Total	**20**				**275**
		SEMESTER-IV							
	IV	Core-7 (DSC-1D)		**Modern nationalism in India**	6	5-1-0	15	60	75
		Core-8 (DSC-2D)		Other Discipline(Discipline-2)/TBD	6		15	60	75
		AECC-4 (Core)		MIL-II	6	5-1-0	15	60	75
		SEC-2		SEC- 2 : Literature and History: Bengal Or SEC- 2 :Understanding Heritage	2	1-1-0	10	40	50
				Semester - 4 : Total	**20**				**275**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
3	V	SEMESTER-V					CA	ESE	TOTAL
		DSE-1A		Any one from Discipline -1(History) (**DSE-1A**:Renaissance and Reformation **Or** Europe in the Ancient Regime **Or** Environmental issues in India)	6	5-1-0	15	60	75
		DSE-2A		Other Discipline(Discipline -2) / TBD	6		15	60	75
		GE-1		TBD	6		15	60	75
		SEC-3		SEC- 3 : Colonial Science in India: Institutions and Practices	2	1-1-0	10	40	50
				Semester - 5 : Total	**20**				**275**
				SEMESTER-VI					
	VI	DSE-1B		Any one from Discipline -1(History) (**DSE-1B:** Modern Europe **Or** Post World War-II Politics **Or** Research Methodology in History)	6	5-1-0	15	60	75
		DSE-2B		Other Discipline (Discipline -2) / TBD	6		15	60	75
		GE-2		TBD	6		15	60	75
		SEC-4		SEC- 4: Art Appreciation An introduction to Indian art Or SEC - 4: Understanding Popular Culture	2	1-1-0	10	40	50
				Semester - 6 : Total	**20**				**275**
				Total in all semester:	**122**				**1700**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **CP**=Core Practical , **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies ,

List of Core Course

DSC-1A (CC-1): Ancient India
DSC-1B(CC-2): Medieval India
DSC-1C (CC-3): Select themes in the Colonial impact on Indian Economy and Society
DSC-1D (CC-4): Modern Nationalism in India

Discipline Specific Electives (DSE)

DSE-1A: Renaissance and Reformation
Or
DSE-1A: Europe in the Ancient Regime
Or
DSE-1A: Environmental issues in India
DSE-1B: Modern Europe
Or
DSE-1B: Post World War-II Politics
Or
DSE-1B: Research Methodology in History

Skill Enhancement Course(SEC)

SEC- 1 : The Making of Indian Foreign Policy
Or
SEC- 1 : Archaeology and Museum Making in Colonial India.
SEC- 2 : Literature and History: Bengal
Or
SEC- 2 : Understanding Heritage
SEC- 3 : Colonial Science in India: Institutions and Practices
SEC- 4: Art Appreciation An introduction to Indian art
Or
SEC - 4: Understanding Popular Culture

Generic Elective(GE)
[Interdisciplinary for other department]

GE- 1: Life and thoughts of Rabindranath Tagore
Or
GE- 1: Theories of the Modern State
Or
GE- 1: Science and Empire
Or
GE- 1: History of Indian Journalism
GE- 2: Gender & Education in India
Or
GE- 2: Visual and Performative Culture in Modern Bengal
Or
GE- 2 : Some Perspectives on Women's Rights in India

Core Courses (CC)

DSC-1A: (CC-1): Ancient India **Credits 06**

DSC1AT: Ancient India

Course Contents:

1. Harappan Civilisation: Features & Town Planning, Decline
2. Vedic Age: Corpus of Vedic Literature, Society, Economy and Polity in Early & Later Vedic Period
3. State Formation in Early India: Mahajanapadas
4. Mauryan Empire: Chandragupta Maurya to Asoka: Polity, Administration, Society, Culture and Mauryan decline
5. Gupta Empire: Chandragupta I to Skandagupta: Polity, Administration, Society, Culture and Downfall
6. India after the Guptas

Suggested Readings:

1. Allchin, Bridget and Raymond, *The Rise of Civilization in India and Pakistan*.
2. Basham, A.L., *The Wonder that was India.*
3. Bhattacharjee, Sukumari, *Women and Society in Ancient India.*
4. Chakrabarty, Ranabir, *Exploring Early India upto A.D. 1300.*
5. *Habib, Irfan (General Editor), A Peoples.*
   (a) Vol. I –Pre History.
   (b) Vol. II –The Indus Civilization.
   (c) Vol. III – The Vedic Age.
   (d) Vol. IV –The Mauryas.
6. Jha, D.N., *Ancient India in Historical Outline*
7. Jha, D.N., *AncientIndia : An Introduction.*
8. Kochar,R., *The Vedic People.*
9. Kosambi, D.D., *An Introduction to the Study of Indian History.*
10. Kulke, H., *The State in India (1000-1700).*
11. Lahiri, Naianjyot, *The Decline and Fall of the Indus Civilization.*
12. Ratnagar, Shireen, *The End of the Great Harappan Tradition*.
13. Sastri, K.A., *A History of South India from Pre-historic Times to the fall of Vijaynagar*,
14. Sharma, R.S., *India's AncientPast.*
15. Singh, Upinder, *A History of Ancient and Early Medieval India*.
16. Thapar, Romila, *From Lineage to State.*
17. Thapar, Romila, *Early India: From the Origins to A.D. 1300.*
18. Thapar, Romila, *TheMauryas Revisited.*
19. Romila, Thapar, *Asoka and the Decline of the Mauryas.*
20. RanabirChakraborty, Bharat ItihaserAdiparba

DSC-1B (CC- 2) : Medieval India **Credits 06**

DSC1BT: Medieval India

Course Contents:

1. Arab Conquest of Sindh: Nature and Impact
2. Causes and Consequences of Early Turkish invasion
3. MahmudofGhazni and Shihab-ud-din of Ghur
4. Establishment and consolidation of the Sultanate: Qutb-ud-din AibaktoFiruz Shah Tughluqs, polity, economy, culture
5. Emergence of regional powers: Vijaynagar and Bahamani Kingdoms, HussainShahi and IlliyasShahi Dynasties.
6. Mughal Imperialism: Establishment and consolidation - Greater Mughals; Polity, economy, culture
7. Socio-cultural syncretism, Bhakti & Sufi movements.

Suggested Readings:

1. Ahmed, Bashir, *Akbar, The Mughal Emperor.*
2. Chandra, S., *History of Medieval India.*
3. Habib, Irfan, *Medieval India: The Study of a Civilization.*
4. Habib, Irfan, *Economic History of Medieval India: A Survey.*
5. Habib, Irfan, *The Agrarian System of Mughal India.*
6. Habibullah, A.B.M., *The Foundation Of Muslim Rule in India.*
7. Hasan A. Mahdi, *The Tughlaq Dynasty.*
8. Hasan, S. Nurul, *Thoughts on Agrarian Relations in Mughal India.*
9. Jackson, Peter, *The Delhi Sultanate: A Political and Military History.*
10. Kulke , H. (ed.), *The State in India(1000-1700).*
11. Kumar, Sunil, *The Emergence of the Sultanate of Delhi.*
16. Raychaudhuri, T.K and Habib, I. (ed.), The *Cambridge Economic History of India.*
17. Stein, Burton, *Vijayanagara.*
18. Alam, Muzaffar and Subhramanyan, Sanjoy (eds.), *The Mughal State.*
19. Ali, M. Athar, *Mughal India, Studies in Polity, Ideas, Society and Culture.*
20. Ali,M. Athar, *The Mughal Nobility under Aurangazeb.*
21. Chandra, Satish, *A History of Medieval India.*
22. Richards, J.F., *The Mughal Empire*.
23. Tripathi, R.P., *The Rise and fall of Mughal India.*
24. Tripathi, R.P., *Some Aspects of Muslim Administration.*

DSC-1C (CC- 3): Select themes in the Colonial impact on Indian Economy and Society
Credits 06

DSC1CT: Select themes in the Colonial impact on Indian Economy and Society

Course Contents:

1. Colonial State institutions and ideologies: Colonial Economic interests, Company's Commerce, Mercantilism to Free trade, Deindustrialisation and Drain of Wealth.
2. Land Settlements and agricultural change— Commercialization of Agriculture.
3. Modern Industrialisation — Long term Constraints
4. Census and Caste — Colonial ethnology — Sanskritisation, Westernisation and Social Reform - Young Bengal, Brahma Samaj&PrarthanaSamaj
5. Reformism and Revivalism: The Aryadharma and Ramkrishna Vivekananda Movement.
6. Islamic reform in India : The Reformers and the Orthodox.

Suggested Readings:

1. Tirthankar Roy, *Economic History of India, 1857-19147*
2. K. N. Raj, *Essays on the Commercialization of Indian Agriculture*
3. SekarBandyopadhyay, *Caste, Culture and Hegemony: Social Dominance in Colonial Bengal*
4. Thomas R. Trautmann, *Aryans and British India*
5. Mushirul Hasan, *Writing India: Colonial Ethnography in the Nineteenth Century*
6. G. S. Ghurye, *Caste and Race in India*
7. Dipankar Gupta, *Caste in Question: Identity or Hierarchy*
8. Nicholas B. Dirks, *Caste of Mind: Colonialism and the Making of Modern India*
9. Shriram Maheswari, *The Census Administration under the Raj and After*
10. C. A. Bayly, *Indian Society and the Making of the British Empire*
11. Douglas M. Peers, *India under Colonial Rule, 1700-1885*
12. B. R. Tomlinson, *The Economy of Modern India, 1860-1970*
13. GurilymBeckerlegge, *The Ramakrishna Mission: The Making of Modern Hindu Movement*
14. Jayasree Mukherjee, *The Ramakrishna-Vivekananda Movement: Impact on Indian Society and Politics, 1893-1922*
15. Neilesh Bose, *Recasting the Region: Language, Culture and Islam in Colonial Bengal*
16. ShireenMaswood, AmitDey and RitwikaBiswas, *Between Tradition and Modernity: Aspects of Islam in South Asia*
17. Barbara D. Metcalf, *Islam in South Asia in Practice*
18. ----------, *Islamic Revival in British India: Deoband 1860-1900*
19. Kenneth W. Jones, *Socio-Religious Reform Movements in British India, Part 3, Vol. 1*
20. H.O. Pearson, *Islamic Reform and Revival in Nineteenth Century India.*

DSC-1D (CC- 4): Modern Nationalism in India **Credits 06**

DSC1DT: Modern Nationalism in India

Course Contents:

1. Emergence of Nationalism in India and its historiography.
2. Economic Nationalism and Cultural Nationalism
3. Rise of the Indian National Congress
4. Anti-partition movement in 1905- Concept of Swadeshi and atmashakti
5. Gandh's Rise to power; Gandhian Mass Movements—Non-cooperation,Civil Disobedience , Quit India Movement.
6. Roots of Communalism and Communal Award
7. Demand for Pakistan : Pakistan Movement from Cripps Mission to Cabinet Mission Plan.
8. Partition and its Aftermath

Suggested Readings:

1. Bandyopadhyay, Sekhar, From Plassey to Partition.
2. Sarkar Sumit, *Modern India* .
3. Chandra Bipan , *India's Struggle for Independence/ India after Independence.*
4. Desai A.R., *Social Background of Indian Nationalism.*
5. Datta K.K., *Social History of Modern India*.
6. Mukherji H.N., *India's Struggle for Freedom.*
7. Chatterji Jaya, *Bengal Divided: Hindu Communalism and partition.*
8. Tripathy Amalesh, *SwadinataSangrameBharaterJatiyo Congress.*
9. Wolpert Stanly, *A new History of India.*
10. Chattopadhyay Pranab Kumar, *Adhunik Bharat.*
11. Chattopadhyay, Mrinal Kanti, *Jyatiyotabadi Jinnah :Chintar Kromobibartan.*
12. Mallik Samar, *Adhunik Bharater Rupantar : Raj Theke Swaraj*.
13. Pahadi, Gopalkrishna, *Adhunik Bharat Charcha*.

Discipline Specific Electives (DSE)

DSE-1A: Renaissance and Reformation **Credits 06**

DSE1AT: Renaissance and Reformation

Course Contents:

1) Political and social background – political system in early modern Europe – collapse of feudalism – and the changing economic life in the 15th and 16th century – commerce and navigation – monarchies and city states –features of the early modern state –the printing revolution.
2) Italian city states, the merchants, the church and the social context of the renaissance – origins of humanism – rediscovery of the classes –the impact of humanism on art, education and political thought –Machiavelli and the idea of a modern state.
3) The background to the reformation –intellectual and popular anti-clericalism – Martin Luther and the reformation –reformation in the national context: France, Switzerland and

England – the distinctiveness of the English reformation –Radical reformation – the Anabaptists, etc. - counter reformation.

4) Renaissance science and the emergence of a secular culture

Suggested Readings:

1. William Roscoe Estep, *Renaissance and Reformation*
2. Bard Thompson, *Humanists and Reformers: A History of the Renaissance and Reformation*
3. Jo Eldridge Carmey, *Renaissance and Reformation, 1500-1620: A Biographical Dictionary*
4. David L. Morse and William M. Thompson eds., *History of Political Ideas,* Vol V *(Renaissance and Reformation)*
5. James A. Patrick ed. ,*Renaissance and Reformation,* Vol. 1
6. Steven E. Ozment, *Religion and Culture in the Renaissance and Reformation*
7. Jonathan W. Zophy, *A Short History of Renaissance and Reformation Europe*
8. Dorothy Mills, *Renaissance and Reformation Times*
9. Tom Monaghan, *Renaissance, Reformation and the Age of Discovery, 1450-1700*
10. William Gilbert, *The Renaissance and the Reformation*
11. Charles G. Nauert, *Humanism and the Culture of Renaissance Europe*
12. Norman F. Cantor and Michael S. Werthman, *Reniassance, Reformation and Absolutism: 1450-1650*
13. Lisa Mullins, *Science in the Renaissance*
14. Marie Boas Hall, *The Scientific Renaissance 1450-1630*
15. Vickey Herold, *Science during the Renaissance*
16. Aldo Altamore and Giobvanni Antonini, *Galileo and the Renaissance Scientific Discourse*
17. Stephen Pumfrey, Paolo L. Rossi, *Science, Culture and Popular Belief in Renaissance Europe*

OR

DSE-1A: Europe in the Ancient Regime **Credits 06**

DSE1AT: Europe in the Ancient Regime

Course Contents :

1) Political system in 18th century Europe: The empires, monarchies and republics – the holy Roman empire and the Russian empire – constitutional monarchy in Britain – the monarchical order in Spain, Prussia, Scandinavian countries, Poland and France – the republican order in the United provinces, Switzerland and Venice.
2) The Overseas empires and the Trading Companies – Spanish, French, Dutch and English overseas settlements.

3) Enlightened Despotism – Russia under Catherine – Austria and Hungary under Joseph II – Prussia under Frederick the Great.
4) Society and the Economy – Agriculture and Commerce – Aristocracy and the Bourgeoisie – the towns and the cities – the artisans and peasants – free peasants and serfs.
5) European Enlightenment – Scientific revolution and seventeenth century origins – England and Holland – the nature of God controversy – the French enlightenment – the enlightenment public sphere – the enlightenment critique of old regime – the idea of progress.

Suggested Readings:

1. M. S. Anderson, *Europe in the Eighteenth Century*
2. A. Cobban, *History of Modern France*, Vol. I
3. William Doyle, *The Old European Order: 1660 – 1800*
4. Carlo Cipolla, *Before the Industrial Revolution: European Society and Economy, 1000–1700*
5. Carlo Cipolla, *Fontana Economic History of Europe: The emergence of industrial Societies*
6. J. H. Plumb, *England in the Eighteenth Century*
7. Nicholas Henshall, *The Myth of Absolutism: Change & Continuity in Early Modern European Monarchy*
8. Peter Gay, *The Enlightenment: An Interpretation*
9. Paul Hazard, *European Thought in the Eighteenth Century*
10. David Ogg, Europe of the Ancient Regime (Fontana History of Europe)

OR

DSE-1A: Environmental issues in India **Credits 06**

DSE1AT: Environmental issues in India

Course Contents:

1. The importance of Environment.

2. Geography, Ecology and Cultures in Pre-Colonial India -
Land, Forests, Dams, Water, Pastures, Ecology of Hills and Mountains

3. Colonialism and developments in the Environment –
New Regimes of land, Forests, Water and Irrigation
Resistance: Peasants, Tribals and Pastoralists.

4. Environmental Issues in Independent India
Forests, Dams, Displacement, Pollution, Degradation.

5. Environmental Movements in Independent India

Forests, Dams, Displacement, Pollution.

6. Enviornmental concerns in a Globalizing World.

Suggested Readings:

1. Mahesh Rangarajan, et al, Environmental Issues in India
2. Anil Agarwal, et al, The State of India's Environment, The Second Citizens' Report, Delhi, 1985
3. Madhav Gadgil & Ramchandran Guha, This Fissured Land, An Ecological History of India, Delhi, OUP,1990
4. -------Ecology and Equity, the use &abuse of nature in contemporary India, 1995
5. David Arnold & Ramchandran Guha(eds,) Nature, Culture, Imperiaism, Delhi, OUP, 1995
6. Salim Ali, The Fall of a Sparrow, 1985

DSE-1B: Modern Europe **Credits 06**

DSE1BT: Modern Europe

Course Contents:

1. French Revolution and Napoleon: Crisis of Ancient Regime: Socio-Political and Economic Condition, Intellectual Impetus: The Revolution in the making, Phases of the French Revolution: the Aristocratic Revolution, The rise of Napoleon Bonaparte: Napoleonic Empire and Europe, Fall of Napoleon: Continental System, Impact of Napoleon in Europe

2. Restoration and reaction in Europe: Vienna Congress, Metternich Era.

3. Movements of National Aspirations: Unification of Italy, Unification of Germany, The Third Republic and the Paris Commune, The Eastern Question.

4. Causes of the two World Wars

Suggested Readings:

1. Fisher H.A.L., History *of Europe.*
2. Thomson David, *Europe since Napoleon.*
3. Lipson E., *Europe in the 19thand 20thCenturies.*
4. Hazen C D., *Europe since 1815.*
5. Ketelby, *History of Modern Times*.
6. Cipolla (ed.), *Fontana Economic History of Europe*.
7. Taylor A.J.P., Origins *of the Second World War.*
8. Taylor AJP, *The struggle for Mastery in Europe.*
9. Carr E.H., *International Relations between the Two World Wars.*

10. Hobsbawm E.J., *Age of Revolution/ Age of Empire.*
11. Roberts J.M., *Europe 1880-1945.*
12. Lefebvre G., *Coming of the French Revolution.*

OR

DSE-1B: Post World War - II Politics **Credits 06**

DSE1BT: Post World War - II Politics

Course Contents:

1. A New World Order and the Origin of the Cold War
2. Cold War - Its Ideology and emergence of American and Soviet Block
3. Economic and military alliance: NATO, SEATO, COMECON, Warsaw
4 Crisis in Hungary, Polish question, Suez crisis, Palestine problem, Iran-Iraq conflict, Gulf War of 1990 - 91, Arab - Israel War
5. Third World and Its ideology, organizations: OPEC, SAARC, ASEAN
6. Détente
7 Collapse of Soviet Bloc: Process of disintegration

Suggested Readings:

1. Taylor, A.J.P., Origins of the Second world War
2. Carr, E.H
   a)International Relations between the two World Wars
   b) The twenty years crisis 1919-39: An Introduction to the Study of the International relations
3. Calvocoressi. P. , World since 1945
4. Kaushik, K., History of Communist Russia 1917-1991 , New Delhi, Macmillan 2006
5. Williams, W.C., H. Piotrowski, The World since 1945—A History of the International Relations

OR

DSE-1B: Research Methodology in History

Credits 06

I Time, space, human agency

[a] Sources as authority and sources in context: written, oral, visual, and archaeological
[b] Facts and historical facts; interpretation and meaning
[c] Hypothesis, argumentation, problematique
[d] Objectivity, causality, generalization, historical imagination
[e] Narrative and history

II History as interdisciplinary practice:

[a] History and Archaeology
[b] History and Anthropology
[c] Quantitative Methods in History
[d] History and Psychology
[e] History and Literature

III Historians at work:

Representative writings of any two major historians are to be critically evaluated on the parameters of the research methodology with an emphasis on the use of the sources, methodology, arguments and conclusion.

Suggested Readings:

1. E. H. Carr, What is History, Penguin, 2008
2. Marc Bloch, The Historian's Craft (Introduction and Chapter I: History,
3. Men and Time), Manchester University Press, 1992.
4. E. Sreedharan, A Text-book of Historiography 500 BC to AD 2000, Orient Longman, 2004
5. Arthur Marwick, New Nature of History: Knowledge, Evidence, Language (Chapter V: The Historian at work: Forget 'facts', Foreground Sources), Lyceum Books Incorporated, 2001.
6. Habib, Irfan. Interpreting Indian History. North Eastern Hill University Publications, Shillong, 1988
7. Arthur Marwick, The Nature of History (Chapter IV: History, Science and Social Science), London: Macmillan, 1989

Skill Enhancement Course (SEC)

SEC- 1 : The Making of Indian Foreign Policy **Credits 02**

Course Contents:

1. Historical Factors in India's foreign policy priorities –pan Asianism
2. The State India and the Third World –Non-alignment –Regional Cooperation
3. India and South Asia: Relationship with the Neighbours
4. India and the Great Powers –(a) United States (b) Soviet Union (c) China
5. India and Globalisation–Economic Diplomacy –The Look East Policy and the European Union
6. India's Nuclear Policy

Suggested Readings:

1. A. Appadorai, *Domestic Roots of India's Foreign Policy 1947-1972*
2. U. S. Bajpai (ed.), *Indian Foreign Policy: The Indira Gandhi Years*
3. JayantanujaBandyopadhyay, *The Making of Indian Foreign Policy*
4. Verinder Grover (ed.), *International Relations and Foreign Policy of India*
5. Linda Racioppi, *Soviet Policy Towards South Asia since 1970*

OR

SEC- 1: Archaeology and Museum Making in Colonial India. Credits 02

Course Contents:

1. The development of archaeological knowledge – early archaeological explorations: Establishment of the Archaeological Survey of India: the archaeological mapping by Alexander Cunningham – Curzon and the new impetus for archaeological conservation: Sir John Marshall and the development of Indian archaeology in the early twentieth century
2. Archaeology as the new foundation for an authentic history of India –Archaeological explorations, excavations and conservation and the creation of heritage sites - A few major sites of archaeological excavations: Public archaeology and popularization of archaeological sites –Archaeology in travel writings –Competing cultural visions around a few major heritage sites.
3. Archaeology and culture – Local historians and archaeological knowledge –the culture of collection and valorization of artifacts- Collecting and museum making - the profiles of a few prominent collectors and museum makers
4. Archaeology and the Museum Movement in India- the Indian Museum- the Provincial museums and the local museums- Background to the formation of the National Museum

Suggested Readings:

1. Basham, A. L. (ed.) *A Cultural History of India* (Delhi, 1975).
2. Chakrabarty, Dilip, *A History of Indian Archaeology from the Beginning to 1947* (Delhi, 1988).
3. GuhaThakurta, Tapati, *Monuments, Objects, Histories: Institutions of Art in Colonial and Post-Colonial India* (Delhi, 2004).
4. GuhaThakurta, Tapati, 'The Endangered Yakshi: Careers of an Ancient Art Object in Modern India' in ParthaChatterjee and AnjanGhosh, eds, *History and the Present*, New Delhi, 2002.
5. Kejariwal, O. P., *The Asiatic Society of Bengal and the Discovery of India's Past*, 1784-1813, Delhi, 1988
6. Lahiri, Nayanjot, *Marshalling The Past: Ancient India and its Modern Histories*, Permanent Black, 2012

7. Roychowdhruy, Madhuparna, Displaying India's Heritage: Archaeology and Museum Movement in Colonial India, Orient Blackswan Publications, Delhi, 2015
8. Singh, Upinder, *The Discovery of Ancient India: Early Archaeologists and the Beginnings of Archaeology*, Delhi, 2004 .

SEC- 2: Literature and History: Bengal **Credits 02**

Course Contents:

1. History and Literature: An Overview
2. Dichotomy between Itihasa and History- sense of itihasain pre-colonial period as part of literature. Concept of 'mythic time'and 'historical time'.Beginning of history-writing in Bengal.Elements of literature in it.
3. Novel as a new literary genre –looking at past through literature. Ramesh Chandra Majumdar, Akshay Kumar Maitreya, Raman Pillai, ChanduMenon, Phakirmohan Senapati.
4. Power and Patriotism: Bankim'sNationalism:BandeMataram, Anandamath
Tagore's Nationalism and Universalism: His Novels: GhareBaire and Char Adhyay
5. Sarat Chandra Chattopadhyay and the Indian Women of Early 20th Century: Some reflections in the novels- Charitrahin and Pother Dabi; Difference of Perspective between Bankim and Tagore .
6. Narratives of Suffering - Economic and Caste discrimination: Tarashankar and the Social milieu in the pre Independent Bengal with special reference to Ganadevata and Hansuli Banker Uakatha
7. Satinath Bhaduri & the Gandhian Movement: Dhorai Charit Manas.

Suggested Readings:

1. Ashin Dasgupta, Itihas O Sahitya
2. Arabinda Samanta, MeenakshiMukhopadhyay, Upanyase AtitItihas O Kalpaitihas
3. Priyadarsee Chakraborty ed., History in Literature - Literature As History,The Issue Revisited
4. Rabindra Rochonabali
5. Romila Thapar, Time as a Metaphor of History: Early India
6. Sisir Kumar Das, History of Indian Literature: 1911-1956, struggle for freedom : triumph and tragedy
7. Satinath Bhadurir Nirbachita Rochonaboli
8. Sarat Sahitya Samagra, Vol 1&2
9. Tarasankar Bandyopadhyay, Hansuli Banker Upakotha,
10. Tarasankar Bandyopadhyay,Ganadevata.

OR

SEC- 2 : Understanding Heritage

Course Contents:

I. Defining Heritage
Meaning of ‘antiquity’, ‘archaeological site’, ‘tangible heritage’, 'intangible heritage' and ‘art treasure’

II. Evolution of Heritage Legislation and the Institutional Framework:
Conventions and Acts - National and International Heritage related government departments, museums, regulatory bodies etc. Conservation Initiatives

III. Challenges facing Tangible and Intangible Heritage
Development, antiquity smuggling, conflict (to be examined through specific case studies)

V. Challenges facing Tangible and Intangible Heritage:
Development, antiquity smuggling, conflict (to be examined through specific case studies)

VI. Heritage and Travel:
Viewing Heritage Sites - The relationship between cultural heritage, landscape and travel recent trends

Suggested Readings:

1. David Lowenthal, Possessed By The Past: The Heritage Crusade and The Spoils of History, Cambridge, 2010
2. Layton, R. P. Stone and J. Thomas. Destruction and Conservation of Cultural Property. London: Rutledge, 2001
3. Lahiri, N. Marshaling the Past - Ancient India and its Modern Histories. Ranikhet: Permanent Black. 2012, Chapters 4 and 5.
4. S.S. Biswas, Protecting the Cultural Heritage (National Legislations and International Conventions). New Delhi: INTACH, 1999.
5. Acts, Charters and Conventions are available on the UNESCO and ASI websites (www.unesco.org; www.asi.nic.in)
6. Agrawal, O.P., Essentials of Conservation and Museology, Delhi,2006
7. Chainani, S. 2007. Heritage and Environment. Mumbai: Urban Design Research Institute, 2007

SEC- 3 : Colonial Science in India: Institutions and Practices **Credits 02**

Course Contents:

1: Science in Colonial India: Problems and Perspectives
2: Science and Colonial Explorations: Science and Orientalism-Early European Scientists: Surveyors, Botanists, Doctors under the East India Company Service

3: Science in Practice: Botanical Garden, Geological Survey of India, Medical College, and Indian Association for the Cultivation of Science.
4: Science and Indigenous Personality: Prafulla Chandra Ray, Jagadish Bose, MahendraLal Sarkar, Maghnad Saha, C.V. Raman- Emergence of National Science
5: Colonial Science in India: Science and Indian Nationalism-Response and Resistance-Ideas of Mahatma Gandhi and other Indian Nationalists.

Suggested Reading :

1. Deepak Kumar, *Science and the Raj: A Study of British India*, Oxford University Press, New Delhi, 2006
2. David Arnold, *Science, Technology and Medicine in Colonial India*, Cambridge University Press, Cambridge, 2000
3. Uma Das Gupta ed., *Science and Modern India: An Institutional History, c. 1784-1947*, Pearson-Longman, New Delhi, 2011
4. Arun Bandyopadhyay, *Science and Society in India, 1750-2000*, Manohar, New Delhi, 2006
5. Pratik chakrabarti, *Western Science in Modern India; Metropolitan Methods, Colonial Practices*, Permanent Black, New Delhi, 2004
6. S. Irfan Habib,Dhruv Raina and Zaheer Baber, eds., *Social History of Science in Colonial India*, Oxford University Press, New Delhi, 2007
7. Satpal Sanwan, *Science, Technology and Colonisation: An Indian Experience, 1757-1857*, AnamikaPrakashan, New Delhi, 1991
8. J. B. Lourdusamy, *Science and National Consciousness in Bengal: 1870-1930*, Orient Longman, New Delhi, 2004
9. Deepak Kumar, *Science and Empire: Essays in Indian Context, 1700-1947*, Anamika Prakashan, New Delhi, 1991
10. Chittabrata Palit, *Science and Nationalsim in Bengal, 1876-1947*, Institute of Historical Studies, Kolkata, 2004

SEC- 4: Art appreciation an introduction to Indian art **Credits 02**

Course Contents:

I. Prehistoric and proto historic art: Rock art; Harappan arts and crafts

II. Indian art (c. 600 BCE – 600 CE):
World Heritage Site Managers, UNESCO World Heritage Manuals [can be downloaded/ accessed at www.unesco.org]. Notions of art and craft - Canons of Indian paintings - Major developments in stupa, cave, and temple art and architecture Early Indian sculpture: style and iconography - Numismatic art

III. Indian Art (c. 600 CE – 1200 CE) :

Temple forms and their architectural features - Early illustrated manuscripts and mural painting traditions Early medieval sculpture: style and iconography - Indian bronzes or metal icons

IV. Indian art and architecture (c. 1200 CE – 1800 CE):

Sultanate and Mughal architecture - Miniature painting traditions: Mughal, Rajasthani, Pahari Introduction to fort, palace and Haveli architecture

V. Modern and Contemporary Indian art and Architecture:

The Colonial Period - Art movements: Bengal School of Art, Progressive Artists Group, etc. Major artists and their art works - Popular art forms (folk art traditions)

Suggested Readings:

1. Neumayer, Erwin, Lines of Stone: The pre-historic rock-art of India, South Asia Books, 1993
2. Goswamy, B.N., Essence of Indian Art, Asian Art Museum of San Francisco, 1986
3. Huntington, Susan, The Art of Ancient India: Hindu, Buddhist, Jain. Weather Hill, 1985
4. Guha-Thakurta, Tapati, The making of a new modern Indian art: Aesthetics and nationalism in Bengal, 1850-1920, Cambridge University Press, 1992
5. Mitter, Partha, Indian Art, Oxford History of Art series, Oxford
6. University Press, 2001 Dhar, Parul Pandya, ed., 2011, Indian Art History Changing Perspectives, New Delhi: D.K. Print world and National Museum Institute (Introduction).
7. Beach, M.C., The New Cambridge History of India I: 3, Mughal and Rajput Painting, Cambridge University Press, 1992.
8. Ray, Nihar Ranjan, An Approach to Indian Art, Calcutta, 1970

OR

SEC - 4: Understanding Popular Culture **Credits 02**

Course Contents :

I : Introduction:

Defining popular culture and understanding it historically

II : Visual expressions - Folk art, calendar art, photography

III: Performance: Theatre, music, folk tales/songs/swang and Nautanki: Identifying themes, functionality, anxieties

IV: The audio-visual:

Cinema and television:

Indian cinema: Mapping the influence of the national struggle for independence (1930s and 40s); Idealized nationalism (1950s), disillusionment and the anti-establishment mood (1970s and 80s); documentary films Expressions of popular culture in television

V. Fairs, Festivals and Rituals:
Disentangling mythological stories, patronage, regional variations

VI: Popular culture in a globalized world:
The impact of the Internet and audio-visual media

Suggested Readings:

1. Dissanayake, W. and K. M. Gokul Singh, Indian Popular Cinema, Trentham Book, London, 2004
2. John Storey, Cultural Theory and Popular Culture, London, 2001
3. Oberoi, Patricia, Freedom and Destiny: Gender, Family and Popular Culture in India, Delhi, 2009
4. Christopher Princy, Camera Indica: The Social Life of Indian Photographs, Chicago, 1998
5. Pankaj Rag, Dhuno ke Yatri, Rajkamal, New Delhi, 2006 (Hindi)
6. Ramanujan, A.K. Folktales from India A Selection of Oral Tales from Twenty-two Languages (Only Introduction).
7. Ramaswamy, V. 'Women and the 'Domestic' in Tamil Folk Songs' in Kumkum Sangari and Uma Chakravarti, eds., From Myths to Markets: Essays on
8. Gender, Shimla, 1999
9. Singh, Lata (ed.), Theatre in Colonial India: Playhouse of Power, New Delhi, 2009

Generic Elective (GE)
[Interdisciplinary for other department]

GE- 1 : Life and Thought of Rabindranath Tagore **Credits 06**

GE1T : Life and Thought of Rabindranath Tagore

Course Contents :

1. Tagore's experience of growing up – recollections of his childhood in *Jeevan Smriti* – the visit to England as a young man – comparing the East and the West in the context of the larger impact of the westernization in Indian society – *Europe Pravasir Patra.*

2. The poet as a public figure – nationalism and swadeshi – *SwadeshiSamaj* essays: the notion of *atmasakti* – rural reconstruction and *samabaya* – the search for a distinctive Indian history and assimilationist civilization: *Itihasa, Bharat BarsherItihasa* and *Bharat Barsher Itihasher Dhara.*

3. Temporary withdrawal from public life and concentration on Shantiniketan Ashram – winning the Nobel Prize - the experience of the First World War and the growingly critical mood about western nationalism – the distinction between the western and eastern nationalism: Tagore's essays on Nationalism

4. Jalianwalabag massacre, renunciation of Knighthood and the return to the engagement of national politics – Tagore and Gandhi, friendships and differences – the religion of man and Tagore's universalism – travels in Russia and new intellectual engagements – search for India's place in Asia – the vision of Greater India: *Parasye and Java Yatrir Diary.*

5. The Second World War on the poet's predicament – the crisis of civilization – the *Kalantar*essays

Suggested Readings:

1. Sabyasachi Bhattacharya, *Rabindranath Tagore: An Interpretation*
2. ----------, *Talking Back: The Idea of Civilization in the Indian Nationalist Discourse*
3. Prabhat Kumar Mukhopadhyay, *RabindraJeevani O Rabindra Sahitya Prabeshak,* 1-4
4. Krishna Kripalani, *Rabindranath Tagore: A Biography*
5. Krishna Dutta and Andrew Robinson, *Rabindranath Tagore: The Myriad-Minded Man*
6. Sisir Kumar Das (ed.), *The English Writings of Rabindranath Tagore* [relevant writings]
7. *Rabindra Rachanabali*(West Bengal Government and Visva-Bharati) [relevant writings]
8. Prasanta Kumar Pal, *Rabi Jivani*, Vol. 1-9 [relevant sections]
9. Debajyoti Bandyopadhyay, *RabindranatherJatiyatabad- Birodhi Swadeshprem*

OR

GE- 1 : Theories of the Modern State **Credits 06**

GE1T : Theories of the Modern State
Course Contents :

1. The State Definitions and Elementary Concepts – Sovereignty and autonomy – state and the community – the nation state.

2. The Absolutist State: Bodin, Hobbes and Hegel: the state, class and civil society.

3. The Liberal State – the state, individualism and citizenship – the constitutional and the contractual state: John Locke – liberalism and the democratic order: Rousseau and the General Will.

4. The Liberal State – the utilitarian version: Bentham and John Stuart Mill – John Mill and democracy: the tyranny of the majority.

5. The state and class Marxist perspective – the problem of Bonapartism – Max Weber and the bureaucratic order.

6. The ideological basis of the Welfare State and its comparison with Communism – John Rawls and the theory of justice.

Suggested Readings:

1. Perry Anderson, *Lineages of the Absolutist State*
2. H. Dickinson, *Liberty and Property*
3. C. B. Macpherson, *The Political Theory of Possessive Individualism*
4. C. B. Macpherson, *The Life and Times of Liberal Democracy*
5. C. B. Macpherson, *Democratic Theory*
6. Ralph Miliband, *The State in Capitalist Society*
7. Harold Laski, *A Short History of Liberalism*
8. Shirley Robin Letwin, *The Pursuit of Certainty: David Hume, Jeremy Bentham, John Stuart Mill and Beatrice Webb*
9. James Steintrager, *Bentham*
10. R. J. Halliday, *John Stuart Mill*
11. Raymond Plant, *Hegel*
12. Amy Gutmann, *Liberal Equality*

OR

GE-1 : Science and Empire **Credits 06**

GE1T: Science and Empire

Course Contents :

1: History and Development of Science under the Colonial Empire-Perspectives and Recent Historical Debates/ Discourse/ Trajectories.

2: Science and Colonial Empire: Concepts and Contours-Different Colonial Experiments in India-Fundamental Research in Science in India.

3: Colonial Science: Indian and Western Interaction-Role of Institutions in Promoting Scientific Knowledge (Botanical Garden, Medical Colleges, Calcutta School of Tropical Medicine, Bose Institute, Indian Institute of Science etc.)

4: Science and Empire-Indian Responses and Resistance-Ideas of Mahatma Gandhi and Jawaharlal Nehru.

5: Scientific Activities under the Empire-Social, Political and Cultural Implication and Historical Debates.

Suggested Readings:

1. Deepak Kumar, *Science and the Raj: A Study of British India*, Oxford University Press, New Delhi, 2006
2. David Arnold, *Science, Technology and Medicine in Colonial India*, Cambridge University Press, Cambridge, 2000
3. Deepak Kumar, *Science and Empire: Essays in Indian Context, 1700-1947*, Anamika Prakashan, New Delhi, 1991
4. Chittabrata Palit, *Science and Nationalsim in Bengal, 1876-1947*, Institute of Historical Studies, Kolkata, 2004
5. Uma Das Gupta ed., *Science and Modern India: An Institutional History, c. 1784-1947*, Pearson-Longman, New Delhi, 2011
6. Sumit Sarkar, *Modern Times: Environment, Economy and Culture*, Permanent Black, New Delhi, 2014
7. Douglas M. Peers and Nandini Gooptu, *India and the British Empire*, Oxford University Press, New Delhi, 2012
8. Michael Mann, *South Asia's Modern History: Thematic Perspectives*, Routledge, London/New Delhi, 2014

OR

GE-1 : History of Indian Journalism **Credits 06**

GE1T : History of Indian Journalism

Course Contents :

I. History of Indian Journalism: Colonial & Post Colonial Period.
II. Pre-colonial History of written records & modalities of Dissemination
III. Advent of Print media: Imperialist Ideologies
IV. Nationalism & Print Culture: Selective study of prominent newspapers: Tribune, Amrita Bazar Patrika, and Hindustan Times
V. Writing & Reporting Experiences

Suggested Readings:

1. Natrajan. J, History of Indian Journalism, Vol. –ii of Press Commission Report, New Delhi, 1954
2. Natrajan. J, A history of the Press in India, Asian Publishing House, Bombay, 1962
3. Ghosh, Hamendra Prasad, Newspapers in India, University of Calcutta,1952
4. Ananda. Prakash, A History of the Tribune, A Centenary Publication by the Tribune Trust, 1986

GE-2 : Gender & Education in India **Credits 06**

GE2T : Gender & Education in India

Course Contents :

I. Historiographical Trends

a. Pre-colonial historiographical trends in women's education
b. colonial historiographical trends in women's education
c. Post-colonial historiographical trends in women's education

II. Education in Early and Medieval Times

a. Women's Education in Medieval times
b. Regional trends of Women's education in pre-colonial India
c. Instances of women's education, obstacles

III. Colonial Period

a. Socio-religious reforms
b. Role of Christian missionaries in spreading female education, recent debates
c. Indigenous initiatives at women's education

IV. Role of Schools and Colleges in colonial and post-colonial period

a. Girls School and Colleges, development towards co-education
b. Expansion of infrastructural facilities in education
c. Technical and vocational education for women

V. Contours of female literacy since 1950

a. Interrogating literacy for women
b. Government policies and Schemes
c. Disparities in Literacy: Region, Community, Social and Eco-factors

VI. Present Scenario

a. Education as a tool of Empowerment

Suggested Readings:

1. Aparna Basu, Growth of Education and Political Development in India, 1898 –1920
2. Usha Sharma, Women Education in Modern India
3. Ramnath Sharma & Rajender Sharma, History of Education in India, Atlantic Publishers, 1996
4. Aparna Basu & Bharati Ray (ed.), Women's Struggle. A History of the All India Women's Conference 2002

OR

GE- 2 : Visual and Performative Culture in Modern Bengal **Credits 06**

GE2T : Visual and Performative Culture in Modern Bengal

Course Contents :

1. Definition of Visual and Performative Culture.
2. Mapping out entertainment sites: the coming of public entertainment –art, aesthetics, cinema and drama.
3. The theatre culture sites with Jatra culture.
4. Physical culture movement in Bengal . Circus as a form of Physical Culture in Bengal. New space of performing art –the case of Bengali songs and dance.
5. The domain of marginalised and middle-class –modernity, colonial state, distortion and indigenous culture.

Suggested Readings:

1. Tapati GuhaThakurta, *The Making of a New 'Indian'Art: Artists, Aesthetics and Nationalism in Bengal, c. 1850-1920*, Cambridge University Press, New Delhi, 2007
2. ArchanaVerma, *Performance and Culture: Narrative, Image and Enactment in India*, Cambridge Scholars Publishing, New Delhi, 2011
3. GayatriSinha, *Art and Visual Culture, 1857-2007*, Marg Publications, New Delhi, 2009
4. Catherine B. Asher, Cynthia Talbot, *India before Europe*, Cambridge University Press, New York, 2006
5. AmitavaChatterjee ed., *People at Play: Sport, Culture and Nationalism*, SetuPrakashani, Kolkata
6. AmitavaChatterjee, ed., *People at Large: Popular Culture in Modern Bengal*, SetuPrakashani, Kolkata
7. AmitavaChatterjee, *Exhibiting Masculine Identity through Circus in Colonial Bengal*, Studies in People's History, Vol. 2, No. 2, 2015

OR

GE- 2: Some Perspectives on Women's Rights in India **Credits 06**

GE2T: Some Perspectives on Women's Rights in India

Course Contents:

I. Definition of Human Rights

1. Human Rights and Women, a survey of the Charter
2. Interrogating Human Rights vis-à-vis personal laws in India
3. UN Convention and Indian Context

II. Indian Constitution and Women's Rights

1. Fundamental Rights and Women
2. Directive Principles and Women
3. Major legal cases defending women's rights vis-à-vis the Constitution

III. Preventive Acts

Minimum Wage Act 1948, Family Courts Act 1986, PNDT Act 1994, Latest Measures

IV. Issues of Violence against Women and Remedial Measures

1. Domestic Violence Act, Prevention of Sexual Harassment at Workplace
2. Practical application and Problems, Remedial Measures

V. Role of Non-Government Institutions

1. Non-Government Organizations and Human Rights
2. Women and Non-Government Organizations – Participations

VI. Present Status

Issues of enabling and empowering modalities – Debate on uniform civil code

Suggested Readings :

1. Urvashi Butalia & Tanika Sarkar, (ed.), Women & Hindu Rights, New Delhi, Kali for Women, 1996
2. Zoya Hasan (ed.), Forging Identities, Communities & Patriarchies, EPW, December 1995
3. Bina Agarwal, Field of Her Own, New Delhi, Kali for Women,

END

VIDYASAGAR UNIVERSITY

POLITICAL SCIENCE

(Honours & General)

Under Graduate Syllabus

(3 Tier Examination Pattern)

w.e.f. 2014-2015

REVISED

Vidyasagar University

Midnapore 721 102

West Bengal

SYLLABUS
for
Three Year Degree Course
in
POLITICAL SCIENCE
(General & Honours)

HONOURS:

Part I

Paper-I : History of Political Thought
Paper-II : Government and Politics in India

Part II

Paper-III : Political Theory
Paper-IV : Comparative Government and Politics
Paper-V : International Relations and Organization

Part III

Paper-VI : Society, State and Politics
Paper-VII : Public Administration
Paper-VIII : Colonialism and Nationalism in India

GENERAL:

Part I

Paper-I : Political Theory

Part II

Paper-II : Modern Governments
Paper-III : Indian Government

Part-III

Paper-IV : Contemporary Political and Administrative Issues

Note:

I. Each paper carries 100 Marks including 10 marks for internal assessment.
II. Figures at the right-hand margin indicate number of classes to be taken for respective topics.

HONOURS COURSE

PAPER – I : Full Marks – 100
(University Examination: 90 + Internal Assessment by College : 10)

History of Political Thought

Group – A

Western Political Thought

1. Greek Political Thought: main features – Plato: concepts of Justice, Aristotle: Theory of state. 06

2. Medieval Political Thought in Europe: main features. 02

3. Renaissance Thought: main features – contributions of Machiavelli – Political Thought of Reformation: Bodin's contribution to the theory of sovereignty. 08

4. Hobbes: Founder of the science of materialist politics – Lockes founder of liberalism, views on liberty, property and consent – Rousseau: General Will. 10

5. Utilitarianism: Bentham and J.S. Mill. 06

6. Revision of liberalism with the aid of idealist assumptions – Green's theory of state. 03

7. Hegel: Civil Society and State. 03

8. Socialism: Utopian and Scientific – main features. 04

Group – B

Indian Political Thought

1. Kautilya : Background of his political ideas; 06

2. Features of Medieval political thought in India. 06

3. Modern political thought in India: Rammohan Roy's contribution to Indian liberalism. 04

4. Ideas of nationalism: Bankimchandra, Swami Vivekananda and Rabindranath Tagore. 10

5. Ideas of socialism: Jayaprakash Narayan and Jawaharlal Neheru. 08

6. M.N. Roy and Radical Humanism. 03

7. Subhas Chandra Bose: doctrine of Synthesis. 03

8. Mahatma Gandhi: ideas of state and democracy, theory of Trusteeship. 06

9. B.R. Ambedkar: Ideas & Social Justice. 04

Recommended Readings:

- Andrew Heywood, *Political Ideologies : An Introduction* (latest edition)
- R.N. Berki, *Western Political Thought*.
- George H. Sabine, *A History of Political Theory*.
- Amal Kumar Mukhopadhyay, *Western Political Though : From Plato to Marx*.
- V.P. Verma, *Ancient and Medieval Indian Political Thought*.
- V.P. Verma, *Modern Indian Political Thought*.
- V.R. Meheta, *Foundations of Indian Political Thought*.
- Buddhadeva Bhattacharyya, *Evolution of the Political Philosophy of Gandhi*.
- Subrata Mukherjee & Sushila Ramaswami, *A history of Political Thought: Plato to Marx.*
- Raymond Gettel, *History of Political Thought*.
- David Thomson (ed), *Political Ideas*.
- S. Avineri, *The Social and Political Thought of Karl Marx*.
- L. Colletti, *From Rousseau to Lenin: Studies in Ideology Society*.
- C.L. Wayper, *Political Thought*.
- Dipak Kumar Das and Tapan Chattopadhaya, *Varieties of Socialist.*
- David Mclellan, *The Thought of Karl Marx*.
- Thomas Pantham & K.L. Destuch, *Political Thought in Modern India*.
- B.R. Nanda, *Gandhi and His Critics*.

- Tarun Kumar Banerjee & Debesh Roy Chowdhury (eds), *Colonial India : Ideas and Movement.*
- অমলকুমার মুখোপাধ্যায়, *রাষ্ট্রদর্শনের ধারা।*
- অমলকুমার মুখোপাধ্যায়, *পাশ্চাত্য রাষ্ট্রচিন্তার ইতিহাস*, (অনুবাদ : অরন্য রায়চৌধুরী)।
- শোভনলাল দাশগুপ্ত, *মার্কসীয় রাষ্ট্রচিন্তা*, (১ম ও ২য় খন্ড)।
- সত্যব্রত চক্রবর্তী (সম্পাদিত), *ভারতবর্ষ : রাষ্ট্রভাবনা*।
- সৌরেন্দ্রমোহন গঙ্গোপাধ্যায়, *বাঙালীর রাষ্ট্রচিন্তা*, (১ম ও ২য় খন্ড)।
- হিমাংশু ঘোষ (অনুদিত), *রাজনৈতিক তত্ত্বের ইতিহাস (জর্জ এইচ. স্যারাইন)।*
- ভারতী মুখার্জী, *প্রাচীন ভারতবর্ষে রাষ্ট্রনৈতিক চিন্তা*।
- অমৃতাভ বন্দ্যোপাধ্যায়, *পাশ্চাত্য* রাষ্ট্রচিন্তার ইতিহাস।
- সুধাকান্ত দে (অনুদিত), *গণরাজ্য (প্লেটো)।*
- অশোককুমার মুখোপাধ্যায়, গণতান্ত্রিক সাম্রাজ্যবাদ : ফেবীয় সাম্রাজ্যবাদী মত।
- নির্মল কান্তি মজুমদার (অনুদিত), *দি প্রিন্স* (ম্যাকিয়াভেলী)।
- দেবাশীষ চক্রবর্তী, *ভারতীয় রাষ্ট্রচিন্তার ধারা* ।
- অনাদি মহাপাত্র, *রাষ্ট্রদর্শন।*
- তরুণকুমার বন্দ্যোপাধ্যায়, *নেতাজী সুভাষচন্দ্রের রাষ্ট্রদর্শন : একটি রূপরেখার সন্ধানে।*
- নিমাই প্রামাণিক, *আধুনিক ভারতের সামাজিক ও রাজনৈতিক ভাবনা (১ম ও ২য় খন্ড)।*

PAPER – II: Full Marks – 100
(University Examination: 90 + Internal Assessment by College: 10)

Government and Politics in India

Group – A

1. Constitutional evolution in India with special emphasis on the role of Constituent Assembly. 02

2. Philosophy of the Constitution: the Preamble. 02

3. The Fundamental Rights and Duties; Directive Principles *of* State Policy, significance and comparison with Fundamental Rights. 12

4. Nature of Federalism: Union-State relations: Recent trends (with special reference to the Sarkaria Commission and the Venkatchaliah Commission's report). 05

5. Union Executive: President: Powers, position and role (with special reference to coalition government) - Vice-President Prime Minister - Council of Ministers and Cabinet - relationship between the Prime Minister and the President. 10

6. The Union Legislature: Lok Sabha and Rajya Sabha: Organization and functions, Law-making procedure, relationship between the two Houses, Committee System, the Speaker. 08

7. Government in the States: (a) Executive: Governor, Chief Minister and Council of Ministers: position, functions, role and relationship; (b) Legislature: composition and functions. 05

8. The Judiciary: The Supreme Court and the High Court's - composition and functions - judicial activism. 04

9. Constitutional Amendment - Procedure. 02

Group-B

1. Social bases and major cleavages in Indian politics: caste and tribe; politics of reservation; religion - communalism and secularism, Politics and Rationalism. 12

2. Party system: features and trends; coalition politics in India recent trends. 06

3. Political Defection: causes, consequences and remedy. 02

4. Electoral system: Election Commission - composition, function and role of electoral reforms in India. 04

5. Interest Group Politics: role of organized business, trade unions, peasant organizations. 10

6. State Politics in India - patterns and trends: State Politics in West Bengal. 06

7. New Social Movements in India: Women's Movements, Human Rights Movements, Environmental Movements. 07

Recommended Readings:

- *The Constitution of India* (Govt. of India Publication - Latest Edition)
- M. V Pylee, *India's Constitution.*
- D. D. Basu, *Introduction to the Constitution of India.*
- Ramesh Thakur, *Government and Politics of India.*
- S. Narang, *Indian Government and Politics.*
- Anil Kumar Jana (ed), *Indian Politics at the Crossroads.*
- Moin Shakir, *State and Politics in Contemporary India.*
- Rakhahari Chatterjee (ed), *Politics India: The State-Society Interface.*
- Rakhahari Chatterjee, *Politics in West Bengal.*
- Bharati Mukherji, *Regionalism in Indian perspective.*
- Asok Mukhopadhyay, *Panchayat Administration in West Bengal.*
- Paul Brass, *The Politics of India since Independence.*

- R. Hardgrave and S. Kochanek, *India: Government and Politics in a Developing Nation.*
- S. L. Sikri, *Indian Government and Politics.*
- L. Fadia, *State Politics in India* (2 Volumes).
- Mohit Bhattacharya & Amal Roy, *Indian Government and Politics.*
- K. K. Ghai, *Indian Government and Politics.*
- S. C. Kashyap (ed), *Perspectives on the Constitution*
- Partha Chatterjee (ed), *State and Politics in India.*
- Sobhanlal Datta Gupta, *India: Politics and Society*: *Today and Tomorrow.*
- T.V. Sathyamurthy (ed), *Social Change and Political Discourse in India: Structures of Powers, Movements of Resistance (4 vols.)*
- M.S.A. Rao*, Social Movements in India.*
- Ghanashyam Shah*, Social Movements and the State.*
- Manoranjan Mohant et al (eds), *People's Rights, Social Movement and the State in Third World.*
- অনাদিকুমার মহাপাত্র, *ভারতের শাসনব্যবস্থা ও রাজনীতি ।*
- নির্মলকান্তি ঘোষ, *ভারতের শাসনব্যবস্থা ও রাজনীতি।*
- নিমাই প্রামাণিক, *ভারতীয় শাসন ব্যবস্থা ও রাজনীতির রূপরেখা।*
- সুজিত সেন (সম্পাদিত), *সাম্প্রদায়িকতা : সমস্যা ও উত্তরণ।*
- সুজিত সেন (সম্পাদিত), *জাতপাত ও জাতি : ভারতীয় প্রেক্ষাপট।*
- ইয়াসিন খান (সম্পা.), *দলিত ও জাতপাত কথা*।
- ইয়াসিন খান, *সাম্প্রদায়িকতা ও ধর্ম নিরপেক্ষতা: রাজনৈতিক ডিসকোর্স।*
- ইয়াসিন খান (সম্পা.), *নারী: সমসাময়িক চোখে*।

PAPER - III : Full Marks – 100
(University Examination : 90 + Internal Assessment by College: 10)

Political Theory

Group-A

1. Nature of politics - approaches to the study of politics: Traditional, Behavioural and Post-behavioural. 06

2. Theories of the state: idealist, individualist, socialist. 04
3. State, law and legal imperatives: the concept of sovereignty: monistic and pluralistic; crises of state sovereignty. 08

4. Political Power and Political Authority. 03

5. Relation between the state and the individual: liberty, equality, rights and justice; concepts and their inter-relations. 10

6. Nationalism and internationalism. 03

7. Political obligation and the right of resistance (Green and Barker's views). 05

8. Theories of Democracy: Protective, Developmental and Participatory. 05

9. Empirical Political Theories: Systems Analysis, Structural - Functionalism and Communications theory. 06

Group – B

1. Marxian approach to the study of politics - dialectical and historical materialism – relationship between base and super structure. 12

2. Marx's analysis of the rise and development of capitalism, contradictions of capitalism. 06

3. Theory of class and class struggle. 05

4. Marxist theory of state: Marx, Engels and Lenin. 08

5. Marx and the concept of freedom and democracy. 06

6. Marxian theory of revolution - contributions of Lenin and Mao. 05

7. Some major debates in Marxism: Lenin-Rosa debate on Party; Stalin – Trotsky, debate on Socialism in one Country. 06

8. Objectives of socialist society. 02

Recommended Readings:

- Amal Roy and Mohit Bhattacharya, *Political Theory: Ideas and Institutions* (Latest edition).
- Alan R. Ball, *Modem Politics and Government* (Latest edition).
- Ernest Barker, *Principles of Social and Political Theory.*
- C.E.M. Joad, *Introduction to Modem Political Theory.*
- Harold J. Laski, *An Introduction to Politics.*
- Harold J. Laski, *A Grammar of Politics.*
- O. P. Gauba, *An Introduction to Political Theory.* (Latest Edition).
- K. Marx and F. Engels, *The Communist Manifesto.*
- V. I. Lerun, *The State and Revolution.*
- S. Avineri, *The Social and Political Thought of Karl Marx.*
- David Mclellan, *Thought of Karl Marx.*
- Maurice Cornforth, *Dialectical Materialism.*
- Andrew Heywood, *Key Concepts in Politics.*
- Andrew Heywood, *Political Ideologies: An Introduction.*
- D. Rjazonov (ed), *The Communist Manifesto.*
- J. Femia, *Marxism and Democracy.*
- H. Apthekar, *Nature of Democracy, Freedom and Revolution.*
- Manoranjan Mohanty, *The Political Philosophy of Mao Tse-Tung.*
- S. P. Verma, *Modem Political Theory.*

- Ralph Miliband, *Marxism and Politics.*
- S. Ramaswami, *Political Theory: Ideas and Concepts*.
- শোভনলাল দত্তগুপ্ত, *মার্কসীয় রাষ্ট্রচিন্তা (নূতন সংস্করণ, ২০০৫)।*
- পরিমল চন্দ্র ঘোষ, *রাষ্ট্রবিজ্ঞানের মূলসূত্র।*
- অশোককুমার মুখোপাধ্যায়, *গণতান্ত্রিক সমাজবাদ, : ফেবীয় সমাজবাদী মত।*
- ভোলানাথ বন্দ্যোপাধ্যায় (অনুদিত), *দ্বন্দ্বমূলক বস্তুবাদ (মরিস কর্ণফোর্থ)।*
- দীপক কুমার দাশ (সম্পাদিত), *রাজনীতির তত্ত্বকথা।*
- নিমাই প্রামাণিক, *আধুনিক রাষ্ট্রতত্ত্বের রূপরেখা।*
- সুদর্শন রায়চৌধুরী (অনুদিত), *রাষ্ট্র (লেনিন) স্বাধীনতা।*
- সুদর্শন রায়চৌধুরী (অনুদিত), *গণতন্ত্র ও বিপ্লব (হাবার্ট আপথেকার)।*
- অমলেন্দু মুখোপাধ্যায় (অনুদিত), *সামাজিক ও রাজনৈতিক নীতিসমূহ (আর্নেষ্ট বার্কার)।*
- অনাদি কুমার মহাপাত্র, *আধুনিক রাষ্ট্রবিজ্ঞান।*

PAPER - IV: Full Marks: 100
(University Examination: 90 + Internal Assessment by College: 10)

Comparative Governments and Politics

Group – A

1. Comparative Government - Distinction between comparative government and comparative politics – significance of studying comparative government and politics. 06

2. Nature of Liberal (UK, USA and Switzerland) and Socialist (PRC) political systems - their distinguishing features with special reference to Convention; Rule of Law, Parliamentary Sovereignty (UK); Separation of Powers; Checks and Balances; Judicial Review (USA); Referendum and Initiative; Landsgemend (Switzerland) : General Principles; Democratic Centralism; role of the Communist Party and Central Military Commission (PRC). 20

3. Federal and Unitary systems: Federalism in USA and Switzerland: nature of unitarism – UK and PRC. 06

4. Parliamentary and Presidential systems: (a) comparative study of British and American practices. (b) American and Swiss presidential system; (c) Unique position of PRC. 06

5. Party system: Comparative study of UK, USA, Switzerland and PRC. 08

6. Interest groups: their role and performance in UK and USA. 04

Group – B

1. Legislature in U.K., U.S.A., Switzerland and P.R.C. - composition and functions of the Legislative Chambers – Role of Second Chamber in U.K., U.S.A. and

Switzerland Committee System in U.K. and U.S.A. - role of Speakers in Parliamentary an Presidential systems.

2. Executive in U.K., U.S.A., Switzerland and PRC.
    a) UK. : Crown, Prime Minister and Cabinet.
    b) US.A. : President and Cabinet.
    c) Switzerland: Federal Council: composition, powers and fictions.
    d) P.R.C. : State Council.

3. Comparative study of (i) British Crown and American Presidency; (ii) British Prime Minister and American President; (iii) British and American Cabinet systems; (iv) U.S. President and Swiss; Federal Council.

4. Relations between Executive and Legislature in U.K., U.S.A., Switzerland and P.R.C.

5. Judiciary in U.K., U.S.A., Switzerland and P.R.C (with special reference to the Procuratorate).

6. Rights and duties of the citizens of U.K., U.S.A., Switzerland and P.R.C. : a comparative study.

Recommended Readings

- G. Roberts, *An Introduction to Comparative Politics.*
- Rakhahari Chatterjee, *Comparative Politics.*
- Rakhahari Chatterjee, *Introduction to Comparative Political Analysis.*
- Harvey and S. Bather, *The British Constitution.*
- Carr, Murphy and Bernstein, *The American Democracy*
- Wilson, *American Government.*
- S. E. Finer, *Comparative Government.*
- J. Blondel, *An Introduction to Comparative Government.*
- H. Birch, *British System of Government.*
- S. K. Dailey (ed), *American Politics and Government.*

- G. Novack, *Lessons on American History.*
- *The Constitution of Peoples Republic of China* (1982)
- D. J. Waller, *Government and Politics of Communist China.*
- W. E. Rappard, *The Government of Switzerland.*
- C. Kapur, *Select Constitutions* (latest edition)
- O. P. Goyal, *Comparative Governments.*
- J. C. Johari, *Modern Political Systems.*
- K. K. Ghai, *Modem Governments.*
- স্নেহময় চাকলাদার, *চীন গণ সাধারণতন্ত্রের রাজনীতি ও সংবিধান।*
- অনাদিকুমার মহাপাত্র, *তুলনামূলক রাজনীতি ও নির্বাচিত শাসন ব্যবস্থা ।*
- নির্মলকান্তি ঘোষ, *নির্বাচিত তুলনামূলক শাসনব্যবস্থা।*
- নিমাই প্রামাণিক, *নির্বাচিত শাসন ব্যবস্থা ও রাজনীতির রূপরেখা।*

PART-II

Paper-V: Full Marks - 100
(University Examination: 90+Internal Assessment by College: 10)

International Relations

Group - A

1. Nature and scope of International Relations: a brief outline of its evolution.

2. Theories of International Relations: (a) Realism; (b) Liberalism; (c) World Systems theory.

3. Basic concepts: (a) Balance of Power; (b) Unipolarity, Bipolarity and Multipolarity (c) Neo-Colonialism; (d) Globalization. (e) Regionalism.

4. Foreign Policy: Concept and techniques: Diplomacy, propaganda, military.

5. Issues in international relations: Terrorism; Environment; Human Rights.

6. Actors in international Relations: (a) State as an actor; evolution of the nation state system - crisis of the nation state; (b) Non-state actors and transnational actors in world politics.

Group - B

7. Cold war and its evolution: an outline; understanding the post-cold war world - an overview; Relevance of NAM.

8. Regional organizations: SAARC; ASEAN; EU.

9. India's foreign policy: Basic principles, and objectives; evolution.

10. India's bilateral relations with USA, China, Pakistan and Bangladesh.

11. Foreign policies of USA, Russia and China.

12. UNO: Its genesis, purposes and principles; composition, functions and role of different organs.

Recommended Readings:

- C.O. Lerche & A. A. Said, *Concepts of International Politics.*
- Robert Jackson and George Sorenson, *Introduction to International Relations.*
- John Baylis and Steve Smith, *The Globalization of World Politics: An Introduction to International Relations.*
- Evan Luard, *The United Nations: How it works and What it Does* (Second Edition, revised by Dereck Heater, 1994).
- Peter Calvocoressi, *World Politics Since* 1945 (Latest Edition)
- Raj Kumar Kothari, Emerging India as a Global Player: Growing Ties any Challenges.
- Raj Kumar Kothari, From Communism to Democratic Communism.
- Raj Kumar Kothari (eds.), India's Foreign Policy in the New Millennium.
- Raj Kumar Kothari (et al), US Policy towards China, India and Japan.
- Hans Morgentheu, *Politics Among Nations.*
- Joseph Frankel, *International Relations in a Changing World.*
- Joseph Frankel, *The Making of Foreign Policy.*
- Radharaman Chakraborty, *Theory and Practice of International Politics.*
- Radharaman Chakraborty, *UNO: A Study in Essentials.*
- Jayantanuja Bandopadhaya, *The Making of India s Foreign Policy.*
- VP Dutt, *India s Foreign Policy.*
- Rumki Basu, *The United Nations.*
- Sakti Mukherjee & Indrani Mukherjee, *International Relations.*
- Adam Roberts & B. Kingsbury (eds), *United Nations, Divided World.*
- K. L. Holsti, *International Politics: A Framework for Analysis.*
- রাধারমণ চক্রবর্তী, *আর্ন্তজাতিক সম্পর্ক।*
- নির্মলকান্তি ঘোষ, *আর্ন্তজাতিক সম্পর্ক।*
- নির্মলকান্তি ঘোষ, *আর্ন্তজাতিক সংগঠন ও জাতিপুঞ্জ।*
- শক্তি মুখার্জী ও ইন্দ্রানী মুখার্জী, *আর্ন্তজাতিক সম্পর্ক।*
- অনাদি কুমার মহাপাত্র, *আর্ন্তজাতিক সংগঠনের রূপরেখা।*
- ইয়াসিন খান (সম্পা.), *মানব অধিকার: নানা দিক*।

PAPER – VI : FULL MARKS – 100
(University Examination: 90 + Internal Assessment by College: 10)

Society, State and Politics

Group – A

1. The study of society and human relationship – social basis of politics – State Civil-Society Relation. 07
2. Nationalism – Nationalism in the West and the Third World – Ethnicity and Nationalism. 06
3. Social inequality and politics: Caste, Class and Power Politics, Gender- Question and Women's Empowerment.
4. Identity Politics : Basic Components.
5. Religion, Perspectives and Politics: religion in society: Marxist and Non-Marxist – Secular and the theocratic Politics.
6. Social and Political Definition and Types: determinants and social changes, evolution and revolution as forms of social change. Trends in Political Change.

Group – B

7. Classification and types of political systems.
8. Political culture and political socialization.
9. Political Process: Political Participation, Political Mobilization and Political Communication.
10. Groups in Politics – Interest Groups, Pressure Groups.
11. Political Parties: Definition, Functions and Types.
12. Modernization and Political Development.

Recommended Readings

- MacIver and Page, *Society*.
- Amal Kumar Mukhopadhay, *Political Sociology*.
- Tom Bottomore, *Political Sociology*.
- Astraf and Sharma, *Political Sociology*.
- Rush and Althrof, *Political Sociology*.

- Satyabrata Chakraborty, *Political Sociology*.
- Guy Rocher, *Introducing Sociology*.
- Asfah (ed), *Women and Politics in Third World*.
- Evans, *Feminism and Political Sociology*.
- M. Bystdzienski (ed), *Women Transforming Politics: Worldwide Strategies for Empowerment*.
- Bendix and S.M. Lipset (eds), *Class, Status and Power: Factions in American Society*.
- অনাদিকুমার মহাপাত্র, *রাজনীতিক সমাজতত্ত্ব।*
- কল্যানী বন্দ্যোপাধ্যায়, *নারীর ক্ষমতায়ণ।*
- হিমাংশু ঘোষ (অনুদিত), *গিডেনস সমাজতত্ত্ব।*
- ইয়াসিন খান, *নারী: সমসাময়িক চোখে*।

BA (Hons.) Part – III
Paper VII

Public Administration

Group – A
[Theories and Concepts]

1. Public Administration: meaning, nature, scope, public vs. Private Administration.

2. Evolution of discipline – Comparative Public Administration and Development Administration – Present Trends.

3. Concepts and Principles: Hierarchy, Unity and Command, Span of Control, Supervision, Authority and Responsibility, Leadership, Delegation and Decentralization.

4. Structure of Organization: Line and Staff. Chief Executives – types and functions, Auxiliaries, Departments, Boards and Commissions.

5. Administrative Processes: Decision making, Co-ordination, Control, Communication and Accountability.

6. People's participation in Administration: Concepts, Types and Constraints.

7. Bureaucratic theory of Organization of Max Weber.
8. Administration is Socialist Countries: Feminist principles of Socialist Management, Chinese administrative system.

Group – B
[Indian Administration]

1. Evolution of Indian Administration: Legacies of the British rule.

2. Organization of the Central Government: Cabinet Secretariat, Central Secretariat, PMO.

3. Organization of the State Governments: State Secretariat and the Chief Secretary, the Divisional Commissioner.

4. Financial Administration: Concept of Budget and its implications.

5. Public Personal Administration in India: Evolution, Classification and recruitment of Civil Services.

6. Local Self-Governance: Panchayats and Municipalities – Organization and major functions (with particular reference to West Bengal).

7. Planning and Plan Administration: Central Sate and District – National Development Council, Planning Commission, District Planning Committees.

8. Issues in Administration: Politicians-administrator relationship, Generalist-Specialist debate, Administrative reforms and Redressal of Citizen's Governances – Lokpal and Lokayuts, Mechanism for Consumer protection, Corruption in Administration.

Recommended Readings:

- Peter Self, *Administrative Theories and Politics*.
- Mohit Bhattacharya, *New Horizons of Public Administration*.
- S.P. Naidu, *Public Administration: Concepts and Theories.*
- Hoshain Singh and Pradeep Sachdev, *Public Administration – Theory and Practice.*
- Ashok Mukhopadhyay, *Panchayat Administration in West Bengal*.
- Mohit Bhattacharya, *Indian Administration.*
- Hoshain Singh and Pankaj Singh*, Indian Administration*.
- Anil Kumar Jana, *Administering District Plans in India*.
- Marina R. Pinto, *Metropolitan City Governance in India*.
- Bijoyini Mohanty*, Glimpses of Local Governance*.
- Rajesh k. Jha, *Public Personnel Administration*.
- রুমকি বসু ও পঞ্চানন চট্টোপাধ্যায়, *জন প্রশাসন।*
- *Indian Journal of Public Administration.*

PART – III
PAPER – VIII: FULL MARKS – 100
(University Examination: 90 + Internal Assessment by College: 10)
Colonialism and Nationalism in India

Group – A

1. Colonialism and Nationalism: Conceptual Clarity – a) Basic tenets of Colonialism b) Approaches to the Study of Nationalism in India – Liberal and Marxist.

2. Foundations of Colonial Rule in India: Legal Foundations of the Colonial State; major Constitutional developments.

3. Major Social and Religious movements in India: Brahmo Samaj, Arya Samaj and Aligarh Movement.

4. The early phase of anti-Colonial struggle: Great Revolt in 1857, Tribal and Peasant Uprisings.

5. Awakening of Indian Nationalism and Birth of Indian National Congress in different ideological streams in the National Movement: Moderates and Extremists, revolutionary radicals; Formation of the Muslim League.

6. Partition of Bengal and Swadeshi Movement; Home Rule Movement.

Group – B

7. Gandhi and Mass Mobilization: Khilafat and Non-cooperation; Civil Disobedience; Quit India Movement.

8. Socialist Alternatives: Congress Socialists & Communists.

9. Social and Political Movements: (a) The Women's participation in national movement and its impact. (b) The Dalit Movements. (c) Peasant and Working Class movements.

10. Communalism in Indian Politics: Hindu Nationalism and Muslim Responses; The Secular Trends.

11. Azad Hind Fauz, INA Trial and RIN uprising.

12. Partition and Independence: the two-Nation theory, partition and the transfer of power.

Recommended Readings:

- R. Young, *Post colonialism: A Very short introduction.*
- A.R. Desai, *Social Background of Indian Nationalism.*
- Sibani Kinkor Chaube, *Colonialism, Freedom Struggle and Nationalism in India.*
- Nimai Sadhan Bose, *Indian National Movement: An Outline.*
- R. C. Majumdar et. al, *An Advanced History of India.*
- A.V. Krishnamurthy, *Freedom Movement in India: 1858-1947.*
- S. Bahdopadhyay, *From Plassey to Partition: A History of Modern India.*
- Nimai Sadhan Bose, *Indian Awakening and Bengal.*
- Santimoy Roy, *Response of Armed Forces Freedom Struggle of India.*
- Asim Kumar Chowdhury, *Socialist Movement in India.*
- Anil Kumar Jana, *Quit India Movement in Bengal.*
- S. Sarkar, *Modern, India* (1885-1847).
- B. Chandra, *Essays on Colonialism.*
- Raj Kumar (ed.), *Development of Nationalism in India.*
- Suratha Kumar Malik: Dalit Movement in Odisha.
- Suratha Kuam Malik: Dalit Identity: The hermeneutical understanding.
- সুমিত সরকার, *আধুনিক ভারত: ১৮৮৫-১৯৪৭।*
- বিপন চন্দ্র ও অন্যান্য, *ভারতের স্বাধীনতা সংগ্রাম* (অনুবাদ)।
- এ. আর. দেশাই, *ভারতীয় জাতীয়তাবাদের সামাজিক পটভূমি* (অনুবাদ)।
- এ. আর. দেশাই, *ভারতীয় জাতীয়তাবাদের সাম্প্রতিক প্রবণতা* (অনুবাদ)।
- নরেন্দ্রনাথ ভট্টচার্য, *ভারতের স্বাধীনতা সংগ্রামের ইতিহাস*।
- নিখিল সুর, *ভারতীয় জাতীয়তাবাদী আন্দোলনের পটভূমি*।
- বিকাশ চক্রবর্তী, *ভারতের স্বাধীনতা সংগ্রাম*।
- শৈলেন্দ্রনাথ সোম, *ভারতের স্বাধীনতা আন্দোলনের ইতিহাস*।
- বিপানচন্দ্র প্রমুখ, *স্বাধীনতা সংগ্রাম* (অনুবাদ)।
- বদরুদ্দীন উমর, *ভারতীয় জাতীয় আন্দোলন*।
- অমলেশ ত্রিপাঠী, ভা*রতের মুক্তি সংগ্রামে চরমপন্থী পর্ব*।

- অশোক কুমার মুখোপাধ্যায়, *স্বাধীনতা সংগ্রামে নিয়মতান্ত্রিক আপসমুখী আন্দোলন, বিপনন, চরিত্র ও তাৎপর্য*।
- অমলেশ ত্রিপাঠী, *স্বাধীনতা সংগ্রামে ভারতের জাতীয় কংগ্রেস (১৮৮৫-১৯৪৭)*।
- সুপ্রকাশ রায়, *ভারতের বৈপ্লবিক সংগ্রামের ইতিহাস*।
- বিপান চন্দ্, *ভারতের জাতীয় আন্দোলন: দীর্ঘমেয়াদী গতিসূত্র*।
- তারাপদ লাহিড়ী, *ভারতের স্বাধীনতা সংগ্রাম ও সাম্প্রদায়িক রাজনীতি*।
- শৈলেশকুমার বন্দ্যোপাধ্যায়, *ভারতভাগ ও ধর্মনিরপক্ষতা*।
- নরহরি কবিরাজ (সম্পা), *অসমাপ্ত বিপ্লব অপূর্ণ আকাঙ্খা: ভারতের স্বাধীনতা সংগ্রামের ইতিহাস*।
- সুকোমল সেন, *ভারতের শ্রমিক আন্দোলনের ইতিহাস: ১৮৩০-২০০০ ।*
- ইয়াসিন খান (সম্পা.), *নারী: সমসাময়িক চোখে*।
- ইয়াসিন খান (সম্পা.), *দলিত ও জাতপাত কথা*।

GENERAL COURSE

Part – I
PAPER – I : Full Marks – 100
(University Examination : 90 + Internal Assessment by College : 10)

Political Theory

1. The discipline of Political Science – Politics and Political Science; Nature and scope; Approaches to study of Politics: traditional, contemporary and Marxist. 20
2. The theories of State: Idealist, Liberal and the Marxist view. 12
3. Basic Concepts: Democracy and Dictatorship; Nationalism and Internationalism; Imperialism and Neo-Colonialism. 12
4. The State as sovereign: the Austinian theory, the pluralist viewpoint; sovereignty and international order. 08
5. Law: Municipal and International – meaning, nature and their differences. 06
6. The Rights: definition, nature and types. 08
7. Liberty and Equality: nature, meaning and relationships. 08
8. Concept of Justice. 05

Recommended Readings:

- Amal Ray and Mohit Bhattacharya, *Political Theory: Ideas and Institutions*.
- Andrew Heywood, *Key Concepts in Politics*.
- O.P. Gauba, *An Introduction to Political Theory*.
- D.C. Bhattacharya, *Political Theory*.
- S.P. Verma, *Modern Political Theory*.
- J.C. Johari, *Political Theory*.
- S. Ramaswami, *Political Theory: Ideas and Concepts*.
- Rumki Basu, *The United Nations*.
- Radharaman Chakraborty, *The United Nations in its Essentials*.
- নিমাই প্রামাণিক, *আধুনিক রাষ্ট্রতত্ত্বের রূপরেখা*।
- অনাদি মহাপাত্র, *রাষ্ট্রবিজ্ঞান*।
- হিমাংশু ঘোষ, *রাষ্ট্রবিজ্ঞান* ।
- রুমকি বসু ও অঞ্জনা ঘোষ, *সম্মিলিত জাতিপুঞ্জ*

Part – II
PAPER – II: Full Marks – 100
(University Examination : 90 + Internal Assessment by College : 10)

Modern Governments

1. U.K.

a) Constitution : sources and salient features 03
b) The Crown : power, position and role. 03
c) The Cabinet: composition and functions; powers and position of the Prime Minister; the Cabinet dictatorship. 08
d) Parliament : composition and functions; the House of Lords and the House of Commons; Speaker; Committee System; Role of Opposition; Relation between the two Houses. 12
e) Party System. 02

2. U.S.A.

a) Basic features of the constitution 03
b) U.S. Federalism : changing nature 04
c) The Bill of Rights 02
d) Executive : President : election, power and position; U.S. Cabinet. 05
e) Legislature : U.S. Congress; Powers and functions of the Senate and the House of Representatives – relationship between the two Houses. 06
f) Judiciary : functions and role. 03
g) Party System. 02

3. Switzerland

a) Salient features of the constitution. 03
b) Direct Democracy in Switzerland : devices. 04
c) Swiss Federal Council : composition, functions and powers. 03
d) Federalism : the basic features and present trends. 03
e) Swiss Federal Assembly : composition, functions and powers. 03
f) Federal Tribunal : organization and jurisdiction. 02

4. China

a) Constitutional Developments in China : a brief outline. 03
b) Rights and Duties of Chinese citizens. 02
c) National Government :
   i) Legislature, National People's Congress, Standing Committee;
   ii) Executive : President, Premiere State Council;
   iii) Judiciary – Peopless Procuratorate. 08

d) Local Peoples' Congress and Local People's Government. 02
e) Communist Party: structure, functions and role. 02

Recommended Readings:

- Harvey and Bather, *The British Constitution*.
- Carr, Murphy and Bernstein, *The American Democracy*.
- D. J. Waller, *Government and Politics of Communist China*.
- O.P. Goyal, *Comparative Governments*.
- *The Constitution of Peoples' Republic of China (1982).*
- W.E. Rappard, *The Government of Switzerland.*
- A.C. Kapur, *Select Constitutions* (Current Edition).
- J.C. Johari, *Major Political Systems*.
- D.C. Bhattacharya, *Modern Political Constitutions*.
- D. Deol, *Comparative Government and Politics*.
- সত্যসাধন চক্রবর্তী ও নির্মলকান্তি ঘোষ, *তুলনামূলক আধুনিক শাসনব্যবস্থা রাজনীতি।*
- নিমাই প্রামাণিক, *নির্বাচিত শাসন ব্যবস্থা ও রাজনীতির রূপরেখা।*
- অনাদিকুমার মহাপাত্র, *নির্বাচিত রাজনীতি ব্যবস্থা* ।
- স্নেহময় চাকলাদার, *চীন গণ সাধারণতন্ত্রের রাজনীতি ও রূপরেখা।*

PAPER – III : Full Marks – 100
(University Examination : 90 + Internal Assessment by College : 10)

Indian Government

1. Framing of the Constitution of India: composition and role of the Constitution Assembly. 05
2. The Preamble and its significance 03
3. Fundamental Rights and Duties of the Citizens. 15
4. Directive Principles of State Policy. 04
5. Nature of Indian Federalism – Centre-State Relations: Recent Trends. 07
6. Union Executive: President, Vice-President, Prime Minister and Council of Ministers. 12
7. Union Legislature: Composition and functions, Law making procedures, Committee System, Speaker. 12
8. Government in the States: Governors, Chief Minster and Council of Ministers – State Legislature: compositions and functions. 10
9. Judiciary: Supreme Court and High Courts: composition, jurisdiction and role. 08
10. Official Language: Constitutional provisions. 03
11. Election Commission: composition and functions – electoral Reforms in India. 05
12. Amendment Procedure. 04
13. Provisions regarding Scheduled Castes, Scheduled Tribes and Other Backward Classes. 06
14. Party System in India: features and trends.

Recommended Readings:

- *The Constitution of India* (Government of India Publication – Latest Edition)
- M.V. Pylee, *India's Constitution*.
- Subhas Kashyap, *Our Constitution*.
- S.L. Sikri, *Indian Government and Politics*.
- D. Basu, *Introduction to the Constitution of India*.
- J.C. Johari, *Indian Government and Politics*.
- Sakti Mukherjee and Indrani Mukherjee, *The Constitution of India*.
- নিমাই প্রামাণিক, *ভারতীয় শাসন ব্যবস্থা ও রাজনীতির রূপরেখা।*
- অনাদিকুমার মহাপাত্র, *ভারতের শাসনব্যবস্থা ও রাজনীতি পরিচয়।*
- নির্মল ভট্টাচার্য ও অশোককুমার মুখোপাধ্যায়, *ভারতের শাসনব্যবস্থা ও রাজনীতি ।*
- হিমাংশু ঘোষ, *ভারতের শাসনব্যবস্থা ও রাজনীতি ।*

PART – III
PAPER – IV : Full Marks – 100

(University Examination : 90 + Internal Assessment by College : 10)

Contemporary India : Political and Administrative Issues.

1. Secularism and Communalism, Caste and Politics, Women's Participation in Politics, Regional Movements : Nature and types; Globalization and its impacts. 20
2. Organization of the Government of India: PMO, Cabinet Secretary and Central Secretariat; Civil Service: Recruitment, training and accountability. 10
3. Legislative Procedure and Process : Presidents' Address, Questions, Calling Attention, Adjournments, No-Confidence Motion, Cut-Motions, Mention (Reference to be made to the procedures followed in West Bengal Legislative Assembly) 15
4. Issues in Contemporary Indian Society: Judicial Activism, Human Rights, National and State Human Rights Commission, Public Interest Litigations, Corruption and Citizen's Charter. 20

5. Local self-government: Rural and Urban – Panchayats, Municipals and Municipal Corporations: Structure, Composition and Functions (with special reference to West Bengal). 20
6. Rural Development Programmes: Integrated Rural Development – Concept and Approaches; Decentralised Planning: Rationality, Methodology and Implementation. (References to be made to the on-going poverty alleviation programmes in West Bengal) 15

Recommended Readings:

- Anil Kumar Jana, *Administering District Plans in India: Issues, Constraints and Choice.*
- Nandadulal Bhakat, *Self-Help Groups for Women*.
- Sandeep Joshi, *Panchayat Raj and Alleviation*.
- Pradeep Sachdeva, *Urban Local Government and Administration in India*.

- Marina P. Pinto, *Metropolitan City Governance in India*.
- Moitree Bhattacharya*, Panchayati Raj in West Bengal*.
- *Rules of Procedure and Conduct of Business in Lok Sabha (GOI).*
- *Rules of Procedure and Conduct of Business in the Council States (GOI).*
- C.P. Bhambhri, *Political Process in India*.
- R.B. Jain, *Public Administration in India*.
- J.C. Johari, *Indian Government and politics*.
- J.C. Johari, *Indian Political System*.
- A.S. Narang, *Indian Government and Politics*.
- Ramesh Thakur, *Government and Politics in India*.
- Moin Shakir, *State and Politics in Contemporary India*.
- Paul Brass, *The Politics of India Since Independence*.
- Bipan Chandra, *Communalism in Modern India*.
- Radharaman Chakraborty, *The United Nations in its Essentials*.
- Anil Kumar Jana (ed), *Indian Politics at the Crossroads*.
- D.C. Gupta, *Indian Government and Politics*.
- Amiya Kumar Chaudhuri, *Legislative Control on Administration*.
- Sushila Kaushik (ed), *Women's Participation in Politics*.
- Sobhanlal Dattagupta (ed), *India: Politics and Society: Today and Tomorrow.*
- S.C. Deogaonkar, *Parliamentary System in India*.
- S.R. Maheswari*, Local Government* (Revised Edition)
- Rakesh Hooja and P.C. Mathur (eds), *District and Decentralized Planning*.
- *West Bengal District Planning Committees Act, 1994*.
- *West Bengal District Planning Committee Rule,. 1994*.
- Datta and Bandyapadhyay, *Planning from Below.*
- *The Constitution Amendment Acts (73rd and 74th) 1992*.
- Satyen Maitra, *Preparation and Evaluation of Learning Materials for the Neo-literates.*
- Mohit Bhattacharya and Pravat Datta, *Governing Rural India.*
- প্রভাত দত্ত, স্থানীয় স্বায়ত্ত্বশাসন উন্নয়ণ।
- নির্মল চন্দ্র ভট্টাচার্য ও অশোককুমার মুখোপাধ্যায়, *ভারতের শাসনব্যবস্থা ও রাজনীতি ।*
- অনাদিকুমার মহাপাত্র, *ভারতের রাজনীতিক ব্যবস্থা : প্রকৃতি ও প্রয়োগ।*
- শাশ্বতী ঘোষ*, সমতার দিকে আন্দোলনের নারী।*
- কল্যানী বন্দ্যোপাধ্যায়*, রাজনীতি ও নারী শক্তি।*
- নিমাই প্রামাণিক, *সামাজিক ও রাজনৈতিক ধারণা ও বিচার্য বিষয়সমূহের রূপরেখা।*

- ইয়াসিন খান, *সাম্প্রদায়িকতা ও ধর্ম নিরপেক্ষতা: রাজনৈতিক ডিসকোর্স।*
- ইয়াসিন খান (সম্পা.), *নারী: সমসাময়িক চোখে*।
- ইয়াসিন খান (সম্পা.), *দলিত ও জাতপাত কথা*।

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year B. A (HONOURS)
in
Political Science

Under Choice Based Credit System (CBCS)
w.e.f 2018-2019

VIDYASAGAR UNIVERSITY

B A (Honours) in Political Science

[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
	Semester-I								
1	I	Core-1		CT1: Understanding Political Theory	6	5-1-0	15	60	75
		Core-2		CT2: Constitutional Government and Democracy in India	6	5-1-0	15	60	75
		GE-1		TBD	6	5-1-0/ 4-0-4	15	60	75
		AECC-1		English/MIL	2	1-1-0	10	40	50
	Semester –I: total				**20**				**275**
	Semester-II								
	II	Core-3		CT3: Political Theory – Concepts and Debates	6	5-1-0	15	60	75
		Core-4		CT4: Political Process in India	6	5-1-0	15	60	75
		GE-2		TBD	6	5-1-0/ 4-0-4	15	60	75
		AECC-2		ENVS	4		20	80	100
	Semester-II : total				**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
	Semester-III								
2	**III**	Core-5		CT5: Introduction to Comparative Government and Politics	6	5-1-0	15	60	75
		Core-6		CT6: Perspectives on Public Administration	6	5-1-0	15	60	75
		Core-7		CT7: Perspectives on International Relations and World History	6	5-1-0	15	60	75
		GE-3		TBD	6	5-1-0/ 4-0-4	15	60	75
		SEC-1		TBD	2	1-1-0	10	40	50
		Semester – III : total			**26**				**350**
	Semester-IV								
	IV	Core-8		CT8: Political Processes and Institutions in Comparative Perspective	6	5-1-0	15	60	75
		Core-9		CT9: Public Policy and Administration in India	6	5-1-0	15	60	75
		Core-10		CT10:Global Politics	6	5-1-0	15	60	75
		GE-4		TBD	6	5-1-0/ 4-0-4	15	60	75
		SEC-2		TBD	2	1-0-0	10	40	50
		Semester – IV : total			**26**				**350**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
							CA	ESE	TOTAL
		Semester-V							
3	**V**	Core-11		CT11: Classical Political Philosophy	6	5-1-0	15	60	75
		Core-12		CT12: Modern Indian political Thought -I	6	5-1-0	15	60	75
		DSE-1		TBD	6	5-1-0	15	60	75
		DSE-2		TBD	6	5-1-0	15	60	75
		Semester –V : total			**24**				**300**
		Semester-VI							
	VI	Core-13		CT13: Modern Political Philosophy	6	5-1-0	15	60	75
		Core-14		CT14: Indian Political Thought - II	6	5-1-0	15	60	75
		DSE-3		TBD	6	5-1-0	15	60	75
		DSE-4		TBD	6	5-1-0	15	60	75
		Semester – VI : total			**24**				**300**
Total in all semester:					**142**				**1900**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies ,

List of the Core courses and Electives

CORE COURSE (CC)

CC-1: Understanding Political Theory
CC-2: Constitutional Government and Democracy in India
CC-3: Political Theory-Concepts and Debates
CC-4: Political Process in India
CC-5: Introduction to Comparative Government and Politics
CC-6: Perspectives on Public Administration
CC-7: Perspectives on International Relations and World History
CC-8: Political Processes and Institutions in Comparative Perspective
CC-9: Public Policy and Administration in India
CC-10: Global Politics
CC-11: Classical Political Philosophy
CC-12: Indian Political Thought-I
CC-13: Modern Political Philosophy
CC-14: Indian Political Thought-II

Discipline Specific Elective (DSE)

DSE-1: India's Foreign Policy in a Globalizing World
Or
DSE-1: Development Process and Social Movements in Contemporary India
DSE-2: Understanding South Asia
Or
DSE-2: United Nations and Global Conflicts
DSE-3: Citizenship in a Globalizing World
Or
DSE-3 : Women, Power and Politics
DSE-4: Human Rights in a Comparative Perspective
Or
DSE-4: Project Work

Skill Enhancement Courses(SEC)

SEC-1: Democratic Awareness with Legal Literacy
Or
SEC-1: Public Opinion and Survey Research
SEC-2: Legislative Practices and Procedures
Or
SEC-2: Peace and Conflict Resolution

Generic Elective (GE)

[Interdisciplinary for other department]

GE-1: Nationalism in India
Or
GE-1: Feminism: Theory and Practice
GE-2: Contemporary Political Economy
Or
GE-2: Governance: Issues and Challenges
GE-3: Gandhi and the Contemporary World
Or
GE-3: Understanding Ambedkar
GE-4: Politics of Globalization
Or
GE-4: United Nations and Global Conflicts

CORE COURSE (CC)

CC-1: Understanding Political Theory **Credit 06**

C1T: Understanding Political Theory

I: Introducing Political Theory

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
4. Critical and Contemporary Perspectives in Political Theory: Feminist and Postmodern

II: Political Theory and Practice

The Grammar of Democracy

1. Democracy: The history of an idea
2. Procedural Democracy and its critique
3. Deliberative Democracy
4. Participation and Representation

Suggested Readings

- 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.

- Bharghava, 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.

- 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.

CC-2: Constitutional Government and Democracy in India Credit 06

C2T: Constitutional Government and Democracy in India

I. The Constituent Assembly and the Constitution

a. Philosophy of the Constitution, the Preamble, and Features of the Constitution
b. Fundamental Rights and Directive Principles

II. Organs of Government

a. The Legislature: Parliament (1.5 weeks or 6 lectures)
b. The Executive: President and Prime Minister
c. The Judiciary: Supreme Court

III. Federalism and Decentralization

a. Federalism: Division of Powers, Emergency Provisions, Fifth and Sixth Schedules
b. Panchayati Raj and Municipalities

Suggested 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-

- 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.

- 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.

- G. Austin, (2000) 'The Social Revolution and the First Amendment', in *Working a Democratic Constitution,* New Delhi: Oxford University Press, pp. 69-98. Sibal, (2010) 'From Niti to Nyaya,' *Seminar,* Issue 615, pp 28-34.
- *The Constitution of India: Bare Act with Short Notes,* (2011) New Delhi: Universal, pp. 4-16.
- 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.
- 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.) *Nehru to 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.
- 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.
- 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.
- 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.
- 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.

- 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.

- 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

CC-3: Political Theory-Concepts and Debates **Credit 06**

C3T: Political Theory-Concepts and Debates

Section A: Core Concepts

I. Importance of Freedom

a. Negative Freedom: Liberty
b. Positive Freedom: Freedom as Emancipation and Development

Important Issue: Freedom of belief, expression and dissent

II. Significance of Equality

a. Formal Equality: Equality of opportunity
b. Political equality
c. Egalitarianism: Background inequalities and differential treatment

Important Issue: Affirmative action

III. Indispensability of Justice

a. Procedural Justice
b. Distributive Justice
c. Global Justice

Important Issue: Capital punishment

IV. The Universality of Rights

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

a. Why should we obey the state? Issues of political obligation and civil disobedience.
b. Are human rights universal? Issue of cultural relativism.
c. How do we accommodate diversity in plural society? Issues of multiculturalism and toleration.

Suggested Readings:

- 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.
- 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.
- 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.
- Seglow, Jonathan. (2003) 'Multiculturalism' in Bellamy, Richard and Mason, Andrew (eds.). *Political Concepts.* Manchester: Manchester University Press, pp. 156-168.
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CC-4: Political Process in India **Credit 06**

C4T: Political Process in India

i. I. Political Parties and the Party System

Trends in the Party System; From the Congress System to Multi-Party Coalitions

ii. **Determinants of Voting Behaviour**
Caste, Class, Gender and Religion

iii. **III. Regional Aspirations**
The Politics of Secession and Accommodation

iv. **IV. Religion and Politics**
Debates on Secularism; Minority and Majority Communalism

v. **V. Caste and Politics**
Caste in Politics and the Politicization of Caste

vi. **VI. Affirmative Action Policies**
Women, Caste and Class

vii. **VII. The Changing Nature of the Indian State**
Developmental, Welfare and Coercive Dimensions

Suggested 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.

- 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.

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- 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.

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- R. Kothari, (1970) 'Introduction', in *Caste in Indian Politics,* Delhi: Orient Longman, pp.3-25.

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- 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.

- 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.

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- 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.

- 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 Samajik Chintan,* Vol. XII (1-2)

- 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.

- 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.

CC-5: Introduction to Comparative Government and Politics Credit 06

C5T: Introduction to Comparative Government and Politics

I. Understanding Comparative Politics

a. Nature and scope
b. Going beyond Eurocentrism

II. Historical context of modern government

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

A comparative study of constitutional developments and political economy in the following countries: Britain, Brazil, Nigeria and China.

Suggested 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:

- Roy, (2001) 'Comparative Method and Strategies of Comparison', in *Punjab Journal of Politics.* Vol. xxv (2), pp. 1-15.

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- J. Chiryankandath, (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
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- 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).

- 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.

CC-6: Perspectives on Public Administration **Credit 06**

C6T: Perspectives on Public Administration

I. Public administration as a discipline

- ✓ Meaning, Dimensions and Significance of the Discipline
- ✓ Public and Private Administration
- ✓ Evolution of Public Administration

II. Theoretical perspectives

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

- ✓ Concept, relevance and approaches
- ✓ Formulation, implementation and evaluation

IV. Major approaches in public administration

- ✓ New Public Administration
- ✓ New Public Management
- ✓ New Public Service Approach
- ✓ Good Governance
- ✓ Feminist Perspectives

Suggested Readings:

- 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

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- P. Mouzelis, 'The Ideal Type of Bureaucracy' in B. Chakrabarty, And M. Bhattacharya, (eds), *Public Administration: A Reader*, New Delhi: Oxford University Press,2003

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- Fredrickson and Smith, 'Decision Theory', in *The Public Administration Theory Primer*. Cambridge: Westview Press, 2003

- R. Arora, 'Riggs' Administrative Ecology' in B. Chakrabarty and M. Bhattacharya (eds), *Public Administration: A reader*, New Delhi, Oxford University Press, 2003
- 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 Miffin,1964
- Peter Drucker, *Innovation and Entrepreneurship*, Harper Collins,1999
- Peter F. Drucker , *The Practice of Management*, Harper Collins, 2006
- 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
- Prabir Kumar De, *Public Policy and Systems*, Pearson Education, 2012
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- M. Bhattacharya, 'Chapter 2 and 4', in *Social Theory, Development Administration and Development Ethics*, New Delhi: Jawahar Publishers, 2006
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- 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

CC-7: Perspectives on International Relations and World History

Credit 06

C7T: Perspectives on International Relations and World History

A. Studying International Relations

i. How do you understand International Relations: Levels of Analysis
ii. History and IR: Emergence of the International State System
iii. Pre-Westphalia and Westphalia
iv. Post-Westphalia

B. Theoretical Perspectives

i Classical Realism & Neo-Realism
ii. Liberalism & Neoliberalism
iii. Marxist Approaches
iv. Feminist Perspectives
v. Eurocentricism and Perspectives from the Global South

C. An Overview of Twentieth Century IR History

i. World War I: Causes and Consequences
ii. Significance of the Bolshevik Revolution
iii. Rise of Fascism / Nazism
iv. World War II: Causes and Consequences
v. Cold War: Different Phases
vi. Emergence of the Third World
vii. Collapse of the USSR and the End of the Cold War
viii. Post Cold War Developments and Emergence of Other Power Centers of Power

Suggested Readings:

- M. Nicholson, (2002) *International Relations: A Concise Introduction*, New York: Palgrave, p. 1-4.
- R. Jackson and G. Sorensen, (2007) *Introduction to International Relations: Theories and Approches*, 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.
- K. Mingst and J. Snyder, (2011) *Essential Readings in International Relations*, New York: W.W. Nortan 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.
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- R. Mansbach and K. Taylor, (2008) *Introduction to Global Politics*, New York: Routledge, pp. 2-32.

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- 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.

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- K. Waltz, (1959) *Man, The State and War*, Columbia: Columbia University Press.

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- 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. Scmidt, (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.

- 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.

- 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.

- 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.

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- 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.

CC-8: Political Processes and Institutions in Comparative Perspective

Credit 06

C8T: Political Processes and Institutions in Comparative Perspective

I. Approaches to Studying Comparative Politics

a. Political Culture
b. New Institutionalism

II. Electoral System

Definition and procedures: Types of election system (First Past the Post, Proportional Representation, Mixed Representation)

III. Party System

Historical contexts of emergence of the party system and types of parties

IV. Nation-state

What is nation–state? Historical evolution in Western Europe and postcolonial contexts
'Nation' and 'State': debates

V. Democratization

Process of democratization in postcolonial, post- authoritarian and post-communist countries

VI. Federalism

Historical context Federation and Confederation: debates around territorial division of power.

Suggested 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.

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- 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.

- Heywood, (2002) 'Representation, Electoral and Voting', in *Politics*. New York: Palgrave, pp. 223-245.

- Evans, (2009) 'Elections Systems', in J. Bara and M. Pennington, (eds.) *Comparative politics.* New Delhi: Sage Publications, pp. 93-119.

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- Heywood, (2002), 'The State', in *Politics*. New York: Palgrave, pp. 85-102

- 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.

- Smith, (2003) 'Democratization in the Third World', in *Understanding Third World Politics: Theories of Political Change and Development*. London: Palgrave Macmillan, pp.250-274.

- 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

- R. Saxena, (2011) 'Introduction', in Saxena, R (eds.) *Varieties of Federal Governance: Major Contemporary Models.* New Delhi: Cambridge University Press, pp. xii-x1.

CC-9: Public Policy and Administration in India **Credit 06**

C9T: Public Policy and Administration in India

I. Public Policy

a. Definition, characteristics and models
b. Public Policy Process in India

II. Decentralization

a. Meaning, significance and approaches and types
b. Local Self Governance: Rural and Urban

III. Budget

a. Concept and Significance of Budget
b. Budget Cycle in India

c. Various Approaches and Types Of Budgeting

IV. Citizen and Administration Interface

a. Public Service Delivery
b. Redressal of Public Grievances: RTI, Lokpal, Citizens' Charter and E-Governance

V. Social Welfare Administration

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

Suggested Readings :

- 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 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
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- M.P.Lester, *Political Participation- How and Why do People Get Involved in Politics* Chicago: McNally, 1965

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- Vasu Deva, *E-Governance In India: A Reality*, Commonwealth Publishers, 2005

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- 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 Mukhopadyay, A. (2005) 'Social Audit', in *Seminar.* No.551.

- 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

CC-10: Global Politics **Credit 06**

C10T: Global Politics

I. Globalization: Conceptions and Perspectives

a. Understanding Globalization and its Alternative Perspectives
b. Political: Debates on Sovereignty and Territoriality
c. Global Economy: Its Significance and Anchors of Global Political Economy: IMF,
d. World Bank, WTO, TNCs
e. Cultural and Technological Dimension
f. Global Resistances (Global Social Movements and NGOs)

II. Contemporary Global Issues

a. Ecological Issues: Historical Overview of International Environmental Agreements, Climate Change, Global Commons Debate
b. Proliferation of Nuclear Weapons
c. International Terrorism: Non-State Actors and State Terrorism; Post 9/11 developments
d. Migration
e. Human Security

III. Global Shifts: Power and Governance

Suggested 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.

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- Heywood, (2011) *Global Politics,* New York: Palgrave-McMillan, pp. 112-134.

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- K. Shimko, (2005) *International Relations: Perspectives and Controversies,* New York: Houghton Mifflin, pp. 195-219.

- 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: Lynne Reinner, pp. 341-351.

- 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).

- 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).
- 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.
- Appadurai, (2000) 'Grassroots Globalization and the Research Imagination', in *Public Culture*, Vol. 12(1), pp. 1-19.
- J. Beynon and D. Dunkerley, (eds.), (2012) *Globalisation: The Reader*, New Delhi: Rawat Publications, pp. 1-19.
- Vanaik, (ed.), (2004) *Globalization and South Asia: Multidimensional Perspectives*, New Delhi: Manohar Publications, pp. 171-191, 192-213, 301-317, 335-357.
- 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).
- G. Laxter and S. Halperin (eds.), (2003) *Global Civil Society and Its Limits*, New York: Palgrave, pp. 1-21.
- 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)
- 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.
- 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.P. Bidwai, (2011) 'Durban: Road to Nowhere', in *Economic and Political Weekly*, Vol.46, No.53, December, pp. 10-12.

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- 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.
- Heywood, (2011) *Global Politics,* New York: Palgrave, pp. 264-281.
- P. Viotti and M. Kauppi, (2007) *International Relations,* New Delhi: Pearson, pp. 276-307.
- Heywood, (2011) *Global Politics,* New York: Palgrave, pp. 282-301.
- 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.
- Vanaik, (2007) *Masks of Empire,* New Delhi: Tulika, pp. 103-128.
- 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.
- 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.
- Acharya, (2001) 'Human Security: East versus West', in *International Journal,* Vol. 56, no. 3, pp. 442-460.
- 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.
- 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.

CC-11: Classical Political Philosophy **Credit 06**

C11T: Classical Political Philosophy

I. Text and Interpretation
II. Antiquity
Plato
Philosophy and Politics, Theory of Forms, Justice, Philosopher King/Queen, Communism
Presentation theme: Critique of Democracy; Women and Guardianship, Censorship

Aristotle
Forms, Virtue, Citizenship, Justice, State and Household
Presentation themes: Classification of governments; man as zoon politikon

III. Interlude:
Machiavelli
Virtu, Religion, Republicanism
Presentation themes: morality and statecraft; vice and virtue

IV. Possessive Individualism
Hobbes
Human nature, State of Nature, Social Contract, State
Presentation themes: State of nature; social contract; Leviathan; atomistic individuals.

Locke
Laws of Nature, Natural Rights, Property,
Presentation themes: Natural rights; right to dissent; justification of property

Suggested 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.

- 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.

- 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.

- Reeve, (2009) 'Plato', in D. Boucher and P. Kelly, (eds) *Political Thinkers: From Socrates to the Present,* Oxford: Oxford University Press, pp. 62-80

- 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.

- 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.

- Taylor, (1995) 'Politics', in J. Barnes (ed.), *The Cambridge Companion to Aristotle*. Cambridge: Cambridge University Press, pp. 232-258

- J. Coleman, (2000) 'Aristotle', in J. Coleman *A History of Political Thought: From Ancient Greece to Early Christianity,* Oxford: Blackwell Publishers, pp.120-186

- Hutchinson, (1995) 'Ethics', in J. Barnes, (ed.), *The Cambridge Companion to Aristotle* Cambridge: Cambridge University Press, pp. 195-232.

- 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

- Q. Skinner, (2000) 'The Theorist of Liberty', in *Machiavelli: A Very Short Introduction*. Oxford: Oxford University Press, pp. 54-87.

- Skoble and T. Machan, (2007) *Political Philosophy: Essential Selections*. New Delhi: Pearson Education pp. 131-157.

- Baumgold, (2009) 'Hobbes', in D. Boucher and P. Kelly (eds) *Political Thinkers: From Socrates to the Present.* Oxford: Oxford University Press, pp. 189-206.

- Macpherson (1962) *The Political Theory of Possessive Individualism: Hobbes to Locke*. Oxford University Press, Ontario, pp. 17-29.

- 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.

- Ryan, (1996) 'Hobbes's political philosophy', in T. Sorell, (ed.) *Cambridge Companion to Hobbes*. Cambridge: Cambridge University Press, pp. 208-245.

- 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

- Macpherson, (1962) *The Political Theory of Possessive Individualism: Hobbes to Locke*. Oxford University Press, Ontario, pp. 194-214.

- R. Ashcraft, (1999) 'Locke's Political Philosophy', in V. Chappell (ed.) *The Cambridge Companion to Locke*, Cambridge. Cambridge University Press, pp. 226-251.

- Hampsher-Monk, (2001) *A History of Modern Political Thought: Major Political Thinkers from Hobbes to Marx,* Oxford: Blackwell Publishers, pp. 69-116

CC-12: Indian Political Thought-I **Credit 06**

C12T: Indian Political Thought-I

I. Traditions of Pre-colonial Indian Political Thought
   a. Brahmanic and Shramanic
   b. Islamic and Syncretic.

II. Ved Vyasa (Shantiparva): Rajadharma

III. Manu: Social Laws

IV. Kautilya: Theory of State

V. Aggannasutta (Digha Nikaya): Theory of kingship

VI. Barani: Ideal Polity

VII. Abul Fazal: Monarchy

VIII. Kabir: Syncretism

Suggested 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.

- 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.

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- V. Varma, (1974) *Studies in Hindu Political Thought and Its Metaphysical Foundations*, Delhi: Motilal Banarsidass, pp. 211- 230.

- Chaturvedi, (2006) 'Dharma-The Foundation of Raja-Dharma, Law and Governance', in *The Mahabharta: An Inquiry in the Human Condition*, Delhi: Orient Longman, pp. 418- 464.

- 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.

- Kautilya, (1997) 'The Elements of Sovereignty' in R. Kangle (ed. and trns.), *Arthasastra 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.

- J. Spellman, (1964) 'Principle of Statecraft', in *Political Theory of Ancient India: A Study of Kingship from the Earliest time to Ceirca AD 300,* Oxford: Clarendon Press, pp. 132- 170.

- 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.

- Gokhale, (1966) 'The Early *Buddhist* View of the State', in *The Journal of Asian Studies,* Vol. XXVI, (1), pp. 15- 22.

- L. Jayasurya, 'Budhism, Politics and Statecraft', Available at *ftp.buddhism.org/Publications/.../Voll1_03_Laksiri%20Jayasuriya.pdf,*Accessed: 19.04.2013.

- Habib, (1998) 'Ziya Barni's Vision of the State', in *The Medieval History Journal,* Vol. 2, (1), pp. 19- 36.

- M. Alam, (2004) 'Sharia Akhlaq', in *The Languages of Political Islam in India 1200- 1800,* Delhi: Permanent Black, pp. 26- 43

- 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 India1200-1800,* Delhi: Permanent Black, pp. 46- 69.

- Habib, (1998) 'Two Indian Theorist of The State: Barani and Abul Fazal', in *Proceedings of the Indian History Congress*. Patiala, pp. 15- 39.

- 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.

CC-13: Modern Political Philosophy **Credit 06**

C13T: Modern Political Philosophy

I. Modernity and its discourses

This section will introduce students to the idea of modernity and the discourses around modernity. Two essential readings have been prescribed.

II. Romantics

a) **Jean Jacques Rousseau**
Presentation themes: General Will; local or direct democracy; self-government; origin of inequality.

b) **Mary Wollstonecraft**
Presentation themes: Women and paternalism; critique of Rousseau's idea of education; legal rights

III. Liberal socialist

John Stuart Mill
Presentation themes: Liberty, suffrage and subjection of women, right of minorities; utility principle.

IV. Radicals

a) **Karl Marx**
Presentation themes: Alienation; difference with other kinds of materialism; class struggle

b) Alexandra Kollontai
Presentation themes: Winged and wingless Eros; proletarian woman; socialization of housework; disagreement with Lenin

Suggested Readings :

- 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

- 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.

- 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.

- J. Cropsey, (1987) 'Karl Marx', in L. Strauss and J. Cropsey, (eds) *History of Political Philosophy*, 2ndEdition. 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

- 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

- Bloom, (1987) 'Jean-Jacques Rousseau', in Strauss, L. and Cropsey, J. (eds.) *History ofPolitical 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/womana. html#CHAPTER%20II, Accessed: 19.04.2013.

- Skoble and T. Machan, (2007) *Political Philosophy: Essential Selections*, New Delhi:Pearson Education, pp. 328-354.

- Ollman (1991) *Marxism: An Uncommon Introduction,* New Delhi: Sterling Publishers.

- G. Blakely and V. Bryson (2005) *Marx and Other Four Letter Words,* London: Pluto

- Skoble, and T. Machan, (2007) *Political Philosophy: Essential Selections*, New Delhi: Pearson Education, pp. 286-327.

- Kollontai, (1977) 'Social Democracy and the Women's Question', in *Selected Writings of Alexandra Kollontai,* London: Allison & Busby, pp. 29-74.

- Kollontai, (1977) 'Make Way for Winged Eros: A Letter to the Youth', in *Selected Writings of Alexandra Kollontai* Allison & Busby, pp. 201-292.

- Porter, (1980) *Alexandra Kollontai: The Lonely Struggle of the Woman who defied Lenin,* New York: Dutton Children's Books.

CC-14: Indian Political Thought-II **Credit 06**

C14T: Indian Political Thought-II

I. Introduction to Modern Indian Political Thought
II. Rammohan Roy: Rights
III. Pandita Ramabai: Gender
IV. Vivekananda: Ideal Society
V. Gandhi: Swaraj
VI. Ambedkar: Social Justice
VII. Tagore: Critique of Nationalism
VIII. Iqbal: Community
IX. Savarkar: Hindutva
X. Nehru: Secularism
XI. Lohia: Socialism

Suggested 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.

- R. Roy, (1991) 'The Precepts of Jesus, the Guide to Peace and Happiness', S. Hay, (ed.) *Sources of Indian Traditio, 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. Panthom and K. Deutsch, (eds.) *Political Thought in Modern India,* New Delhi: Sage, pp.32-52.

- S. Sarkar, (1985) 'Rammohan Roy and the break With the Past', in *A Critique on colonial India,* Calcutta: Papyrus, pp. 1-17.

- 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.

- U. Chakravarti, (2007) *Pandita Ramabai - A Life and a Time*, New Delhi: Critical Quest, pp. 1-

- 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.

- 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.

- 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.

- 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.

- 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.

- 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,AurobindoGhose, Mahatma Gandhi and Rabindranath Tagore,* Gurgaon: The AcademicPress, pp. 154- 190.

- R. Terchek, (2002) 'Gandhian Autonomy in Late Modern World', in A. Parel (ed.), *Gandhi,Freedom and Self Rule*. Delhi: Sage.

- Ambedkar, (1991) 'Constituent Assembly Debates', S. Hay (ed.), *Sources of IndianTradition, 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* andRawat Publications.

- 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.

- 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.

- 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.

- Nandy, (1994) 'Rabindranath Tagore & Politics of Self', in *Illegitimacy of Nationalism,* Delhi: Oxford University Press, pp. 1-50.

- M. Iqbal, (1991) 'Speeches and Statements', in S. Hay (ed.), *Sources of Indian Tradition, Vol. 2,* Second Edition, New Delhi: Penguin, pp. 218-222.

- 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.

- 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.

- 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.

- Dh. Keer, (1966) *Veer Savarkar*, Bombay: Popular Prakashan, pp. 223-250.

- 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 Modem India*, New Delhi: Sage, pp. 260- 274.

- Zachariah, (2004) *Nehru*, London: Routledge Historical Biographies, pp. 169-213.

- 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

- 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.

- 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.

DISCIPLINE SPECIFIC ELECTIVE (DSE)

DSE-1: India's Foreign Policy in a Globalizing World **Credit 06**

DSE1T: India's Foreign Policy in a Globalizing World

I. India's Foreign Policy: From a Postcolonial State to an Aspiring Global Power
II. India's Relations with the USA and USSR/Russia

III. India's Engagements with China

IV. India in South Asia: Debating Regional Strategies

V. India's Negotiating Style and Strategies: Trade, Environment and Security Regimes
VI. India in the Contemporary Multipolar World

Suggested Readings :

- S. Ganguly and M. Pardesi, (2009) 'Explaining Sixty Years of India's Foreign Policy', in *India Review*, 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: Routeledge, pp.3-31

- W. Anderson, (2011) 'Domestic Roots of Indian Foreign Policy', in W. Anderson, *Trysts with Democracy: Political Practice in South Asia*, Anthem Press: University Publishing Online.

- J. Bandhopadhyaya, (1970) *The Making Of India's Foreign Policy*, New Delhi: Allied Publishers.

- 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.

- 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.

- 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.

- H. Pant, (2011) 'India's Relations with China', in D. Scott (ed.), *Handbook of India's International Relations*, London: Routeledge, pp. 233-242.

- 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.

- 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.

- 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.

- 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

- S. Cohen, (2002) 'The World View of India's Strategic Elite', in S. Cohen, *India: Emerging Power*, Brookings Institution Press, pp. 36-65.

- 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 Cobenefits', 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.

- P. Bidwai, (2005) 'A Deplorable Nuclear Bargain', in *Economic and Political Weekly*, Vol. 40 (31), pp. 3362-3364.

- Anant, (2011) 'India and International Terrorism', in D. Scott (ed.), *Handbook of India's International Relations*, London: Routledge, pp. 266-277.

- 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.

- 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.

- Narlikar, (2006) 'Peculiar Chauvinism or Strategic Calculation? Explaining the Negotiating Strategy of a Rising India', in *International Affairs*, Vol. 82 (1), pp. 59-76.

- 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/

OR

DSE-1: Development Process and Social Movements in Contemporary India

Credit 06

DSE1T: Development Process and Social Movements in Contemporary India

I. Development Process since Independence

a. State and planning
b. Liberalization and reforms

II. Industrial Development Strategy and its Impact on the Social Structure

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

a. Land Reforms, Green Revolution
b. Agrarian crisis since the 1990s and its impact on farmers

IV. Social Movements

a. Tribal, Peasant, Dalit and Women's movements
b. Maoist challenge
c. Civil rights movements

Suggested Readings :

- 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.

- 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.

- Aggarwal, (2006) 'Special Economic Zones: Revisiting the Policy Debate', in *Economic and Political Weekly*, XLI (43-44), pp.4533-36.

- 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.) *SocialMovements in India*, Delhi: Oxford University Press, pp 32-60.

- 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).

- 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.

- Ray, (1996) 'Civil Rights Movement and Social Struggle in India', in *Economic and Political Weekly*, XXI (28). pp. 1202-1205.

- 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.
- S. Banerjee, (1986) 'Naxalbari in Desai', in A.R. (ed.) *Agrarian Struggles in India After Independence*. Delhi: Oxford University Press, pp.566-588.
- 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 ofMobilization 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.

DSE-2: Understanding South Asia **Credit 06**

DSE2T: Understanding South Asia

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I. South Asia- Understanding South Asia as a Region

a) Historical and Colonial Legacies
b) Geopolitics of South Asia

II. Politics and Governance

a) Regime types: democracy, authoritarianism, monarchy
b) Emerging constitutional practices: federal experiments in Pakistan; constitutional debate in Nepal and Bhutan; devolution debate in Sri Lanka

III. Socio-Economic Issues

a) Identity politics and economic deprivation: challenges and impacts (case studies of Pakistan, Bangladesh, Nepal, Sri Lanka)

IV. Regional Issues and Challenges

a) South Asian Association for Regional Cooperation (SAARC): problems and prospects
b) Terrorism Migration

Suggested Readings:

- Hewitt, V. (1992) 'Introduction', in The International Politics of South Asia. Manchester: Manchester University Press, pp.1-10.

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- Hagerty, D.T. (ed.) (2005) South Asia in World Politics, Oxford: Rowman and Littlefield.

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- Kukreja, V. and Singh, M.P. (eds) (2008) Democracy, Development and Discontent in SouthAsia. New Delhi: Sage.

OR

DSE-2: United Nations and Global Conflicts **Credit 06**

DSE2T: United Nations and Global Conflicts

.

I. The United Nations

(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

(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

Suggested Readings:

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- 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 twentyfirst century. London: Verso, pp. 47-71.
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- organization, New Delhi, Sterling Publishers
- Gareis, S.B. and Varwick, J. (2005) *The United Nations: An introduction.* Basingstoke: Palgrave, pp. 15-21.
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- 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.
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- 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.
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- 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.
- 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.
- 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.
- 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.
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DSE-3: Citizenship in a Globalizing World **Credit 06**

DSE3T: Citizenship in a Globalizing World

1. Classical conceptions of citizenship
2. The Evolution of Citizenship and the Modern State
3. Citizenship and Diversity
4. Citizenship beyond the Nation-state: Globalization and global justice
5. The idea of cosmopolitan citizenship

Suggested Readings

- Acharya, Ashok. (2012) *Citizenship in a Globalising World.* New Delhi: Pearson.
- Beiner, R. (1995) *Theorising Citizenship*. Albany: State University of New York Press.
- Held, David (1995), *Democracy and the Global Order: From the Modern State to Cosmopolitan Governance* (Stanford: Stanford University Press).
- Kymlicka, Will (1999), "Citizenship in an Era of Globalization: A Response to Held," in Ian Shapiro and Casiano Hacker-Cordon (eds.), *Democracy's Edges* (Cambridge, UK: Cambridge University Press).
- Oliver, D. and D. Heater (1994). *The Foundations of Citizenship*. London, Harvester Wheatsheaf.
- Scholte, Jan Aart (2000), *Globalization: A Critical Introduction* (New York: St. Martin's).
- Zolo, Danilo (1997), *Cosmopolis: Prospects for World Government* (Cambridge, UK: Polity Press).

OR

DSE-3 : Women, Power and Politics **Credit 06**

DSE3T : Women, Power and Politics

I. Groundings

1. Patriarchy
    a. Sex-Gender Debates
    b. Public and Private
    c. Power
2. Feminism
3. Family, Community, State
    a. Family
    b. Community
    c. State

II. Movements and Issues

1. History of the Women's Movement in India
2. Violence against women
3. Work and Labour
    a. Visible and Invisible work
    b. Reproductive and care work

c. Sex work

Suggested 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

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- 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

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- N. Menon, (2004) 'Sexual Violence: Escaping the Body', in *Recovering Subversion,* New Delhi: Permanent Black, pp. 106-165

- P. Swaminathan, (2012) 'Introduction', in *Women and Work*, Hyderabad: Orient Blackswan, pp.1-17

- J. Tronto, (1996) 'Care as a Political Concept', in N. Hirschmann and C. Stephano, *Revisioning the Political*, Boulder: Westview Press, pp. 139-156

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- N. Menon (2008) 'Gender', in R. Bhargava and A. Acharya (eds) *Political Theory: An Introduction*, New Delhi, Pearson

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DSE-4: Human Rights in a Comparative Perspective **Credit 06**

DSE4T: Human Rights in a Comparative Perspective

I. Human Rights: Theory and Institutionalization

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

a. Torture: USA and India
b. Surveillance and Censorship: China and India
c. Terrorism and Insecurity of Minorities: USA and India

III. Structural Violence

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

Suggested 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

- 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,

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- E. Scarry, (2010) 'Resolving to Resist', in *Rule of Law, Misrule of Men***,** Cambridge: Boston Review Books**,** MIT, pp.1-53.

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- 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.

- 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

- H. Goodall, (2011) 'International Indigenous Community Study: Adivasi Indigenous People in India', in A. Cadzow and J. Maynard (eds**.),** *Aboriginal Studies*, Melbourne: Nelson CengageLearning, pp.254-259.

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- 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 mpoverishment? Reforming Resettlement through Investments and Benefit-Sharing***,** pp. 181-207, New Delhi: Oxford University Press.

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- D. O'Byrne, (2007) 'Theorizing Human Rights', in *Human Rights: An Introduction*, Delhi, Pearson, pp.26-70.

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- 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

OR

DSE-4: Project Work **Credit 06**

Skill Enhancement Course (SEC)

SEC-1: Democratic Awareness with Legal Literacy **Credit 02**

SEC1T: Democratic Awareness with Legal Literacy

Course Content:

Unit I

- Outline of the Legal system in India
- 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.
- Role of the police and executive in criminal law administration.
- Alternate dispute mechanisms such as lok adalats, non - formal mechanisms.

Unit II

- Brief understanding of the laws applicable in India
- 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.
- 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 PenalCode, offences against women, juvenile justice, prevention of atrocities on Scheduled Castes and Scheduled Tribes.
- Concepts like Burden of Proof, Presumption of Innocence, Principles of Natural Justice, Fair comment under Contempt laws.
- Personal laws in India : Pluralism and Democracy
- Laws relating to contract, property and tenancy laws.
- Laws relating to dowry, sexual harassment and violence against women
- Laws relating to consumer rights
- Laws relating to cyber crimes
- Anti-terrorist laws: implications for security and human rights
- Practical application: Visit to either a (I) court or (ii) a legal aid centre set up by the
- 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

- Critical Understanding of the Functioning of the Legal System
- Legal Services Authorities Act and right to legal aid, ADR systems

Practical application:

- 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
- 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.

Exercises for students

1. Discuss the debates around any recent Ordinance, Bill or Act in Parliament.
2. How to file an FIR? In case there has been a theft in the neighbourhood how would you file the first Hand Information Report?
3. Under what circumstances can detention and arrest become illegal?
4. Discuss any contemporary practice or event that violates the equality and protection against discrimination laws.
5. Read Ordinance XV -D of University of Delhi and make a list of the kinds of conduct that would qualify as sexual harassment.
6. Your friend has shared with you an incident of unwelcome verbal remarks on her by a person of higher authority in your college, what would you do?
7. You have seen a lady in your neighbourhood being beaten up by her husband. Identify the concerned Protection Officer in case you want to provide information about this incident.
8. Read the Vishakha Guidelines as laid down by the Supreme Court and the Act against sexual harassment at the workplace. Discuss what constitutes sexual harassment and the mechanisms available for its redressal in your institution.
9. What is the procedure to file an RTI?
10. You bought a product from a nearby shop which was expired, the shop keeper Refused to return it. Use your knowledge of Consumer Protection Act to decide what you do next?
11. What must you keep in mind as a consumer while making a purchase that may later help you make use of Consumer Protection Act? (Hint- Should you ask for a Bill?)
12. In your surroundings have you witnessed any incident that would be considered offensive under the SC and ST Act? Make a class- room presentation on it.

Suggested Readings:

- *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
- Multiple Action Research Group, *Our Laws Vols 1-10*, Delhi.

- Indian Social Institute, New Delhi, *Legal Literacy Series Booklets*.
- S.K. Agarwala, *Public Interest Litigation in India*, K.M. Munshi Memorial Lecture, Second Series, Indian Law Institute, Delhi, 1985.
- S.P. Sathe, *Towards Gender Justice*, Research Centre for Womens' Studies, SNDT Women's University, Bombay, 1993.
- Asha Bajpai, *Child Rights in India : Law, Policy, and Practice*, Oxford University Press, New Delhi,2003
- Agnes, Flavia *Law and Gender Equality*, OUP, 1997.
- Sagade, Jaga, *Law of Maintenance: An Empirical Study*, ILS Law College, Pune 1996.
- B.L. Wadhera, *Public Interest Litigation - A Handbook*, Universal, Delhi, 2003.
- Nomita Aggarwal, Women and Law in India, New Century, Delhi, 2002.
- P.C. Rao and William Sheffiled *Alternate Dispute Resolution: What it is and How it Works*, , Universal Law Books and Publishers, Delhi, 2002
- V.N. Shukla's *Constitution of India* by Mahendra P. Singh, Eastern Book Co. 10th edition 2001.
- Parmanand Singh, *'Access to Justice and the Indian Supreme Court'*, 10 & 11 Delhi Law Review 156, 1981-82.
- J. Kothari, (2005) 'Criminal Law on Domestic Violence', *Economic and Political Weekly*,Vol. 40(46), pp. 4843-4849.
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- M, Mohanty et al. (2011) *Weapon of the Oppressed, Inventory of People's Rights in India*. Delhi: Danish Books.

- Centre for Good Governance, (2008) *Right to Information Act, 2005: A Citizen's Guide*, Availableat http:// www.rtigateway.org.in/Documents/Publications/A%20CITIZEN'S%20GUIDE.pdf

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- Andrew, (1996) 'Arbitrary Government and the Rule of Law', in *Arguing About the Law, An Introduction to Legal Philosophy,* Wordsworth, Boston., pp.3-19.

- SAHRDC, (2006) 'Criminal Procedure and Human Rights in India' in *Oxford Handbook of Human Rights and Criminal Justice in India- The system and Procedure*, New Delhi: Oxford University Press, pp.5-15.

- K. Sankaran and U. Singh, (2008) 'Introduction', in *Towards Legal Literacy*. New Delhi: Oxford University Press, pp. xi – xv.

- Pandey, (2008) 'Laws Relating to Criminal Justice: Challenges and Prospects', in K.Sankaran and U. Singh, *Towards Legal Literacy,* New Delhi: Oxford University Press, pp.61-77.

- SAHRDC, (2006)'Reporting a Crime: First Information Report', in *Oxford Handbook of Human Rights and Criminal Justice in India- The system and Procedure*, New Delhi: Oxford University Press, pp.16-26.

- SAHRDC, (2006) 'Bail', in *Oxford Handbook of Human Rights and Criminal Justice in India- The system and Procedure*, New Delhi: Oxford University Press, pp.59-71.

- SAHRDC, (2006) 'Detention', in *Oxford Handbook of Human Rights and Criminal Justice in India- The system and Procedure*. New Delhi: Oxford University Press, Pp.72-84.

- P. Mathew, (2003) *Your Rights if you are Arrested,* New Delhi. Indian Social Institute.

- Gender Study Group, (1996) Sexual Harassment in Delhi University, A Report, Delhi: University of Delhi.

- P. Mathew, (2002) *The Law on Atrocities Against Scheduled Castes and Scheduled Tribes,* New Delhi: Indian Social Institute.

- K. Saxena, (2011) 'Dalits', in M. Mohanty et al., *Weapon of the Oppressed, Inventory of People's Rights in India*. Delhi: Danish Books, Pp.15-38

- K. Saxena, (2011) 'Adivasis', in M. Mohanty et al., *Weapon of the Oppressed, Inventory of People's Rights in India*, Delhi: Danish Books, Pp.39-65.

- S. Durrany, (2006) *The Protection of Women From Domestic Violence Act 2005*, New Delhi: Indian Social Institute.

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- P. D. Mathew,(2004)*The Measure to Prevent Sexual Harassment of Women in Work Place.* New Delhi: Indian Social Institute.

- D. Srivastva, (2007) 'Sexual Harassment and Violence against Women in India: Constitutional and Legal Perspectives', in C. Kumar and K. Chockalingam (eds) *Human Rights, Justice, and Constitutional Empowerment*, Delhi: Oxford University Press.

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Bare Acts:

- *Consumer Protection Act, 1986,* Available http://chdslsa.gov.in/right_menu/act/pdf/consumer.pdf.

- *Criminal law Amendment Act, 2013,* Available at http://egazette.nic.in/WriteReadData/2013/E_17_2013_212.pdf , Accessed: 10.04.2013.

- *Protection of Women Against Domestic Violence Act, 2005*, Available at http://wcd.nic.in/wdvact.pdf.

- *Right to Information Act, 2005*, Available at http://righttoinformation.gov.in/rti-act.pdf.

- *Scheduled Castes and Scheduled Tribes Prevention of Atrocities Act, 1989,* Available at http://tribal.nic.in/writereaddata/linkimages/poaact989E4227472861.pdf.

- *Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights)Act2006,*Availableathttp://tribal.gov.in/writereaddata/mainlinkFile/File1033.pdf.

- *The Persons with Disabilities (Equal Opportunities, Protection of Rights, Full Participation)Act,1995,*Availableathttp://bhind.nic.in/Sparsh_disability%20act%201995.pdf.

- *The Right of Children to Free and Compulsory Education Act, 2009,* Available at http://www.delta.org.in/form/rte.pdf.

- *The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Bill, 2012***,** Available at http://164.100.24.219/BillsTexts/LSBillTexts/PassedLoksabha/144C_2010_LS_Eng.pdf.

- *Criminal Law Amendment Act*, 2013**,** Available at ,mha.nic.in/pdfs/TheCrimnalLaw030413.pdfFile Format: PDF/Adobe Acrobat – Quick View.

OR

SEC-1: Public Opinion and Survey Research **Credit 02**

SEC1T: Public Opinion and Survey Research

I. Introduction to the course

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

b. What is sampling? Why do we need to sample? Sample design.
c. Sampling error and non-response
d. Types of sampling: Non random sampling (quota, purposive and snowball sampling); random sampling: simple and stratified

III. Survey Research

a. Interviewing: Interview techniques pitfalls, different types of and forms of interview
b. Questionnaire: Question wording; fairness and clarity.

IV. Quantitative Data Analysis

a. Introduction to quantitative data analysis
a. Basic concepts: correlational research, causation and prediction, descriptive and inferential Statistics

V. Interpreting polls

Prediction in polling research: possibilities and pitfalls
Politics of interpreting polling

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 behavior 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.

SuggestedReadings:

- 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.
- 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)
- 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.
- 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.
- 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.
- 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.

SEC-2: Legislative Practices and Procedures **Credit 02**

SEC2T: Legislative Practices and Procedures

I. Powers and functions of people's representative at different tiers of governance
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
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
Types of committees, role of committees in reviewing government finances, policy, programmes, and legislation.

IV. 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.

V. Support in media monitoring and communication
Types of media and their significance for legislators; Basics of communication in print and electronic media.

Suggested 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

- 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/240da49ca467a53f80256b4f005ef245/8e6fc72d6b546696c1257123002fcceb/$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_SOMANA THAN.pdf, Accessed: 19.04.2013

- Debroy, (2001) 'Why we need law reform' *Seminar* January.

- 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, Accessed: 19.04.2013

- 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-theunion- budget-1023/, Accessed: 19.04.2013

- G. Rose, (2005) **'**How to Be a Media Darling: There's No getting Away From It', *StateLegislatures*, Vol. 31(3).

- N. Jayal and P. Mehta (eds), (2010)*The Oxford Companion to Politics in India*, Oxford University Press: New Delhi,Jalan, (2007) *India's Politics*, New Delhi: Penguin.

- Initiating Discussion on Various Type of Debates in *Rajya Sabha*, Available athttp://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.aspxAccessed: 19.04.2013. *Ethics Committee of Rajya Sabha*, available at: http://rajyasabha.nic.in/rsnew/publication_electronic/ethics_committee.pdf,Accessed: m19.04.2013.

- *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*,Availableathttp://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, Availableathttp://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

OR

SEC-2: Peace and Conflict Resolution **Credit 02**

SEC2T: Peace and Conflict Resolution

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

Suggested Readings:

- 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
- 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
- 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

- 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

- 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.

- 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.
- 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
- 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
- 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

- 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
- 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
- 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
- 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
- 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

Generic Elective (GE)
[Interdisciplinary for other department]

GE-1: Nationalism in India **Credit 06**

GE1T: Nationalism in India

I. Approaches to the Study of Nationalism in India

Nationalist, Imperialist, Marxist, and Subaltern Interpretations

II. Reformism and Anti-Reformism in the Nineteenth Century

Major Social and Religious Movements in 19th century

III. Nationalist Politics and Expansion of its Social Base

a. Phases of Nationalist Movement: Liberal Constitutionalists, Swadeshi and the Radicals; Beginning of Constitutionalism in India
b. Gandhi and Mass Mobilisation: Non-Cooperation Movement, Civil Disobedience Movement, and Quit India Movement
c. Socialist Alternatives: Congress Socialists, Communists

IV. Social Movements

a. The Women's Question: Participation in the National Movement and its Impact
b. The Caste Question: Anti-Brahminical Politics
c. Peasant, Tribals and Workers Movements

V. Partition and Independence

a. Communalism in Indian Politics
b. The Two-Nation Theory, Negotiations over Partition

Suggested Readings:

- S. Bandopadhyay, (2004) *From Plassey to Partition: A History of Modern India*, New Delhi: Orient Longman, pp. 184-191

- R. Thapar, (2000) 'Interpretations of Colonial History: Colonial, Nationalist, Post-colonial', in P. DeSouza, (ed.) *Contemporary India: Transitions*, New Delhi: Sage Publications, pp. 25-36.

- S. Bandopadhyay, (2004) From Plassey to Partition: A History of Modern India, New Delhi: Orient Longman, pp.139-158, 234-276.

- Sen, (2007) 'The idea of Social Reform and its Critique among Hindus of Nineteenth Century India', in S. Bhattacharya, (ed.) *Development of Modern Indian Thought and the Social Sciences*, Vol. X. New Delhi: Oxford University Press.

- S. Bandopadhyay, (2004) *From Plassey to Partition: A History of Modern India*. New Delhi:Orient Longman, pp. 279-311.

- S. Sarkar, (1983*) Modern India (1885-1947)*, New Delhi: Macmillan,

- P. Chatterjee, (1993) 'The Nation and its Pasts', in P. Chatterjee, *The Nation and its Fragments: Colonial and Postcolonial Histories*. New Delhi: Oxford University Press, pp. 76-115.

- S. Bandopadhyay, (2004) *From Plassey to Partition: A history of Modern India*. New Delhi: Orient Longman, pp. 342-357, 369-381.

- G. Shah, (2002) *Social Movements and the State*, New Delhi: Sage, pp. 13-31

- Jalal, and S. Bose, (1997) *Modern South Asia: History, Culture, and Political Economy*. New Delhi: Oxford University Press, pp. 135-156.

- Nandy, (2005) *Rashtravad banam Deshbhakti* Translated by A. Dubey, New Delhi: Vani Prakashan. pp. 23-33. (The original essay in English is from A. Nandy, (1994) New Delhi: Oxford University Press, pp. 1-8.)

- Chakrabarty and R. Pandey, (2010) *Modern Indian Political Thought*, New Delhi: Sage Publications.

- P. Chatterjee, (1993) *The Nation and its Fragments: Colonial and Postcolonial Histories*, New Delhi: Oxford University Press.

- R. Pradhan, (2008) *Raj to Swaraj*, New Delhi: Macmillan (Available in Hindi).

- S. Islam, (2006) *Bharat Mein Algaovaad aur Dharm*, New Delhi: Vani Prakashan.

OR

GE-1: Feminism: Theory and Practice **Credit 06**

GE1T: Feminism: Theory and Practice

I. Approaches to understanding Patriarchy

- 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

- 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

Suggested Readings:

- 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.

- 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.
- 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: ZedBooks, pp. 1-24, 71-108, and Conclusion.
- Forbes, Geraldine (1998) *Women in Modern India*. Cambridge: Cambridge University Press,pp. 1-150.
- 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, Maiyatree. (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 andFemale Political Participation', in Ghadially, Rehana. (ed.) *Urban Women in ContemporaryIndia: A Reader*. New Delhi: Sage.
- Roy, Kumkum. (1995) 'Where Women are Worshipped, There Gods Rejoice: The Mirage ofthe 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.
- 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.

GE-2: Contemporary Political Economy **Credit 06**

GE2T: Contemporary Political Economy

I. Approaches to Political Economy

Classical Liberalism, Marxism, Welfarism, Neo-liberalism and Gandhian approach

II. Capitalist Transformation

a. European Feudalism and Transition to Capitalism
b. Globalization: Transnational Corporations, World Trade Organization, Non-governmental Organizations (their role in development)

III. Issues in Development

I. Culture: Media and Television
II. Big Dams and Environmental Concerns
III. Military: Global Arms Industry and Arms Trade
IV. Knowledge Systems

IV. Globalization and Development Dilemmas

I. IT revolution and Debates on Sovereignty
II. Gender
III. Racial and Ethnic Problems
IV. Migration

Suggested Readings :

- Arblaster, A. (2006) 'The Rise and Decline of Western Liberalism' in Lal, D. *Reviving the Invisible Hand: The Case for Classical Liberalism in the Twentyfirst Century*. Princeton: Princeton University Press, pp. 1- 8, 17- 30, and 48- 51.

- Mandel, E. (1979) *An Introduction to Marxist Economic Theory*. New York: Pathfinder Press, 3rd print, pp. 3-73.

- Kersbergen, K.V. and Manow, P. (2009) *Religion, Class Coalition and Welfare State*. Cambridge: Cambridge University Press, chapters 1 and 10, pp. 1-38; 266-295

- Andersen, J. G. (ed.) (2008) 'The Impact of Public Policies' in Caramani, D *Comparative Politics.* Oxford: Oxford University Press, ch 22, pp. 547- 563 .

- Harvey, D. (2005) A *Brief History of Neo-liberalism.* Oxford: Oxford University Press, pp. 1-206.

- Ghosh, B.N. (2007) *Gandhian Political Economy: Principles, Practice and Policy*. Ashgate Publishing Limited, pp. 21- 88.

- Phukan, M. (1998) *The Rise of the Modern West: Social and Economic History of Early Modern Europe.* Delhi: Macmillan India, (ch.14: Transition from Feudalism to Capitalism), pp. 420- 440.

- Gilpin, R. (2003) *Global Political Economy: Understanding the International Economic Order*. Hyderabad: Orient Longman, pp. 278- 304.

- Kennedy, P. (1993) *Preparing for the Twentieth Century.* UK: Vintage, Ch. 3 Gelinas, J. B. (2003) *Juggernaut Politics- Understanding Predatory Globalization.* Halifax, Fernwood, Ch.3. Available from: *www.globalpolicy.org*

- Gilpin, R. (2003) *Global Political Economy: Understanding the International Economic Order.* Hyderabad: Orient Longman, Ch. 8, pp. 196- 233.

- Prasad, K. (2000) *NGOs and Social-economic Development Opportunities*. New Delhi: Deep & Deep, ch. 1, 2, 3, 5.

- Fisher, J. (2003) *Non-governments – NGOs and the Political Development in the Third World.* Jaipur: Rawat, ch. 1, 4, 6.81

- Media and Television Mackay, H. (2004) 'The Globalization of Culture' in Held, D. (ed.) *A Globalizing World? Culture, Economics and Politics*. London: Routledge, pp. 47- 84

- Tomlinson, J. (2004) 'Cultural Imperialism' in Lechner, F. J and Boli, J. (eds.) *The*
- *Globalization Reader*. Oxford: Blackwell, pp. 303- 311.

- Lechner, F. J and Boli, J. (eds.) (2004) *The Globalization Reader.* Oxford: Blackwell, pp. 361- 376 and 398- 404.

- Held, D. and Mcrew, A. (eds.) (2000) *The Global Transformations Reader*. Cambridge: Polity Press, pp. 374- 386.

- Singh, S. (1997) *Taming the Waters: The Political Economy of Large Dams in India*. New Delhi: Oxford University Press, pp. 133- 163, 182- 203, 204- 240.

- Kesselman, M. (2007) *The Politics of Globalization.* Boston: Houghton Mifflin Company, pp. 330- 339.

- Marglin, S. (1990) 'Towards the Decolonisation of the Mind' in Marglin, S. and Marglin, F. A. (eds.) *Dominating Knowledge: Development, Culture and Resistance*. Oxford: Oxford University Press, pp. 1- 28.

- *L. Lechner, F. J and Boli, J. (eds.) (2004) The Globalization Reader. Oxford: Blackwell, pp. 211- 244.*

- *Held, D. and Mcrew, A. (eds.) (2000) The Global Transformations Reader. Cambridge: Polity Press, pp. 105-155.*

- *Omahe, K. (2004) 'The End of the Nation State', L. Lechner, F. J and Boli, J. (eds.) The Globalization Reader. Oxford: Blackwell, ch. 29.*

- *Glen, J. (2007) Globalization: North-South Perspectives.* London: Routledge, ch.6.

- Sen, A. (2006) *Identity and Violence: Illusion and Destiny.* London: Penguin/Allen Lane, ch.7, pp. 130-148.

- Berkovitch, N. (2004) 'The Emergence and Tranformation of the International Women's Movements' in L. Lechner, F. J and Boli, J. (eds.) *The Globalization Reader*. Oxford: Blackwell, ch.31, pp. 251- 257.

- Steans, J. (2000) 'The Gender Dimension' in Held, D. and Mcrew, A. (eds.), *The Global Transformations Reader*. Cambridge: Polity Press, ch.35, pp. 366- 373.

- Tickner, J. A. (2008) 'Gender in World Politics' in Baylis, J.,Smith, S. & Owens, P. (eds.) *Globalization of World Politics*, 4th edn., New Delhi: Oxford University Press, ch.15.

- Kesselman, M. and Krieger, J. (2006) *Readings in Comparative Politics: Political Challenges and Changing Agendas*. Boston: Houghton Miffin Company, pp. 243- 254 and 266- 276.

- Arya, S. and Roy, A. (eds.) *Poverty Gender and Migration.* New Delhi: Sage, Ch. 1

- Kesselman, M. (2007) *The Politics of Globalization.* Boston: Houghton Mifflin Company, pp. 450- 462.

- Nayyar, D. (ed.) (2002) *Governing Globalization.* Delhi: OUP, pp. 144- 176.

OR

GE-2 : Governance: issues and challenges **Credit 06**

GE2T : Governance: issues and challenges

1. Government and governance: concepts
Role of State in the Era of Globalisation
State, Market and Civil Society

2. Governance and development
Changing Dimensions of Development Strengthening Democracy through Good Governance

3. Environmental governance
Human-Environment Interaction
Green Governance: Sustainable Human Development

4. Local governance

Democratic decentralisation
People's Participation in Governance

5. Good governance initiatives in india: best practices
- Public Service Guarantee Acts
- Electronic Governance

- Citizens Charter & Right to Information
- Corporate Social Responsibility

Suggested Readings :

- 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
- 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
- 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
- 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.
- 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.
- 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
- 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
- Crowther, *Corporate Social Responsibility,* Deep and Deep Publishers, 2008Sanjay 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

GE-3: Gandhi and the Contemporary World **Credit 06**

GE3T: Gandhi and the Contemporary World

I. Gandhi on Modern Civilization and Ethics of Development

a. Conception of Modern Civilisation and Alternative Modernity
b. Critique of Development: Narmada Bachao Andolan

II. Gandhian Thought: Theory and Action

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: 1947and Communal Unity

III. Gandhi's Legacy

a) Tolerance: Anti - Racism Movements (Anti - Apartheid and Martin Luther ling)
b) The Pacifist Movement
c) Women's Movements
d) *Gandhigiri*: Perceptions in Popular Culture

IV. Gandhi and the Idea of Political

a) Swaraj
b) Swadeshi

Suggested Readings :

- 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.
- 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 ConflictOver 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 GandhianThought*, New Delhi: Sage Publication.
- Parekh, (1997) 'Satyagrah', in *Gandhi: A Brief Insight,* Delhi: Sterling Publishing Company, pp. 51-63.
- Dalton, (2000) 'Gandhi's originality', in A. Parel (ed) *Gandhi, Freedom and Self-Rule*, New Delhi: Lexington Books, pp.63-86.
- 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
- 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/IngfridxKnudegaardxmasteroppgavexixhistorie.pdf?sequence%3D1+gandhi+and+temple+entry&hl=en&gl=in&pid=bl&srcid=ADGEESiKGssA7q2z1kxiuitm3bciHPh_HI3chWKbJlVo9HE4LcWCLmKdKXCirPaIzh7Tp47fyoBQlHX9GUesefn8YCAQeaQSKMRdrwvYT2Q8c7XV95tQhSGuO9bNCGEdlYGoBjzoVdJc&sig=AHIEtbQ78zwxGvh92AnwmRHiA7t2wWXXJQ, Accessed: 14.04.2013, pp.27-38.

- P. Rao, (2009) 'Gandhi, Untouchability and the Postcolonial Predicament: A Note'. *Social Scientist.* 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.

- Hardiman, (2003) 'Fighting Religious Hatreds', in *Gandhi in His Time and Ours*. Delhi:Oxford University Press.

- Hardiman, (2003) 'Gandhi's Global Legacy', in *Gandhi in His Time and Ours*. Delhi: OxfordUniversity 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.

- 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.

- 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.

- Dalton, (1996) 'Swaraj: Gandhi's Idea of Freedom', in *Mahatma Gandhi: Selected Political Writings*, USA: Hackett Publishing, pp. 95-148.

- Parel (ed.) (1997) 'Editor's Introduction', in *Gandhi, Hind Swaraj and Other Writings* Cambridge: Cambridge University Press.

- 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.

- 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.

- 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, Ahmmedabad, 1928, pp. 95-107
2. A Report followed by presentation on functioning of Cooperative and Community engagement for example Amuland/or SEWA in Gujarat to understand Trusteeship and its relevance

Topic 3

1. Movie Screenings (Movies like Lage Raho Munna Bhai, Gandhi by Richard Attenboroughand 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 Smiriti to understand on-going Gandhian work and programme and interacting with Gandhian activists.

OR

GE-3: Understanding Ambedkar **Credit 06**

GE3T: Understanding Ambedkar

I. Introducing Ambedkar

Approach to Study Polity, History, Economy, Religion and Society

II. Caste and Religion

a. Caste, Untouchability and Critique of Hindu Social Order
b. Religion and Conversion

III. Women's Question

a. Rise and Fall of Hindu Women
b. Hindu Code Bill

IV. Political Vision

a. Nation and Nationalism
b. Democracy and Citizenship

V. Constitutionalism

a. Rights and Representations
b. Constitution as an Instrument of Social Transformation

VI. Economy and Class Question

a. Planning and Development

b. Land and Labor
c. Students Presentations

a. Format for Student Presentations

1) Five presentations on any original writing/speeches by B. R Ambedkar can be used by the students for presentations (Preferably other than compulsory writings that has been suggested in the reading list)
2) Six Presentations on the different issues concerned to Ambedkar's works and their relevance in contemporary India. (Preferably other than compulsory writings that has been suggested in the reading list)
3) One Presentation on Critical understanding on Ambedkar's Ideas.

b. References for Students' Presentations:

1) Babasaheb Ambedkar, Writings and Speeches, 22 Volumes (Available on www.ambedkar.org)
2) Narendra Jadhav, Ambedkar Spoke, 3 Volumes
3) Any other related audio-visual source

Suggested Readings:

- G. Omvedt, (2008) 'Phule-Remembering The Kingdom of Bali', Seeking Begumpura Navyana, pp. 159-184.

- M. Gore, (1993) *The Social Context of an Ideology: Ambedkar's Political and Social Thought*, Delhi: Sage Publication, pp. 73-122 ; 196-225.

- Ambedkar, (1989) 'Annihilation of Caste with a Reply to Mahatma Gandhi', in *Dr. Babasaheb Ambedkar Writings and Speeches: Vol. 1*, Education Deptt., Government of Maharashtra, Mumbai, pp. 23-96.

- E. Zelliot, (1996) 'From Untouchable to Dalit: Essays on the Ambedkar Movement', in *The Leadership of Babasaheb Ambedkar*, Delhi: Manohar, pp. 53-78.

- G. Omvedt, *Liberty Equality and Community: Dr. Ambedkar's Vision of New Social Order*, Available at http://www.ambedkar.org/research/LibertyEquality.htm, Accessed: 19.04.2013.

- *The Untouchables Who were they and why they become Untouchables?*, Available athttp://www.ambedkar.org/ambcd/39A.Untouchables%20who%20were%20they_why%20they%20became%20PART%20I.htm, Accessed: 18.04.2013.

- Ambedkar, (1987) 'The Hindu Social Order: Its Essential Principles', in *Dr. Babasaheb Ambedkar Writings and Speeches: Vol. 3*, Education Deptt., Government of Maharashtra, 1989, pp. 95-129.

- Ambedkar, (2003) 'What way Emancipation?', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III*, Education Deptt., Government of Maharashtra, Mumbai, pp-175-201. Additional Readings:

- Ambedkar, (1987) 'Philosophy of Hinduism', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 3,* Education Deptt., Government of Maharashtra, Mumbai, pp-3-92.

- Zelliot, (2013) 'Ambedkar's World: The Making of Babasaheb and the Dalit Movement', in *The Religious Conversion Movement-1935-1956,* Delhi, pp. 143-173.

- S. Rege, (2013) 'Against the Madness of Manu', in *B. R. Ambedkar's Writings on Brahmanical Patriarchy*, Navyana Publication, pp. 13-59 ; 191-232.

- Ambedkar, (2003) 'The Rise and Fall of Hindu Woman: Who was Responsible for It?', in *Dr. Babasaheb Ambedkar Writings and Speeches Vol. 17- II,* Education Deptt., Government of Maharashtra, Mumbai, pp. 109-129.

- Ambedkar, (1987) 'The Women and the Counter-Revolution', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 3,* Education Deptt., Government of Maharashtra, Mumbai, pp. 427-437.

- P. Ramabai , (2013), *The High Caste Hindu Woman*, Critical Quest, Delhi.

- B. Ambedkar, (1991) 'What Gandhi and Congress have done to the Untouchables', in *Dr. Babasaheb Ambedkar Writings and Speeches*, Education Deptt, Government of Maharashtra, Vol.9, pp. 40-102; 181-198; 274-297.

- B. Ambedkar, (2003) 'Conditions Precedent for the successful working of Democracy', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III*, Education Deptt, Government of Maharashtra, Mumbai, pp. 472-486.

- G. Aloysius, (2009). *Ambedkar on Nation and Nationalism*, Critical Quest, Delhi.

- B. R. Ambedkar, (2003), 'I have no Homeland', in *Dr. Babasaheb Ambedkar Writings and Speeches Vol- 17,* Education Deptt., Government of Maharashtra, Mumbai, pp-51-58.

Additional Readings:

- B. Ambedkar, (2003), 'Role of Dr. B. R. Ambedkar in Bringing The Untouchables on the Political Horizon of India and Lying A Foundation of Indian Democracy', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-I,* Education Deptt., Government of Maharashtra, Mumbai, pp-63-178.

- B. Ambedkar, (2003) 'Buddhism paved way for Democracy and Socialistic Pattern of Society', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III*, Education Deptt., Government of Maharashtra, Mumbai, pp. 406-409.

- B. Ambedkar, (2003) 'Failure of Parliamentary Democracy will Result in Rebellion, Anarchy and Communism', in *Dr. Babasaheb Ambedkar Writings and*

Speeches, Vol. 17-III, Education Deptt., Government of Maharashtra, Mumbai, pp. 423-437.

- B. Ambedkar, (2003) 'Prospects of Democracy in India', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III*, Education Deptt., Government of Maharashtra, Mumbai, pp. 519-523.

- B. Ambedkar, (2003) 'People cemented by feeling of one country, One Constitution and One Destiny, Take the Risk of Being Independent', in *Dr. Babasaheb Ambedkar Writings and Speeches Vol. 17-III*, Education Deptt, Government of Maharashtra, Mumbai, pp. 13-59.

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- B. Ambedkar, (2013), *States and Minorities*, Delhi: Critical Quest.

- Gajendran, (2007) 'Representation', in S. Thorat and Aryama (eds.), *Ambedkar in Retrospect: Essays on Economics, Politics and Society*, Delhi: Rawat Publishers, pp. 184-194.

- Ambedkar, (2003), 'Depressed Classes against Second Chamber: Dr. Ambedkar on Joint Parliamentary Committee Report Provision for Better Representation Demanded', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-I*, Education Deptt, Government of Maharashtra, Mumbai, pp. 231-243.

- Ambedkar, (1987) 'Buddha or Karl Marx', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 3*, Education Deptt., Government of Maharashtra, Mumbai, pp-442-462.

- S. Thorat, (2007) 'Economic System, Development and Economic Planning', in S. Thorat and Aryama (eds), *Ambedkar in Retrospect: Essays on Economics, Politics and Society*, Delhi: Rawat Publishers, pp. 25-48.

- B. Ambedkar, (1991) '*Labor and Parliamentary Democracy and Welfare'*, in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 10*, Education Deptt., Government of Maharashtra, Mumbai, pp. 106-112; 139-143; 243-252

- B. Mungekar, (2007) 'Labour Policy' in S. Thorat and Aryama (eds), *Ambedkar in Retrospect: Essays on Economics, Politics and Society*, Delhi: Rawat Publishers, pp. 76-92.

- R. Ram, (2010) 'Dr, Ambedkar, Neo Liberal Market-Economy and Social Democracy in India', in *Human Rights Global Focus*, Vol. V (384), pp. 12-38, Available at www.roundtableindia.co.in, Accessed: 19.04.2013.

- B. Ambedkar, (2003) 'Trade Union must Enter Politics to Protect their Interests', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III*, Education Deptt, Government of Maharashtra, Mumbai, pp.174-192.

- B. Ambedkar, (1991) 'Why Indian Labour determined to War', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 10*, Education Deptt, Government of Maharashtra, Mumbai, pp.36-43.

- Teltumbde and S. Sen (eds), 'Caste Question in India', in *Scripting the Change, Selected Writings of Anuradha Ghandi*, pp. 62- 91.

GE-4: Politics of Globalization **Credit 06**

GE4T: Politics of Globalization

.

1. Concept of Globalisation: Globalisation debate; for and against.
2. Approaches to understanding globalisation:
    a. Liberal approach
    b. Radical approach
3. International Institutions/Regimes
    a. World Bank
    b. International Monetary Fund
    c. The World Trade Organisation
4. Issues in Globalisation: Alternative Perspectives on its nature and character, critical dimensions: economic, political and cultural
5. Globalisation and democracy: State, sovereignty and the civil society.
6. Globalisation and Politics in developing countries
    a. Globalisation and social movements
    b. Globalisation and the demise of Nation State
    c. Globalisation and human migration
7. The inevitability of globalisation: Domestic and Global responses

Suggested Reading:

- Anthony Giddens, The Globalizing of Modernity.
- Arjun Appadurai, Modernity at Large: Cultural Dimensions of Globalisation, University of Minnesota Press, 1996.
- David E. Korten, Niconor Perlas and Vandana Shiva (ed.), International Forum of Globalisation.
- Deepak Nayyar (ed.) Governing Globalisation: Issues and Institutions, Oxford University Press, 2002.
- Held, David and Anthony Mc grew (ed.), The Global Transformation Reader: An introduction to the Globalisation Debate, 2nd Cambridge, Polity Press, Blackwell Publishing.
- Jagdish Bhagwati, In defense of Globalisation, Oxford University Press, 2004.
- John Stopford, Multinational Corporations, Foreign Policy, Fall, 1998
- Joseph E Stiglitg, Globalisation and its discontents.
- Keohane Rebert and Joseph S. Nye Jr., Globalisation: What is new, what is not.

- Kofi Annan, The politics of Globalisation,
- Marc Lindenberg and Coralie Bryant, Going Global: Transforming Relief and Development NGOs, Bloomfield, Kumarian Press.
- Noreena Hertz, The silent take over: Global Capitalism and the death of Democracy, Praeger, 2000.
- Nye Joseph S and John D. Donanu (ed.) Governance in a Globalizing World, Washington dc, Brookings.
- Nye Jr. Joseph S, Globalisation and American Power.
- Pilpin Robert, The National State in the Global Economy.
- Samuel Huntington, The clash of Civilizations and the Remaking of world order.
- Stanley Hoffman, Clash of civilizations,
- Tyler Cowen, Creative Destruction: How Globalisation is changing the world's culture, New Jersey, Princeton University Press, 2000.
- Brahis John and Steeve Smith (ed.) The Globalisation of World Politics: An Introduction to International Relations, Oxford University Press, 2001.
- John Clark (ed.), Globalising Civic Engagement: Civil Society and Transnational Action, London, Earthscan, 2003.
- Sanjeev Khagram, James Riker and Korthrxu Sikkink (ed.) Restructuring World Politics: Transnational Social Movements, MN, University of Minnesota Press, 2002.
- Bernard Hoelkman and Michel Kostecki, the Political Economy of the World Trading System: From GATT to WTO, New York, OUP,

OR

GE-4: United Nations and Global Conflicts **Credit 06**

GE4T: United Nations and Global Conflicts

I. The United Nations

(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

(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

Suggested Readings:

- 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 twentyfirst 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 Ffifty*. London: Macmillan, pp. 1-14.
- Basu, Rumki (2014) United Nations: Structure and Functions of an international organization, New Delhi, Sterling Publishers
- Gareis, S.B. and Varwick, J. (2005) *The United Nations: An introduction.* Basingstoke: Palgrave, pp. 15-21.
- 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.
- 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.

- 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.
- 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.
- 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.
- 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.
- 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.

- 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.

- Claude, I. (1984) *Swords into plowshares: the progress and problems of international organisation*. 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 United Nations*. 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/N97/189/79/1MG/n9718979.pdf,Open Element (accessed on 13 October 2011).

END

VIDYASAGAR UNIVERSITY

Curriculum for 3-Year B.A. (General)
in
Political Science

Under Choice Based Credit System (CBCS)
w.e.f 2018-2019

VIDYASAGAR UNIVERSITY
B A (General) in Political Science
[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
1	**I**	**SEMESTER-I**					**CA**	**ESE**	**TOTAL**
		Core-1 (DSC-1A)		**Introduction to political theory**	6	5-1-0	15	60	75
		Core-2 (DSC-2A)		Other Discipline(Discipline-2)/TBD	6		15	60	75
		AECC-1 **(Core)**		English-I	6	5-1-0	15	60	75
		AECC-1 **(Elective)**		English/MIL	2	1-1-0	10	40	50
				Semester - I : Total	**20**				**275**
		SEMESTER-II							
	II	Core-3 (DSC-1B)		**Indian Government and Politics**	6	5-1-0	15	60	75
		Core-4 (DSC-2B)		Other Discipline(Discipline-2)/TBD	6		15	60	75
		AECC-2 **(Core)**		MIL - I	6	5-1-0	15	60	75
		AECC-2 **(Elective)**		Environmental Studies	4		20	80	100
				Semester - 2 : Total	**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
2	**III**	**SEMESTER-III**					**CA**	**ESE**	**TOTAL**
		Core-5 (DSC-1C)		**Comparative Government and Politics**	6	5-1-0	15	60	75
		Core-6 (DSC-2C)		Other Discipline(Discipline-2)/TBD	6		15	60	75
		AECC-3 **(Core)**		English-II	6	5-1-0	15	60	75
		SEC-1		SEC-1: Legislative Support	2	1-1-0	10	40	50
				Semester - 3 : Total	**20**				**275**
				SEMESTER-IV					
	IV	Core-7 (DSC-1D)		**Introduction to International Relations**	6	5-1-0	15	60	75
		Core-8 (DSC-2D)		Other Discipline(Discipline-2)/TBD	6		15	60	75
		AECC-4 **(Core)**		MIL - II	6	5-1-0	15	60	75
		SEC-2		SEC-2: Public Opinion and Survey Research	2	1-1-0	10	40	50
				Semester - 4 : Total	**20**				**275**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
3	V	SEMESTER-V					CA	ESE	TOTAL
		DSE-1A		Any one from Discipline -1(Political Sc.) (DSE-1A: Themes in Comparative Political Theory Or Democracy and Governance)	6	5-1-0	15	60	75
		DSE-2A		Other Discipline(Discipline -2) / TBD	6		15	60	75
		GE-1		TBD	6		15	60	75
		SEC-3		SEC-3:Democratic Awareness with Legal Literacy	2	1-1-0	10	40	50
				Semester - 5 : Total	**20**				**275**
		SEMESTER-VI							
	VI	DSE-1B		Any one from Discipline -1(Political Sc.) (DSE-1B:Administration and Public Policy: Concepts and Theories **Or** Understanding Globalization)	6	5-1-0	15	60	75
		DSE-2B		Other Discipline (Discipline -2) / TBD	6		15	60	75
		GE-2		TBD	6		15	60	75
		SEC-4		SEC-4: Conflict and Peace Building	2	1-1-0	10	40	50
				Semester - 6 : Total	**20**				**275**
	Total in all semester:				**122**				**1700**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **CP**=Core Practical , **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies ,

List of Core Courses and Electives
Core Courses (CC)

DSC-1A: Introduction to Political Theory
DSC-1B: Indian Government and Politics
DSC-1C: Comparative Government and Politics
DSC-1D: Introduction to International Relations

Discipline Specific Courses (DSE)

DSE-1A: Themes in Comparative Political Theory
Or
DSE-1A: Democracy and Governance
DSE-1B: Administration and Public Policy: Concepts and Theories
Or
DSE-1B: Understanding Globalization

Skill Enhancement Courses (SEC)

SEC-1: Legislative Support
SEC-2: Public Opinion and Survey Research
SEC-3: Democratic Awareness with Legal Literacy
SEC-4: Conflict and Peace Building

Generic Electives (GE)
[Interdisciplinary for other department]

GE-1: Reading Gandhi
Or
GE-1: Nationalism in India
Or
GE-1: Understanding Ambedkar
GE-2: Human Rights, Gender and Environment
Or
GE-2: Contemporary Political Economy
Or
GE-2: United Nations and Global Conflicts

Core Courses (CC)

DSC-1A (CC-1): Introduction to Political Theory **Credit 06**

DSC1AT: Introduction to Political Theory

1. Course Content:

a. What is Politics?

b. What is Political Theory and what is its relevance?

2. Concepts:

Democracy, Liberty, Equality, Justice, Rights, Gender, Citizenship, Civil Society and State

3. Debates in Political Theory:

a. Is democracy compatible with economic growth?

b. On what grounds is censorship justified and what are its limits?

c. Does protective discrimination violate principles of fairness?

d. Should the State intervene in the institution of the family?

Suggested Readings:

1. 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.
2. 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.
3. Sriranjani, V. (2008) 'Liberty', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction.*New Delhi: Pearson Longman, pp. 40-57.
4. Acharya, A. (2008) 'Equality', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction.*New Delhi: Pearson Longman, pp. 58-73.
5. Menon, K. (2008) Justice', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction.* New Delhi: Pearson Longman, pp. 74-82.
6. Talukdar, P.S. (2008) 'Rights', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction.*New Delhi: Pearson Longman, pp. 88-105.
7. Srinivasan, J. (2008) 'Democracy', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction.*New Delhi: Pearson Longman, pp. 106-128.
8. Roy, A. 'Citizenship', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction.* New Delhi: Pearson Longman, pp. 130-147.
9. Das, S. (2008) 'State', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction.* New Delhi:Pearson Longman, pp. 170-187.
10. Singh, M. (2008) 'Civil Society', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction.*New Delhi: Pearson Longman, pp. 188-205.
11. Menon, N. (2008) 'Gender', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An*
12. *Introduction.* New Delhi: Pearson Longman, pp. 224-235.
13. Shorten, A. (2008) 'Nation and State', in McKinnon, C. (ed.) *Issues in Political Theory*, New York: OxfordUniversity Press, pp. 33-55.
14. Christiano, Thomas. (2008) 'Democracy', in McKinnon, Catriona. (ed.) *Issues in Political Theory*, New York: Oxford University Press, pp. 80-96.

15. Riley, J. (2008) 'Liberty', in McKinnon, C. (ed.) *Issues in Political Theory*, New York: Oxford University Press, pp. 103-125.
16. Casal, P. & William, A. (2008) 'Equality', in McKinnon, C. (ed.) *Issues in Political Theory*. New York: Oxford University Press, pp. 149- 165.
17. Wolf, J. (2008) 'Social Justice', in McKinnon, C. (ed.) *Issues in Political Theory.* New York: Oxford University Press, pp. 172-193.
18. Brighouse, H. (2008) 'Citizenship', in McKinnon, C. (ed.) *Issues in Political Theory.* New York: Oxford University Press, pp. 241-259.
19. Chambers, C. (2008) 'Gender', in McKinnon, C. (ed.) *Issues in Political Theory.* New York: Oxford University Press, pp. 241-288.
20. Swift, A. (2001) *Political Philosophy: A Beginners Guide for Students and Politicians.* Cambridge: Polity Press.
21. 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.
22. Prezowrski, 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.
23. 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.
24. Acharya, A. (2008) 'Affirmative Action', in Bhargava, R. and Acharya, A. (eds.) *Political Theory: An Introduction.* New Delhi: Pearson Longman, pp. 298-307.
25. Frances E O. (1985) 'The Myth of State Intervention in the Family', *University of Michigan Journal of Law Reform*. 18 (4), pp. 835-64.
26. Jha, M. (2001) 'Ramabai: Gender and Caste', in Singh, M.P. and Roy, H. (eds.) *Indian Political Thought: Themes and Thinkers*, New Delhi: Pearson.

DSC-1B (CC-2): - Indian Government and Politics **Credit 06**

DSC1BT: - Indian Government and Politics

Course Content:

1) Approaches to the Study of Indian Politics and Nature of the State in India: Liberal, Marxist and Gandhian

2) Indian Constitution: basic features, debates on Fundamental Rights and Directive Principles

3) Institutional Functioning: Prime Minister, Parliament and Judiciary

4) Power Structure in India: Caste, class and patriarchy

5) Religion and Politics: debates on secularism and communalism

6) Parties and Party systems in India
7) Social Movements : Workers, Peasants, Environmental and Women's Movement
8) Strategies of Development in India since Independence: Planned Economy and Neo-liberalism

Suggested Readings:

1. Abbas, H., Kumar, R. & Alam, M. A. (2011) *Indian Government and Politics.* New Delhi: Pearson, 2011.
2. Chandhoke, N. & Priyadarshi, P. (eds.) (2009) *Contemporary India: Economy, Society, Politics.* New Delhi: Pearson.
3. Chakravarty, B. & Pandey, K. P. (2006) *Indian Government and Politics.* New Delhi: Sage.
4. Chandra, B., Mukherjee, A. & Mukherjee, M. (2010) *India After Independence.* New Delhi: Penguin.
5. Singh, M.P. & Saxena, R. (2008) *Indian Politics: Contemporary Issues and Concerns.* New Delhi: PHI Learning.
6. Vanaik, A. & Bhargava, R. (eds.) (2010) *Understanding Contemporary India: Critical Perspectives.* New Delhi: Orient Blackswan.
7. Menon, N. and Nigam, A. (2007) *Power and Contestation: India Since 1989.* London: Zed Book.
8. Austin, G. (1999) *Indian Constitution: Corner Stone of a Nation.* New Delhi: Oxford University Press.
9. Austin, G. (2004) *Working of a Democratic Constitution of India.* New Delhi: Oxford University Press.
10. Jayal, N. G. & Maheta, P. B. (eds.) (2010) *Oxford Companion to Indian Politics.* New Delhi: Oxford University Press.

DSC-1C (CC-3) : Comparative Government and Politics **Credit 06**

DSC1CT: Comparative Government and Politics

Course Content:

1. The nature, scope and methods of comparative political analysis

2. Comparing Regimes: Authoritarian and Democratic

3. Classifications of political systems:
a) Parliamentary and Presidential: UK and USA
b) Federal and Unitary: Canada and China

4. Electoral Systems: First past the post, proportional representation, mixed systems

5. Party Systems: one-party, two-party and multi-party systems
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.
Suggested Readings:

1. Bara, J & Pennington, M. (eds.). (2009) *Comparative Politics.* New Delhi: Sage.
2. Caramani, D. (ed.). (2008) *Comparative Politics*. Oxford: Oxford University Press.
3. Hague, R. and Harrop, M. (2010) *Comparative Government and Politics: An Introduction.* (Eight Edition). London: Palgrave McMillan.
4. Ishiyama, J.T. and Breuning, M. (eds.). (2011) *21st Century Political Science: A Reference Book.* Los Angeles: Sage.
5. Newton, K. and Deth, Jan W. V. (2010) *Foundations of Comparative Politics: Democracies of the Modern World.* Cambridge: Cambridge University Press.
6. O'Neil, P. (2009) *Essentials of Comparative Politics.* (Third Edition). New York: WW. Norton & Company, Inc.
7. Palekar, S.A. (2009) *Comparative Government and Politics.* New Delhi: PHI Learning Pvt. Ltd.
8. Caramani, D. (2008) 'Introduction to Comparative Politics', in Caramani, D. (ed.) *Comparative Politics*. Oxford: Oxford University Press, pp. 1-23.
9. Mohanty, M. (1975) 'Comparative Political Theory and Third World Sensitivity', in *Teaching Politics.* Nos. 1 & 2, pp. 22-38.
10. 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.
11. Hague, R. and Harrop, M. (2004) *Comparative Government and Politics: An Introduction.*London: Palgrave McMillan, pp. 36-50, 51-68.
12. Hague, R and Harrop, M. (2004) 'The Political Executive', in *Comparative Government and Politics: An Introduction.* London: Palgrave McMillan, pp. 268-290.
13. Cameron, D. R. (2002) 'Canada', in Ann L. G. (ed.) *Handbook of Federal Countries.* Montreal & Kingston: McGill-Queen's University Press, pp. 105-119.
14. 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.
15. Dhillon, Michael. (2009), 'Government and Politics', in *Contemporary China: An Introduction.* London, New York: Routledge, 2009, pp. 137-160.
16. Evans, Jocelyn A.J. (2009) 'Electoral Systems', in Bara, J. and Pennington, M. (eds.) *Comparative Politics*. New Delhi: Sage, pp. 93-119.
17. 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.
18. 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.
19. Caramani, D. (2008) 'Party Systems', in Caramani, D. (ed.) *Comparative Politics.* Oxford: Oxford University Press, pp. 293317, 318-347.
20. Poggi, Gianfranco. (2008) 'The nation-state', in Caramani, D. (ed.) *Comparative Politics.* Oxford: Oxford University Press pp. 85-107.
21. Hague, R. and Harrop, M. (2004) 'The state in a global context', in *Comparative Government and Politics: An Introduction.* London: Palgrave McMillan, pp. 17-34.
22. Bara, J. (2009) 'Methods for Comparative Analysis', in Bara, J. & Pennington, M. (eds.) *Comparative Politics.* New Delhi: Sage, pp. 40-65.

23. Blondel, J. (1996) 'Then and Now: Comparative Politics', *Political Studies. Vol. 47, Issue 1*, pp. 152-160
24. Chandhoke, N. (1996) 'Limits of Comparative Political Analysis', *Economic and Political Weekly.* vol. 31, No. 4, (January 27), pp. PE 2-PE8.
25. Mair, P. (2008) 'Democracy', in Carmani, D. (ed.) *Comparative Politics.* Oxford: Oxford University Press, pp. 108-132.
26. Robbins, J. W. (2011) 'Parsidentialism Verses Parliamentarism', in Ishiyama, J. T. and Marijke, B. (eds.) *21st Century Political Science: A Reference Book.* Los Angeles: Sage, pp. 177- 185.
27. Watts, D. (2003) *Understanding US/UK Government and Politics.* Manchester: Manchester University Press, pp. 1-25; 66-105; 106-138.

DSC-1D (CC-4): Introduction to International Relations **Credit 06**

DSC1DT: Introduction to International Relations

Course Content:

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)

2. Cold War & Post-Cold War Era

a) Second World War & Origins of Cold War
b) Phases of Cold War:
    i. First Cold War
    ii. Rise and Fall of Detente
    iii. Second Cold War
    iv. 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)

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

Suggested Readings:

1. 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.

2. 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.

3. Jackson, R. and Sorenson, G. (2008) *Introduction to International Relations: Theories and Approaches*. New York: Oxford University Press, pp. 59-96.
4. Goldstein, J. and Pevehouse, J.C. (2009) *International Relations.* New Delhi: Pearson, pp. 81-111.

5. Tickner, J. A. (2001) *Gendering World Politics: Issues and Approaches in the Post-Cold War Era.* Columbia University Press.

6. 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.

7. Wenger, A. and Zimmermann, D. (eds.) (2003) *International Relations: From the Cold World War to the Globalized World.* London: Lynne Rienner, pp. 54-89.

8. Appadorai and Rajan, M. S. (eds.) (1985) *India's Foreign Policy and Relations.* New Delhi: South AsiannPublishers.
9. Mewmillians, W.C. and Piotrowski, H. (2001) *The World Since 1945: A History of International Relations*.Fifth edition. London: Lynne Rienner Publishers.

10. Smith, M., Little, R. and Shackleton, M. (eds.) (1981) *Perspectives on World Politics.* London: Croom Helm

11. 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.

12. Ganguly, S. (ed.) (2009) *India's Foreign Policy: Retrospect and Prospect.* New Delhi: Oxford University Press.

13. 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.

14. Basu, Rumki (ed)(2012) *International Politics: Concepts theories and Issues*, New Delhi, Sage Publications India Pvt Ltd.

Discipline Specific Electives (DSE)

DSE-1A: Themes in Comparative Political Theory **Credit 06**

DSE1AT: Themes in Comparative Political Theory

Course Content:

1. Distinctive features of Indian and Western political thought
2. Western Thought: Thinkers and Themes
    a. Aristotle on Citizenship
    b. Locke on Rights
    c. Rousseau on inequality
    d. J. S. Mill on liberty and democracy
    e. Marx and Bakunin on State
3. Indian Thought: Thinkers and Themes
    a. Kautilya on State
    b. Tilak and Gandhi on Swaraj
    c. Ambedkar and Lohia on Social Justice
    d. Nehru and Jayaprakash Narayan on Democracy
    e. Pandita Ramabai on Patriarchy

Suggested Readings:

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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. Sparks, Ch. and Isaacs, S. (2004) *Political Theorists in Context*. London: Routledge, pp. 237-255.

10. Mehta, V. R. (1992) *Foundations of Indian Political Thought.* New Delhi: Manohar Publishers, pp. 88-109.

11. 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.

12. 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.

13. 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.

14. 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.

15. 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.

16. Jha, M. (2001) 'Ramabai: Gender and Caste', in Singh, M.P. and Roy, H. (eds.) *Indian Political Thought:Themes and Thinkers,* New Delhi: Pearson.

OR

DSE-1A: Democracy and Governance **Credit 06**

DSE1AT: Democracy and Governance

Course Content:

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

2. Ideas, Interests and Institutions in Public Policy:

A. Contextual Orientation of Policy Design

B. Institutions of Policy Making

a. Regulatory Institutions – SEBI, TRAI, Competition Commission of India,

b. Lobbying Institutions: Chambers of Commerce and Industries, Trade Unions, Farmers Associations, etc.

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.

4. Dynamics of Civil Society: New Social Movements and Various interests, Role of NGO's, Understanding the political significance of Media and Popular Culture.

Suggested Readings:

1. Agarwal B, Environmental Management, Equity and Ecofeminism: Debating India's Experience, Journal of Pesant Studies, Vol. 25, No. 4, pp. 55-95.

2. Atul Kohli (ed.), The Success of India's Democracy, Cambridge University Press, 2001.

3. Corbridge, Stuart and John Harris, Reinventing India: Liberalisation, Hindu Nationalism and Popular Democracy OUP, 2000.

4. J.Dreze and A.Sen, India: Economic Development and Social Opportunity,Clarendon, 1995

5. Saima Saeed, Screening the Public Sphere: Media and Democracy in India,2013

6. Nick Stevenson, Understanding Media Cultures, 2002

7. Fuller, C.J. (ed.) Caste Today, Oxford University Press, 1997

8. Himat Singh, Green Revolution Reconsidered: The Rural World of Punjab, OUP, 2001.

9. Jagdish Bhagwati, India in Transition: Freeing the Economy, 1993.

10. Joseph E. Stiglitz, Globalisation and its Discontents, WW Norton, 2003.

11. Patel, I.G., Glimpses of Indian Economic Policy: An Insider View, OUP, 2002.

12. 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.

13. Smitu Kothari, Social Movements and the Redefinition of Democracy, Boulder, Westview,1993.

14. Qah, John S.T., Curbing Corruption in Asia: A Comparative Study of Six Countries, Eastern University Press, 2003.

15. Vasu Deva, *E-Governance In India : A Reality*, Commonwealth Publishers,2005

16. 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

17. Pankaj Sharma, E-*Governance: The New Age Governance*, APH Publishers,2004

18. Pippa Norris, *Digital Divide: Civic Engagement, Information Poverty and the Internet in Democratic Societies*, Cambridge: Cambridge University Press, 2001.

19. Ghanshyam Shah [ed.], Social Movements and The State, Sage Publication, 2002

20. Su H. Lee, Debating New Social Movements: Culture, Identity, and Social Fragmentation ,Rawat Publishers, 2010

21. S. Laurel Weldon ,When Protest Makes Policy : How Social Movements Represent Disadvantaged Groups, Michigan Publishers, 2011

22. Richard Cox, Production, Power and World Order, New York, Columbia University Press,1987

23. Baxi, Upendra and Bhikhu Parekh, (ed.) Crisis and Change in Contemporary India, New Delhi, Sage, 1994.

24. Bidyut Chakrabarty, Public Administration: A Reader, Delhi Oxford University Press, 2003.

25. Elaine Kamarck, Government Innovation Around the World: Occasional Paper Series, John F Kennedy School of Government, 2003

26. Kothari, Rajini, Politics in India, Delhi, Orient Longman, 1970.

27. Mackie, Gerry, Democracy Defended, New York, Cambridge University Press, 2003.

28. Mahajan, Gurpreet (ed.), Democracy, Difference and Social Justice, New Delhi, Oxford University Press, 2000.

29. Menon, Nivedita, (ed.), Gender and Politics in India, New Delhi, Oxford University Press, 2001.

30. Mohanty, Manoranjan, Peoples Rights: Social Movements and the State in the Third World, Sage, New Delhi, 1998.

31. Paul Brass, Politics in India since Independence, Hyderabad, Orient Longman, 1990.

32. Rob Jenkins – Regional Reflections: Comparative Politics across India's States, New Delhi, OUP, 2004.

33. Sury, M.M, India: A Decade of Economic reforms : 1991 –2001, New Delhi, New Century Publication, 2003.

34. Thomas R. Dye., Understating Public Policy, Prentice Hall NJ, 1984.

35. Y. Dror, Public Policy Making Reexamined, Leonard Hill Books, Bedfordshire, 1974.

36. Basu Rumki et, al(ed) Democracy and good governance: Reinventing the Public service Delivery System in India, New Delhi, Bloomsbury India, 2015

DSE-1B: Administration and Public Policy: Concepts and Theories Credit 06

DSE1BT: Administration and Public Policy: Concepts and Theories

Course Content:

1. 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.

2. Administrative theories: the classical theory, scientific management, the human - relation theory, and rational decision-making.

3. Understanding public policy: concept and theories, relevance of policy making in public administration and process of policy formulation and implementation and evaluation**.**

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.

Suggested Readings:

1. Wasthi, A.and Maheshwari, S. (2003), *Public Administration.* Agra: Laxmi Narain Agarwal, pp. 3-12.
2. Basu, Rumki, (2014), Public Administration, Concepts and Theories, Delhi Sterling Publishers

3. Henry, N. (2003), Public Administration and Public Affairs. New Delhi: Prentice Hall, pp. 1- 52.

4. 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.

5. Henry, N. (2003) Public Administration and Public Affairs. New Delhi: Prentice Hall, pp. 53-74.

6. 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.

7. Hyderbrand, W. (1980) 'A Marxist Critique of Organization Theory', in Evan, W (ed.) *Frontiers in Organization & Management.* New York: Praeger, pp. 123-150.

8. 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.

9. Bhattacharya, M. (1999) *Restructuring Public Administration: Essays in Rehabilitation.* New Delhi: Jawahar, pp. 29-70, 85-98.

10. Bhattacharya, M. (2001) *New Horizons in Public Administration*. New Delhi: Jawahar, pp. 248-272, 301-323.

11. Dye, T.R. (1975) *Understanding Public Policy.* New Jersey: Prentice Hall, pp. 1-38, 265- 299.

12. Dror, Y. (1983) *Public Policy Making Reexamined.* Oxford: Transaction Publication, pp. 129-216.

13. Bernard, C. (1938) *The Functions of Executive.* Cambridge: Harvard University Press.

14. Esman, M.J. (1986) 'Politics of Development Administration', in Montgomery, J.D. and Siffin, W. (eds.), *Approaches to Development Politics* . New York: McGraw-Hill.

15. Gant, G.F. (1979) *Development Administration: Concepts, Goals, Methods.* Madison: University of Wisconsin Press.

16. 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.

17. 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.

18. Mooney, J. (1954) *The Principles of Organization.* New York: Harper & Row.

19. Simon, H. (1967) *Administrative Behavior: A Study of Decision Making Process in Administrative Organization.* New York: Macmillan.

20. Wiedner, E. (ed.) (1970) *Development Administration in Asia.* Durham: Duke University Press.

OR

DSE-1B: Understanding Globalization **Credit 06**

DSE1BT: Understanding Globalization

Course Content:

1. Globalization

a) What is it?

b) Economic, Political, Technological and Cultural Dimensions

2. Contemporary World Actors

a) United Nations

b) World Trade Organisation (WTO)

c) Group of 77 Countries (G-77)

3. Contemporary World Issues

a) Global Environmental Issues (Global Warming, Bio-diversity, Resource Scarcities)

b) Poverty and Inequality

c) International Terrorism

Suggested Readings:

1. Lechner, F. J. and Boli, J. (eds.) (2004) *The Globalization Reader*. 2nd Edition. Oxford: Blackwell.

2. Held, D., Mc Grew, A. et al. (eds.) (1999) *Global Transformations Reader. Politics, Economics and Culture*, Stanford: Stanford University Press, pp. 1-50.

3. Viotti, P. R. and Kauppi, M. V. (2007) *International Relations and World Politics-Security, Economy, Identity.* Third Edition. Delhi: Pearson Education, pp. 430-450.

4. 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.

5. Tickner, J.A. (2008) 'Gender in World Politics', in Baylis, J. and Smith, S. (eds.) *The Globalization of World Politics: An Introduction to International Relation. 4th Edition.*Oxford: Oxford University Press.

6. Taylor, P. and Grom, A.J.R. (eds.) (2000) *The United Nations at the Millennium.* London: Continuum. pp. 1-20.
7. 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.

8. Sauvant, K. (1981) *Group of 77: Evolution, Structure and Organisation*, New York: Oceana Publications.

9. Chasek, P. S., Downie, D. L. and Brown, J. W. (eds.) *Global Environmental Politics.* Fourth Edition. Boulder: Colorado: Westview Press.

10. Roberts, J.M. (1999) *The Penguin History of the 20th Century*. London: Penguin.

11. Smith, M., Little, R. and Shackleton, M. (eds.) (1981) *Perspectives on World Politics.* London: Croom Helm.

12. White, B. et al. (eds.) (2005) *Issues in World Politics.* Third Edition, New York: Macmillan, pp. 74-92; 191-211.

13. Halliday, F. (2004) 'Terrorism in Historical Perspective', *Open Democracy.* 22 April, available at: http://www.opendemocracy.net/conflict/article_1865.jsp

14. 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.

15. Vanaik, A. (2007) 'Political Terrorism and the US Imperial Project', in *Masks of Empire*. New Delhi: Tulika Books, pp. 103-128.

16. 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.

Skill Enhancement Courses (SEC)

SEC- 1: Legislative Support **Credit 02**

SEC1T: Legislative Support

Course Content:

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.

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.

3. Supporting the legislative committees
Types of committees, Role of committees in reviewing government finances, policy, programmes, and legislation**.**

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.

5. Support in media monitoring and communication: Types of media and their significance for legislators. Basics of communication in print and electronic media. **.**

Suggested Readings:

1. 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

2. Vanka, S. *Primer on MPLADS* Centre for Policy Research, New Delhi, 2008. can be accessed on:http://www.prsindia.org/parliamenttrack/primers/mplads-487/

3. 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

4. Government of India (Lok Sabha Secretariat) *Parliamentary Procedures (Abstract Series)*, 2009. Can be accessed on: http://164.100.47.132/LssNew/abstract/index.aspx

5. 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

6. Government of India, (Ministry of Parliamentary Affairs) *Subordinate Legislation, Parliamentary Procedure*, 2009. Can be accessed on: http://mpa.nic.in/Manual/Manual_English/Chapter/chapter-11.htm

7. 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

8. 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_TVSOMANATHAN.pdf.
9. Debroy, Bibek, "Why we need law reform," *Seminar* January 2001.

10. Mehta, Pratap Bhanu, "India's Unlikely Democracy: The Rise of Judicial Sovereignty**,"** *Journal of Democracy* Vol.18, No.2, pp.70-83.
11. Government links: http://loksabha.nic.in/; http://rajyasabha.nic.in/; http://mpa.nic.in

12. 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

13. 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 unionbudget 1023/

SEC-2: Public Opinion and Survey Research **Credit 02**

SEC2T: Public Opinion and Survey Research

Course Content:

I. Introduction to the course

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

a. What is sampling? Why do we need to sample? Sample design.
b. Sampling error and non-response
c. Types of sampling: Non random sampling (quota, purposive and snowball Sampling); random sampling: simple and stratified

III. Survey Research

a. Interviewing: Interview techniques pitfalls, different types of and forms of Interview
b. Questionnaire: Question wording; fairness and clarity.

IV. Quantitative Data Analysis

a. Introduction to quantitative data analysis
b. Basic concepts: co relational research, causation and prediction, descriptive and Inferential Statistics

V. Interpreting polls

Prediction in polling research: possibilities and pitfalls
Politics of interpreting polling

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 behavior 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.

Suggested Readings:

1. R. Erikson and K. Tedin, (2011) *American Public Opinion,* 8th edition, New York: Pearson Longman Publishers,. pp. 40-46.

2. G. Gallup, (1948) *A guide to public opinion polls* Princeton, Princeton University Press, 1948.Pp. 3-13.

3. 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)

4. Lokniti Team, (2004) 'National Election Study 2004', *Economic and Political Weekly*, Vol. XXXIX (51).

5. 'Asking About Numbers: Why and How', *Political Analysis* (2013), Vol. 21(1): 48-69, (first published online November 21, 2012)

6. H. Asher, (2001) 'Chapters 3 and 5', in *Polling and the Public: What Every Citizen Should Know,* Washington DC: Congressional Quarterly Press.

7. R. Erikson and K. Tedin, (2011) *American Public Opinion,* 8th edition, New York, Pearson Longman Publishers, pp. 40-46.

8. A.Agresti and B. Finlay, (2009) *Statistical methods for the Social Sciences,* 4th edition, Upper saddle river, NJ: Pearson-Prentice Hall,

9. S. Kumar and P. Rai, (2013) 'Chapter 1', in *Measuring Voting Behaviour in India*, New Delhi: Sage.

10. R. Karandikar, C. Pyne and Y. Yadav, (2002) 'Predicting the 1998 Indian Parliamentary Elections', *Electoral Studies*, Vol. 21, pp.69-89.

11. 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.

12. K. Warren, (2001) 'Chapter 2', in *In Defense of Public Opinion Polling,* Boulder: West view Press, pp. 45-80.

13. W. Cochran, (2007) 'Chapter 1', *Sampling Techniques,* John Wiley & Sons.

14. G. Gallup, (1948) *A Guide to Public Opinion Polls.* Princeton: Princeton University Press, pp. 14-20; 73-75.

15. D. Rowntree (2000) *Statistics Without Tears: an Introduction for Non Mathematicians,* Harmonds worth: Penguin.

SEC-3 : Democratic Awareness with Legal Literacy **Credit 02**

SEC3T : Democratic Awareness with Legal Literacy

Course Content:

Unit I

- Outline of the Legal system in India
- 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.
- Role of the police and executive in criminal law administration.
- Alternate dispute mechanisms such as lok adalats, non - formal mechanisms.

Unit II

- Brief understanding of the laws applicable in India
- 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.

- 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.

- Concepts like Burden of Proof, Presumption of Innocence, Principles of Natural Justice, Fair comment under Contempt laws.

- Personal laws in India : Pluralism and Democracy

- Laws relating to contract, property and tenancy laws.
- Laws relating to dowry, sexual harassment and violence against women

- Laws relating to consumer rights

- Laws relating to cyber crimes

- Anti-terrorist laws: implications for security and human rights

- **Practical application:** Visit to either a (I) court or (ii) a legal aid centre set up by the Legal Services Authority or an NGO or (iii) a Lok Adalat, and to interview a litigant or person being counseled. Preparation of a case history.

Unit III

Access to courts and enforcement of rights

- Critical Understanding of the Functioning of the Legal System
- Legal Services Authorities Act and right to legal aid, ADR systems

Practical application:

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

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.

Suggested Reading:

1. Creating Legal Awareness, edited by Kamala Sankaran and Ujjwal Singh (Delhi: OUP, 2007)

2. Legal literacy: available amongst interdisciplinary courses on Institute of Life Long Learning (Delhi University) Virtual Learning Portal namely vle.du.ac.in Multiple Action Research Group, *Our Laws Vols 1-10*, Delhi.

3. Indian Social Institute, New Delhi, *Legal Literacy Series Booklets*.

4. S.K. Agarwala, *Public Interest Litigation in India*, K.M. Munshi Memorial Lecture, Second Series, Indian Law Institute, Delhi, 1985.
5.
6. S.P. Sathe, *Towards Gender Justice*, Research Centre for Womens' Studies, SNDT Women's University, Bombay, 1993.

7. Asha Bajpai, *Child Rights in India : Law, Policy, and Practice*, Oxford University Press, New Delhi,2003

8. Agnes, Flavia *Law and Gender Equality*, OUP, 1997.

9. Sagade, Jaga, *Law of Maintenance: An Empirical Study*, ILS Law College, Pune 1996.

10. B.L. Wadhera, *Public Interest Litigation - A Handbook*, Universal, Delhi, 2003.

11. Nomita Aggarwal, Women and Law in India, New Century, Delhi, 2002.

12. P.C. Rao and William Sheffiled *Alternate Dispute Resolution: What it is and How it Works*, , Universal Law Books and Publishers, Delhi, 2002

13. V.N. Shukla's *Constitution of India* by Mahendra P. Singh, Eastern Book Co. 10th edition 2001.

14. Parmanand Singh, *'Access to Justice and the Indian Supreme Court'*, 10 & 11 Delhi Law Review 156, 1981-82.

SEC-4: Conflict and Peace Building **Credit 02**

SEC4T: Conflict and Peace Building

Course Content:

Unit I. Concepts

a. Understanding Conflict
b. Conflict Management, Conflict Resolution and Conflict Transformation
c. Peace Building

Unit II: Dimensions of Conflict

a. Ideology
b. Economic/Resource Sharing Conflicts
c. Socio- Cultural Conflicts (Ethnic, Religious, Gender- based)

Unit III: Sites of Conflict

a. Local
b. Sub-National
c. International

Unit IV: Conflict Responses: Skills and Techniques

a. Negotiations: Trust Building
b. Mediation: Skill Building; Active Listening
c. Track I, Track II & Multi Track Diplomacy
d. Gandhian Methods

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 endeavors' in the South Asian region which have used music as a peace building measure for promoting understanding among different communities.

4) A sport 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.

Suggested Readings:

1. O. Ramsbotham, T. Woodhouse and H. Miall, (2011) 'Understanding Contemporary Conflict', in *Contemporary Conflict Resolution*, (Third Edition), Cambridge: Polity Press, pp. 94-122.

2. 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.

3. P. Wallensteen, (2012) 'Armed Conflicts', in *Understanding Conflict Resolution*, (Third Edition), London: Sage, pp. 13-28.

4. C. Mitchell, (2002) 'Beyond Resolution: What Does Conflict Transformation Actually Transform?', in *Peace and Conflict Studies*, 9:1, May, pp.1-23.

5. S. Ryan, (1990) 'Conflict Management and Conflict Resolution', in *Terrorism and Political Violence*, 2:1, pp. 54-71.

6. J. Lederach, (2003) *The Little Book Of a Conflict Transformation*, London: Good Books.
7. L.Doucet, (1996)*Thinking About Conflict*, Resource Pack For Conflict Transformation: International Alert.

8. M. Lund, (2001) 'A Toolbox for Responding to Conflicts and Building Peace', in L. Reychler and T. Paffenholz, eds., *Peace-Building: A Field Guide*, Boulder: Lynne Rienner, pp. 16-20.

9. L. Schirch, (2004) *The Little Book Of Strategic Peacebuilding*, London: Good Books.

10. R. Rubenstein, (2003) 'Sources', in S. Cheldelin, D. Druckman and L. Fast (eds.) *Conflict: From Analysis to Intervention*, London: Continuum, pp.55-67.

11. 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.

12. 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.

13. D. Barash and C. Webel, (2009) *Peace and Conflict Studies*, London: Sage Publication, pp. 91- 117.

14. D. Sandole, (2003) 'Typology' in S. Cheldelin, D. Druckman and L. Fast (eds.) *Conflict: From Analysis to Intervention*, London: Continuum, pp.39-54.

15. P. Wallenstein, (2007) *Understanding Conflict Resolution* (2nd ed.), London: Sage Publications.

16. H. Saunders, (1999) *A Public Peace Process: Sustained Dialogue To Transform Racial and Ethnic Conflicts*, Palgrave Macmillan: New York, pp. 1-30.

17. 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.

18. J Bercovitch, V. Kremenyuk, and I. Zartman (eds.), (2009) *The Sage Hand Book of Conflict Resolution*, London: Sage Publications.

19. 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.

20. J. Davies and E. Kaufman (eds.), (2003) *Second Track/Citizens' Diplomacy: Concepts and Techniques for Conflict Transformation*, Rowman & Littlefield: Maryland.

21. C. Webel and J. Galtung (eds.), (2007) *The Handbook of Peace and Conflict Studies*, London: Routledge.

22. Toolkits by United States Institute of Peace

23. S. Mason and M. Siegfried, (2010) *Debriefing Mediators To Learn Their Experiences*, Washington D.C: United States Institute of Peace.

24. I. Zartman and A. De Soto, (2010) *Timing Mediation Initiatives*, Washington D.C: United States Institute of Peace.

25. A. Smith and D. Smock, (2010) *Managing A Mediation Process*, Washington D.C: United States Institute of Peace.

26. 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:

27. The International Network of Peace Museums, at www.mueseumsforpeace.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

28. 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

29. Mediation:http://www.initiativeforpeacebuilding.eu/resources/A_guide_to_Mediation_HDC.pdf
http://www.pgexchange.org/images/toolkits/civicus%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

30. 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

31. John Paul Lederach, *The Journey Toward Reconciliation*, London: Herald Press, 1999.

32. Charles Lerche, "Peace Building through Reconciliation," *International Journal of Peace Studies*, Vol. 5. No. 2,
2000.http://www.gmu.edu/programs/icar/ijps/vol5_2/lerche.htm Crossword Puzzle:
http://www.cengage.com/cgiwadsworth/
course_products_wp.pl?fid=M20bI&product_isbn_issn=9781133602101
http://www.cengage.com/cgiwadsworth/
course_products_wp.pl?fid=M20bI&product_isbn_issn=9781111344238

Generic Elective (GE)

[Interdisciplinary for other department]

GE-1: Reading Gandhi **Credit: 06**

GE1T: Reading Gandhi

Course Content:

A).Ways to read a text:

a. textual

b. contextual

B) Hind Swaraj:

1. Gandhi in his own words: A close reading of Hind Swaraj.
2.Commentaries on Hind Swaraj and Gandhian thought:

C) Gandhi and modern India.

a. Nationalism.
b. Communal unity
c. Women's Question
d. Untouchability.

Suggested Readings:

1. Terence Ball, Reappraising Political Theory, Ch. 1, OUP, 1995

2. "Meaning and Interpretation in the History of Ideas" in Visions of Politics, Quentin Skinner(ed.), Vol. 1, CUP, Cambridge, 2002.

3. "Introduction", M.K.Gandhi, Hind Swaraj and other writings ed. A.J.Parel (1997).

4. B. Parekh, Gandhi (1997), chs. 4 ("Satyagraha") and 5 ("The critique of modernity").

5. D.Hardiman, Gandhi in his time and ours (2003), ch.4 ("An alternative modernity").

6. "Nationalist Movement in India--- A Reader" by Sekhar Bandyopadhyay. OXFORD. 2008.

7. Gandhi's India of my Dreams (compiledR.K.Prabhu):
"The meaning of Swaraj" (no.2); "In defence of Nationalism" (no.3);
"India'scultural heritage" (no.45); "Regeneration of Indian women" (no.54);
Women's education"(no.55);"Communal unity" (no.59);"The curse of ntouchability" (no.61); "Religious tolerance.in India" (no.62);
"The problem of minorities" (no.66).

OR

GE-1: Nationalism in India **Credit 06**

GE1T: Nationalism in India

Course Content:

I. Approaches to the Study of Nationalism in India

Nationalist, Imperialist, Marxist, and Subaltern Interpretations

II. Reformism and Anti-Reformism in the Nineteenth Century

Major Social and Religious Movements in 19th century

III. Nationalist Politics and Expansion of its Social Base

a. Phases of Nationalist Movement: Liberal Constitutionalists, Swadeshi and the Radicals; Beginning of Constitutionalism in India
b. Gandhi and Mass Mobilisation: Non-Cooperation Movement, Civil Disobedience Movement, and Quit India Movement
c. Socialist Alternatives: Congress Socialists, Communists

IV. Social Movements

a. The Women's Question: Participation in the National Movement and its Impact
b. The Caste Question: Anti-Brahminical Politics
c. Peasant, Tribals and Workers Movements

V. Partition and Independence

a. Communalism in Indian Politics
b. The Two-Nation Theory, Negotiations over Partition

Suggested Readings:

1. S. Bandopadhyay, (2004) *From Plassey to Partition: A History of Modern India*, New Delhi: Orient Longman, pp. 184-191

2. R. Thapar, (2000) 'Interpretations of Colonial History: Colonial, Nationalist, Post-colonial', in P. DeSouza, (ed.) *Contemporary India: Transitions*, New Delhi: Sage Publications, pp. 25-36.

3. S. Bandopadhyay, (2004) From Plassey to Partition: A History of Modern India, New Delhi: Orient Longman, pp.139-158, 234-276.

4. A.Sen, (2007) 'The idea of Social Reform and its Critique among Hindus of Nineteenth Century India', in S. Bhattacharya, (ed.) *Development of Modern Indian Thought and the Social Sciences*, Vol. X. New Delhi: Oxford University Press.

5. S. Bandopadhyay, (2004) *From Plassey to Partition: A History of Modern India*. New Delhi: Orient Longman, pp. 279-311.

6. S. Sarkar, (1983*) Modern India (1885-1947)*, New Delhi: Macmillan,

7. P. Chatterjee, (1993) 'The Nation and its Pasts', in P. Chatterjee, *The Nation and its Fragments: Colonial and Postcolonial Histories*. New Delhi: Oxford University Press, pp. 76-115.

8. S. Bandopadhyay, (2004) *From Plassey to Partition: A history of Modern India*. New Delhi: Orient Longman, pp. 342-357, 369-381.

9. G. Shah, (2002) *Social Movements and the State*, New Delhi: Sage, pp. 13-31

10. A.Jalal, and S. Bose, (1997) *Modern South Asia: History, Culture, and Political Economy*. New Delhi: Oxford University Press, pp. 135-156.

11. A.Nandy, (2005) *Rashtravad banam Deshbhakti* Translated by A. Dubey, New Delhi: Vani Prakashan. pp. 23-33. (The original essay in English is from A. Nandy, (1994) New Delhi: Oxford University Press, pp. 1-8.)

12. B. Chakrabarty and R. Pandey, (2010) *Modern Indian Political Thought*, New Delhi: Sage Publications.

13. P. Chatterjee, (1993) *The Nation and its Fragments: Colonial and Postcolonial Histories*, New Delhi: Oxford University Press.

14. R. Pradhan, (2008) *Raj to Swaraj*, New Delhi: Macmillan (Available in Hindi).

15. S. Islam, (2006) *Bharat Mein Algaovaad aur Dharm*, New Delhi: Vani Prakashan.

OR

GE-1: Understanding Ambedkar **Credit 06**

GE1T: Understanding Ambedkar

Course Content:

I. Introducing Ambedkar

Approach to Study Polity, History, Economy, Religion and Society

II. Caste and Religion

a. Caste, Untouchability and Critique of Hindu Social Order
b. Religion and Conversion

III. Women's Question

a. Rise and Fall of Hindu Women
b. Hindu Code Bill

IV. Political Vision

a. Nation and Nationalism
b. Democracy and Citizenship

V. Constitutionalism

a. Rights and Representations
b. Constitution as an Instrument of Social Transformation

VI. Economy and Class Question

a. Planning and Development
b. Land and Labor

Students Presentations

a. Format for Student Presentations

1) Five presentations on any original writing/speeches by B. R Ambedkar can be used by the students for presentations (Preferably other than compulsory writings that has been suggested in the reading list)
2) Six Presentations on the different issues concerned to Ambedkar's works and the irrelevance in contemporary India. (Preferably other than compulsory writings that has been suggested in the reading list)
3) One Presentation on Critical understanding on Ambedkar's Ideas.

b. References for Students' Presentations:

1) Babasaheb Ambedkar, Writings and Speeches, 22 Volumes (Available on www.ambedkar.org)
2) Narendra Jadhav, Ambedkar Spoke, 3 Volumes
3) Any other related audio-visual source

Suggested Readings:

1. G. Omvedt, (2008) 'Phule-Remembering The Kingdom of Bali', Seeking Begumpura Navyana, pp. 159-184.

2. M. Gore, (1993) *The Social Context of an Ideology: Ambedkar's Political and Social Thought*, Delhi: Sage Publication, pp. 73-122 ; 196-225.

3. B. Ambedkar, (1989) 'Annihilation of Caste with a Reply to Mahatma Gandhi', in *Dr. Babasaheb Ambedkar Writings and Speeches: Vol. 1*, Education Deptt., Government of Maharashtra, Mumbai, pp. 23-96.

4. E. Zelliot, (1996) 'From Untouchable to Dalit: Essays on the Ambedkar Movement', in *The Leadership of Babasaheb Ambedkar*, Delhi: Manohar, pp. 53-78.

5. G. Omvedt, *Liberty Equality and Community: Dr. Ambedkar's Vision of New Social Order*, Available at http://www.ambedkar.org/research/LibertyEquality.htm, Accessed: 19.04.2013.

6. *The Untouchables Who were they and why they become Untouchables?*, Available at http://www.ambedkar.org/ambcd/39A.Untouchables%20who%20were%20they_why%20they%20became%20PART%20I.htm, Accessed: 18.04.2013.

7. B. Ambedkar, (1987) 'The Hindu Social Order: Its Essential Principles', in *Dr. Babasaheb Ambedkar Writings and Speeches: Vol. 3*, Education Deptt., Government of Maharashtra, 1989, pp. 95-129.

8. B. Ambedkar, (2003) 'What way Emancipation?', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III*, Education Deptt., Government of Maharashtra, Mumbai, pp-175-201.

9. B. Ambedkar, (1987) 'Philosophy of Hinduism', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 3*, Education Deptt., Government of Maharashtra, Mumbai, pp-3-92.

10. E. Zelliot, (2013) 'Ambedkar's World: The Making of Babasaheb and the Dalit Movement', in *The Religious Conversion Movement-1935-1956,* Delhi, pp. 143-173.

11. S. Rege, (2013) 'Against the Madness of Manu', in *B. R. Ambedkar's Writings on Brahmanical Patriarchy*, Navyana Publication, pp. 13-59 ; 191-232.

12. B. Ambedkar, (2003) 'The Rise and Fall of Hindu Woman: Who was Responsible for It?', in *Dr. Babasaheb Ambedkar Writings and Speeches Vol. 17- II,* Education Deptt., Government of Maharashtra, Mumbai, pp. 109-129.

13. B. Ambedkar, (1987) 'The Women and the Counter-Revolution', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 3,* Education Deptt., Government of Maharashtra, Mumbai, pp.427-437.

14. P. Ramabai , (2013), *The High Caste Hindu Woman,* Critical Quest, Delhi.

15. B. Ambedkar, (1991) 'What Gandhi and Congress have done to the Untouchables', in *Dr. Babasaheb Ambedkar Writings and Speeches*, Education Deptt, Government of Maharashtra, Vol.9, pp. 40-102; 181-198; 274-297.

16. B. Ambedkar, (2003) 'Conditions Precedent for the successful working of Democracy', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III,* Education Deptt, Government of Maharashtra, Mumbai, pp. 472-486.

17. G. Aloysius, (2009). *Ambedkar on Nation and Nationalism,* Critical Quest, Delhi.

18. B. R. Ambedkar, (2003), 'I have no Homeland', in *Dr. Babasaheb Ambedkar Writings and Speeches Vol- 17,* Education Deptt., Government of Maharashtra, Mumbai, pp-51-58.

19. B. Ambedkar, (2003), 'Role of Dr. B. R. Ambedkar in Bringing The Untouchables on the Political Horizon of India and Lying A Foundation of Indian Democracy', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-I,* Education Deptt., Government of Maharashtra, Mumbai, pp-63-178.

20. B. Ambedkar, (2003) 'Buddhism paved way for Democracy and Socialistic Pattern of Society', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III,* Education Deptt., Government of Maharashtra, Mumbai, pp. 406-409.

21. B. Ambedkar, (2003) 'Failure of Parliamentary Democracy will Result in Rebellion, Anarchy and Communism', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III,* Education Deptt., Government of Maharashtra, Mumbai, pp. 423-437.
22. B. Ambedkar, (2003) 'Prospects of Democracy in India', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III,* Education Deptt., Government of Maharashtra, Mumbai, pp. 519-523.

23. B. Ambedkar, (2003) 'People cemented by feeling of one country, One Constitution and One Destiny, Take the Risk of Being Independent', in *Dr. Babasaheb Ambedkar Writings and Speeches Vol. 17-III,* Education Deptt, Government of Maharashtra, Mumbai, pp. 13-59.

24. Ambedkar, Evidence before South Borough committee on Franchise, Available at http://www.ambedkar.org/ambcd/07.%20Evidence%20before%20the%20Southborough%20Committee.htm, Accessed: 19.04.2013.

25. Constituent Assembly Debates, Ambedkar's speech on Draft Constitution on 4th November1948, *CAD Vol. VII,* Lok Sabha Secretariat, Government of India, 3rd Print, pp. 31-41.

26. B. Ambedkar, (2013), *States and Minorities*, Delhi: Critical Quest.

27. A.Gajendran, (2007) 'Representation', in S. Thorat and Aryama (eds.), *Ambedkar in Retrospect: Essays on Economics, Politics and Society*, Delhi: Rawat Publishers, pp. 184-194.

28. B. Ambedkar, (2003), 'Depressed Classes against Second Chamber: Dr. Ambedkar on Joint Parliamentary Committee Report Provision for Better Representation Demanded', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-I,* Education Deptt, Government of Maharashtra, Mumbai, pp. 231-243.

29. B. Ambedkar, (1987) 'Buddha or Karl Marx', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 3*, Education Deptt., Government of Maharashtra, Mumbai, pp-442-462.

30. S. Thorat, (2007) 'Economic System, Development and Economic Planning', in S. Thorat and Aryama (eds), *Ambedkar in Retrospect: Essays on Economics, Politics and Society*, Delhi: Rawat Publishers, pp. 25-48.

31. B. Ambedkar, (1991) '*Labor and Parliamentary Democracy and Welfare'*, in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 10,* Education Deptt., Government of Maharashtra, Mumbai, pp. 106-112; 139-143; 243-252

32. B. Mungekar, (2007) 'Labour Policy' in S. Thorat and Aryama (eds), *Ambedkar in Retrospect: Essays on Economics, Politics and Society,* Delhi: Rawat Publishers, pp. 76-92.

33. R. Ram, (2010) 'Dr, Ambedkar, Neo Liberal Market-Economy and Social Democracy in India', in *Human Rights Global Focus,* Vol. V (384), pp. 12-38, Available at www.roundtableindia.co.in, Accessed: 19.04.2013.

34. B. Ambedkar, (2003) 'Trade Union must Enter Politics to Protect their Interests', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III*, Education Deptt, Government of Maharashtra, Mumbai, pp.174-192.

35. B. Ambedkar, (1991) 'Why Indian Labour determined to War', in *Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 10*, Education Deptt, Government of Maharashtra, Mumbai, pp. 36-43.

36. A. Teltumbde and S. Sen (eds), 'Caste Question in India', in *Scripting the Change, Selected Writings of Anuradha Ghandi*, pp. 62- 91.

GE-2: Human Rights, Gender and Environment **Credit 06**

GE2T: Human Rights, Gender and Environment

Course Content:

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.

III : 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

Suggested Readings:

1. Agarwal, Anil and Sunita Narain (1991), *Global Warming and Unequal World: A Case of Environmental Colonialism*, Centre for Science and Environment, Delhi.

2. Baxi, Upendra (2002), *The Future of Human Rights*, Oxford University Press, Delhi.

3. Beteille, Andre (2003), *Antinomies of Society: Essays on Ideology and Institutions*, Oxford University Press, Delhi.

4. Geetha, V. (2002) *Gender*, Sree Publications, Kolkata.

5. Ghanshyam Shah, (1991) *Social Movements in India*, Sage Publications, Delhi.

6. Guha, Ramachandra and Madhav Gadgil, (1993) *Environmental History of India*, University of California Press, Berkeley.

7. Haragopal, G. (1997) *The Political Economy of Human Rights*, Himachal Publishing House, Mumbai.

8. Menon, Nivedita (ed) (2000) *Gender and Politics in India*, Oxford University Press, Delhi.

9. Patel, Sujata et al (eds) (2003) *Gender and Caste: Issues in Contemporary Indian Feminism*, Kali for Women, Delhi.

10. Shah, Nandita and Nandita Gandhi (1992) *Issues at Stake: Theory and Practice in the Contemporary Women's Movement in India*, Kali for Women, Delhi.

11. Gonsalves, Colin (2011) Kaliyug: The decline of human rights law in the period of globalization Human Rights Law Network, New Delhi.

12. Sen, Amartya, Development as Freedom (1999) New Delhi, OUP.

OR

GE-2: Contemporary Political Economy **Credit 06**

GE2T: Contemporary Political Economy

Course Content:

I. Approaches to Political Economy

Classical Liberalism, Marxism, Welfarism, Neo-liberalism and Gandhian approach

II. Capitalist Transformation

a. European Feudalism and Transition to Capitalism
b. Globalization: Transnational Corporations, World Trade Organization, Non-governmental Organizations (their role in development)

III. Issues in Development

(i) Culture: Media and Television
(ii) Big Dams and Environmental Concerns
(iii) Military: Global Arms Industry and Arms Trade
(iv) Knowledge Systems

IV. Globalization and Development Dilemmas

(i) IT revolution and Debates on Sovereignty
(ii) Gender
(iii) Racial and Ethnic Problems
(iv) Migration

Suggested Readings:

1. Arblaster, A. (2006) 'The Rise and Decline of Western Liberalism' in Lal, D. *Reviving the Invisible Hand: The Case for Classical Liberalism in the Twenty first Century.* Princeton: Princeton University Press, pp. 1- 8, 17- 30, and 48- 51.

2. Mandel, E. (1979) *An Introduction to Marxist Economic Theory.* New York: Pathfinder Press, 3rd print, pp. 3-73.

3. Kersbergen, K.V. and Manow, P. (2009) *Religion, Class Coalition and Welfare State.* Cambridge: Cambridge University Press, chapters 1 and 10, pp. 1-38; 266-295

4. Andersen, J. G. (ed.) (2008) 'The Impact of Public Policies' in Caramani, D *Comparative Politics.* Oxford: Oxford University Press, ch 22, pp. 547- 563 .

5. Harvey, D. (2005) A *Brief History of Neo-liberalism.* Oxford: Oxford University Press, pp. 1- 206.

6. Ghosh, B.N. (2007) *Gandhian Political Economy: Principles, Practice and Policy.* Ashgate Publishing Limited, pp. 21- 88.

7. Phukan, M. (1998) *The Rise of the Modern West: Social and Economic History of Early Modern Europe.* Delhi: Macmillan India, (ch.14: Transition from Feudalism to Capitalism), pp. 420- 440.

8. Gilpin, R. (2003) *Global Political Economy: Understanding the International Economic Order.* Hyderabad: Orient Longman, pp. 278- 304.

9. Kennedy, P. (1993) *Preparing for the Twentieth Century.* UK: Vintage, Ch. 3
10. Gelinas, J. B. (2003) *Juggernaut Politics- Understanding Predatory Globalization.* Halifax, Fernwood, Ch.3. Available from: *www.globalpolicy.org*

11. Gilpin, R. (2003) *Global Political Economy: Understanding the International Economic Order. H*yderabad: Orient Longman, Ch. 8, pp. 196- 233.

12. Prasad, K. (2000) *NGOs and Social-economic Development Opportunities.* New Delhi: Deep & Deep, ch. 1, 2, 3, 5.

13. Fisher, J. (2003) *Non-governments – NGOs and the Political Development in the Third World.* Jaipur: Rawat, ch. 1, 4, 6.81

14. Media and Television Mackay, H. (2004) 'The Globalization of Culture' in Held, D. (ed.) *A Globalizing World? Culture, Economics and Politics*. London: Routledge, pp. 47- 84.

15. Tomlinson, J. (2004) 'Cultural Imperialism' in Lechner, F. J and Boli, J. (eds.) The Globalization Reader. Oxford: Blackwell, pp. 303- 311.

16. Lechner, F. J and Boli, J. (eds.) (2004) *The Globalization Reader.* Oxford: Blackwell, pp. 361- 376 and 398- 404.

17. Held, D. and Mcrew, A. (eds.) (2000) *The Global Transformations Reader*. Cambridge: Polity Press, pp. 374- 386.

18. Singh, S. (1997) *Taming the Waters: The Political Economy of Large Dams in India*. New Delhi: Oxford University Press, pp. 133- 163, 182- 203, 204- 240.

19. Kesselman, M. (2007) *The Politics of Globalization.* Boston: Houghton Mifflin Company, pp. 330- 339.

20. Marglin, S. (1990) 'Towards the Decolonisation of the Mind' in Marglin, S. and Marglin, F. A. (eds.) *Dominating Knowledge: Development, Culture and Resistance*. Oxford: Oxford University Press, pp. 1- 28.

21. L. Lechner, F. J and Boli, J. (eds.) (2004) The Globalization Reader. Oxford: Blackwell, pp. 211- 244.

22. Held, D. and Mcrew, A. (eds.) (2000) The Global Transformations Reader. Cambridge: Polity Press, pp. 105-155.

23. Omahe, K. (2004) 'The End of the Nation State', L. Lechner, F. J and Boli, J. (eds.) The Globalization Reader. Oxford: Blackwell, ch. 29.

24. Glen, J. (2007) *Globalization: North-South Perspectives.* London: Routledge, ch.6.

25. Sen, A. (2006) *Identity and Violence: Illusion and Destiny.* London: Penguin/Allen Lane, ch.7, pp. 130-148.

26. Berkovitch, N. (2004) 'The Emergence and Tranformation of the International Women's Movements' in L. Lechner, F. J and Boli, J. (eds.) *The Globalization Reader*. Oxford: Blackwell, ch.31, pp. 251- 257.

27. Steans, J. (2000) 'The Gender Dimension' in Held, D. and Mcrew, A. (eds.), *The Global Transformations Reader*. Cambridge: Polity Press, ch.35, pp. 366- 373.

28. Tickner, J. A. (2008) 'Gender in World Politics' in Baylis, J.,Smith, S. & Owens, P. (eds.) *Globalization of World Politics*, 4th edn., New Delhi: Oxford University Press, ch.15.

29. Kesselman, M. and Krieger, J. (2006) *Readings in Comparative Politics: Political Challenges and Changing Agendas*. Boston: Houghton Miffin Company, pp. 243-254 and 266- 276.

30. Arya, S. and Roy, A. (eds.) *Poverty Gender and Migration.* New Delhi: Sage, Ch. 1

31. Kesselman, M. (2007) *The Politics of Globalization.* Boston: Houghton Mifflin Company, pp. 450- 462.

32. Nayyar, D. (ed.) (2002) *Governing Globalization.* Delhi: OUP, pp. 144- 176.

OR

GE-2: United Nations and Global Conflicts **Credit 06**

GE2T: United Nations and Global Conflicts

Course Content:

I. The United Nations

(a) An Historical Overview of the United Nations
(b) Principles and Objectives
(c) Structures and Functions: General Assembly; Security Council, and Economic and SocialCouncil; 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: UnitedNations 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

(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

Suggested Readings:

1. Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations.* Delhi: Pearson Education, pp. 39-62.

2. Goldstein, J. and Pevehouse, J.C. (2006) *International relations*. 6th edn. New Delhi: Pearson, pp. 265-282.

3. Taylor, P. and Groom, A.J.R. (eds.) (2000) *The United Nations at the millennium.* London: Continuum, pp. 1-20.

4. Gareis, S.B. and Varwick, J. (2005) *The United Nations: an introduction.* Basingstoke: Palgrave, pp. 1-40.

5. Gowan, P. (2010) 'US: UN', in Gowan, P. 'A calculus of power: grand strategy in the twentyfirst century. London: Verso, pp. 47-71.

6. 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.

7. Thakur, R. (1998) 'Introduction', in Thakur, R. (eds.) *Past imperfect, future uncertain: The UN at Ffifty*. London: Macmillan, pp. 1-14.

8. Basu, Rumki (2014) United Nations: Structure and Functions of an international organization, New Delhi, Sterling Publishers

9. Gareis, S.B. and Varwick, J. (2005) *The United Nations: An introduction.* Basingstoke:Palgrave, pp. 15-21.

10. Taylor, P. and Groom, A.J.R. (eds.) (2000) *The United Nations at the millennium.* London: Continuum, pp. 21-141.

11. Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations.* Delhi: Pearson Education, pp.119-135.

12. Nambiar, S. (1995) 'UN peace-keeping operations', in Kumar, S. (eds.) The United Nations atfifty. New Delhi, UBS, pp. 77-94.

13. Whittaker, D.J. (1997) 'Peacekeeping', in *United Nations in the contemporary world*.London: Routledge, pp. 45-56.

14. White, B. et al. (eds.) (2005) *Issues in world politics*. 3rd edn. New York: Macmillan, pp. 113-132.

15. Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations.* Delhi: Pearson Education,pp.264-266.

16. 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.

17. 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.

18. Ghali, B.B. (1995) *An agenda for peace*. New York: UN, pp.5-38.

19. United Nations Department of Public Information. (2008) *The United Nations Today*. NewYork: UN.

20. Calvocoressi, P. (2001) *World Politics: 1945-200.* 3rd edn. Harlow: Pearson Education, pp.116-124.

21. Armstrong, D., Lloyd, L. and Redmond, J. (2004) *International organisations in world politics.* 3rd edn. New York: Palgrave Macmillan, pp. 42-43.

22. Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations.* Delhi: Pearson Education, pp. 64-65 and 172-173.

23. Calvocoressi, P. (2001) *World Politics: 1945-200.* 3rd edn. Harlow: Pearson Education, pp. 528-546.

24. 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.

25. Achcar, G. (2004) *Eastern cauldron*. New York: Monthly Review Press, pp. 29-45 and 234- 241.

26. 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.

27. 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.

28. Calvocoressi, P. (2001) *World Politics: 1945-200.* 3rd edn. Harlow: Pearson Education, pp.570-576.

29. Ali, T. (ed.) (2000) *Masters of the Universe*. London: Verso, pp. 230-245 and 271-284.

30. Kaldor, M. and Vashee, B. (eds.) (1997) *New wars.* London: Wider Publications for the UN University, pp. 137-144 and 153-171.

31. 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.

32. Goldstein, J.S. (2003) *International relations.* 3rd edn. Delhi: Pearson Education, pp 43-51.

33. Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations.* Delhi: Pearson Education, pp.24-27.

34. Roberts, A. and Kingsbury, B. (eds.) (1994) *United Nations, Divided World.* 2nd edn. Oxford: Clarendon Press, pp. 420-436.

35. Taylor, P. and Groom, A.J.R. (eds.) (2000) *The United Nations at the millennium.* London: Continuum, pp. 196-223 and 295-326.

36. Gareis, S.B. and Varwick, J. (2005) *The United Nations: An introduction.* Basingstoke: Palgrave, pp. 214-242.

37. Moore, J.A. Jr. and Pubantz, J. (2008) *The new United Nations.* Delhi: Pearson Education, pp. 91-112.

38. Claude, I. (1984) *Swords into plowshares: the progress and problems of international organisation*. 4th edn. New York: Random House.

39. Dodds, F. (ed.) (1987) *The way forward: beyond the agenda 21*. London: Earthscan.

40. Rajan, M.S., Mani, V.S and Murthy, C.S.R. (eds.) (1987) *The nonaligned and the United Nations*. New Delhi: South Asian Publishers.

41. South Asia Human Rights Documentation Centre. (2006) *Human rights: an overview*. New Delhi: Oxford University Press.

42. 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/N97/189/79/1MG/n9718979.pdf,Open Element (accessed on 13 October 2011).