

RANI CHANNAMMA UNIVERSITY

BELAGAVI

THE COURSE STRUCTURE & SYLLABUS OF UNDER GRADUATE

COMPULSORY PAPER

ENVIRONMENTAL SCIENCE

2ND Semesters

w.e.f.

Academic Year 2020-21 and Onwards

Under

contd - -

Part 3: AECC - Ability Enhancement Compulsory Course

Sem	Course Code	Title of the Paper	Teaching Hours/Week	Credits	Marks		Total	Duration of Exam
					Sem End Exam	IA		
I	AECC	ENVIRONMENTAL SCIENCE	2	2	40	10	50	2 Hrs

Marks -50marks

UNIT-I ECOSYSTEM, BIODIVERSITY AND NATURAL RESOURCES.

16Hours

Definition, Scope and basic principles of ecology and environment. Biological levels of organization population, community, ecosystem and biosphere.

Ecosystem types: Terrestrial, aquatic and artificial.

Organization of ecosystems: Biotic- Role of plants animals and microorganisms.

abiotic components- Role of Water, light & temperature. Food chain and food web.

Population and Community ecology- Population density, Natality, mortality, Growth curves - sigmoid growth curve. Community structure and species diversity-Diversity types and levels (alpha, beta and gamma). Study of western ghats as a Biodiversity hotspot.

UNIT-II ENVIRONMENTAL POLLUTION, GLOBAL ISSUES AND LEGISLATION.

16Hours

Causes, effects and control measures of air pollution, water pollution & soil pollution.

Concept of Global warming, Eutrophication, carbon sequestration and carbon foot printing.

Sustainable development & Ecological restoration. solid waste management, Water harvesting methods.

Forest conservation act, biodiversity bill (2002), Wildlife Protection act 1972.

Conservation Biology- Threats to Biodiversity, Wildlife trade.

Renewable and non-renewable resources, Biodiversity Conservation -Insitu and Exsitu methods.

Field visit to nearby Forest to study the Biodiversity.

Field visit to Industrial area to study impact of pollution on the Biodiversity.

Contd - - -

References:

1. Ahmedullah, M. and M.P. Nayar, 1986. Endemic plants of the Indian region. Vol 1. Botanical Survey of India.
2. Biodiversity and its conservation in India. Indus Publishing Company, New Delhi Primack, Richard B 2006.
3. Essentials of conservation biology, 4th edition, Senaceer Associates, Sunderland, Mass.
4. Krishnamurthy K V 20014. An advanced text book of Biodiversity,
5. Principles and Practice. Oxford and IBH Publishing Co. Pvt. Ltd. Negi S S 1933.
6. Biodiversity in India (floristic aspects). Bishen Singh Mahendra Pal Singh, Dehradun.
7. Muller Dombois J. And Ellenberg, H. (1974) aims and methods of vegetation ecology, Wiley, new york.
8. Odum, E.P. 91971) fundamentals of Ecology, saunders, Philadelphia.
9. Kormondy, E. J. (1996) concepts of ecology, prentice hall, India, New Delhi.
10. Foin, T.C. (1976) ecological system and environment, Mifflin, boston.
11. Nobel B.J. and Wright, R.T. (1996) environmental science, prentice hall New Jersey.
12. Lillesand T.M. and Kiefer R.W. (1987) Remote sensing and image interpretation , John Wiley and sons, New York.
13. Agarwal, S.B. and Agarwal, M. (Ed.) (2000) environmental pollution and responses, CKC, press, London.
14. Koshoo, T. N. (1991) environmental concept and stragies ashish publ. House, new delhi.
15. Colinvaux P.C. (1993) ecology John Wiley and Sons, New york.
16. Indian Journal of Ecology by Indian Journal of Ecology
17. Ecology, Environment and Conservation journal.

Question paper pattern:

There will be two sections in a question paper of theory course for the semester end examination.
(Part I and Part II).

Part I - There shall be 6 questions carrying 2marks each. Students should answer any 4 questions out of 6 questions.


Part II - There shall be 4 questions (two from each unit with sub questions a, b, & c) carrying 16 marks each. Students should answer any 2 questions out of 4 questions.

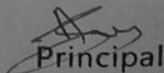
Part I (4x 2) : 08Marks

Part II (2 X 16) : 32 Marks

Distribution of Marks:

Theory Courses: a) Examination	:	40 Marks
b) Internal Assessment	:	10 Marks
c) Total	:	50 Marks


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Vijayapur.


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S.B. Arts and KCP Science College
VIJAYAPUR

**B. A. /B. Sc. SYLLABUS IN GEOGRAPHY
SEMESTER – I
THEORY PAPER-I**

PART – A : PHYSICAL GEOGRAPHY

Objectives: The objective of the course is to familiarize the students with the need for understanding of physical geography with reference to certain fundamental concepts, focusing on the unity of Geomorphology in the earth materials and the processes with or without an element of time. Process of component of Geomorphology is segmented into the internal and external processes of landscape evolution.

Course structure : One Theory and One Practical

Teaching Theory : 05 hours per week

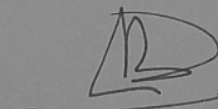
Practical : 04 hours per week

Examination : One Theory paper of 80 Marks and 20 Marks for internal assessment (IA) one Practical of 40 Marks and 10 Marks for internal assessment (IA) (out of 10 IA marks 7 marks for practical record and journal and 3marks for attendance).

Units	Topic	Teaching Hours
I	Introduction to Physical Geography: The Nature, Scope & Content of Physical Geography, Relationship between Physical Geography and other branches of sciences, Significance of Physical Geography.	10
II	Earth as a Planet: Latitude and Longitudes: Rotation and Revolution of the earth, Origin and Evolution of the Earth; Nebular & Tidal theory Interior of the Earth, Earth Movements: orogenic and epeirogenic movements: Faults, Folds & related land forms.	12
III	Wegner's theory of Continental Drift; Weathering and its types; Rocks; origin, types and distribution and their economic significance	10
IV	Endogenetic & Exogenetic Forces; Earthquakes and Volcanoes and its distribution, causes and effects, Examples of earthquakes in India	12
V	Denudation- Work of river, Wind, Glacier, Underground Water and Sea Waves and its effects. Drainage pattern, major deltas of Indian rivers.	16
Total		60 hours

Reference:

1. Physical Geography: Strahler & Strahler
2. Physical Geography: R. N. Tikka
3. Physical Geography: Majid Hussain
4. Physical Geography: Das Gupta & Kapoor
5. Physical Geography (Kannada): Mallappa P
6. Physical Geography (Kannada): Ranganath
7. Physical Geography (Kannada): M. B. Gaudar
8. Physical Geography (Kannada): S. S. Nanjannavar
9. Fundamentals of Physical Geography: F. J. Mankhouse



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Concept and Development of Human Rights

- 3) Meaning Scope and Development of Human Rights
- 4) Universal Declaration of Human Rights. UDHR 1948, International Covenant on Civil and Political rights. ICCPR 1996 & International Covenant on Economic social and Cultural Rights.(ICESCR) 1966.

Unit -IV Human Rights in India

10 Hours

- 1) Protection of Human Rights Act, 1993
- 2) Third Generation Human Rights (Group Rights) and Fourth Generation Human Rights. (Right to Development and Environmental Rights.)
- 3) Convention on the Elimination of All forms of Discrimination against Women.
- 4) Convention on the Rights of the Child

Unit- V Enforcement of Human Rights

10 Hours

- 1) National Human Rights Commission,
- 2) State Human Rights Commission.
- 3) Judicial Activism and Human Rights.
- 4) Human Rights Courts in India.

References for Environmental Studies

01. A.K. De, Environmental Chemistry, Wiley International.
02. B.K. Sharma, Environmental Chemistry, Goel Publishing house.
03. E.D. Wagner, Environmental Management, Saunders Co., USA.
04. T.G. Miller, Environmental Science, Wordsworth publishing Co.


References for Human Rights


1. K.P. Saksena "Human Rights" 1996 New Delhi.
2. Dr. S. Mangalmurthya "Human Rights " Chetan Book House Mysore2004.
3. Krishnamurthy S. "Human Rights and Police Administration" B. R. Publishing Corporation, Bangalore.
4. B.P. Singh "Human Rights in India" Deep & Deep Publication New Delhi.
5. D.D. Basu, "Human Rights in Constitutional Law" prentice hall.
6. S.O. Agarwal, "Human Rights" Central law Agency, Allahabad.
7. V.A. Anand "Human Rights" Allahabad Law Agency, Faridabad.

Scheme of Examination

Semester	Title of the paper	Theory Hours/ week	Theory Marks	I.A. Marks	Exam Hours	Total Marks
II Semester	Environmental Studies and Human Rights(EVS & HRS)	04	80	20	1.5 Hours	100

Note: The final examination is on Multiple Choice Questions(MCQ) Based. Each unit shall carry equal weightage during the preparation of the question paper.


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Name of the subject: **Environmental studies and Human rights**

Contact Hours : 52

Contact Hours per Week : 04

Total marks for examination : 80

Internal Assessments : 20

B.A./B.Sc./BCA/BSW-II Semester

Compulsory subject

With effect from the Academic Year 2018-19 onwards

Teaching Hours: 04 Hours per Week

Total Hours: 52

UNIT-I

10 Hours

1) The Multidisciplinary Nature of Environmental Studies

Definition, scope and importance

Need for public awareness.

2) Natural Resources

Renewable and Non-renewable Resources:

Natural resources and associated problems-Forest resources: resources, Mineral resources, Food resources, Energy resources.

3) Ecosystems: Concept-Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem.

4) Ecosystems: Introduction, types, characteristic features, structure and function.

UNIT-II

10 Hours

1) Biodiversity and Its Conservation

Introduction, definition: genetic, species and ecosystem diversity.

2) Biodiversity at global, National and local levels-Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Conservation of biodiversity.

Environmental Pollution: Definition, Causes, effects and control measures.

3) Waste Management-Solid waste management: Causes, effects and control measures of urban and industrial wastes.

4) Social Issues and the Environment-Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

UNIT-III

12 Hours

1) Human Population and the Environment-Population growth, variation among nations, Population explosion – Family Welfare Programme.

2) Field Work

a) Visit to a local area to document environmental assets – river/forest/grassland/hill/mountain.

b) Study of common plants, insects, birds.

c) Study of simple ecosystems – pond, river, hill slopes, etc.

(Field work equal to 2 lecture hours)

contd...

8. BOTANY (OPTIONAL)

B.Sc. VI Semester

(w.e.f 2016-17)

Botany paper- I

50 Hrs

Objectives: This paper has topics on Cell Biology, Genetics and Evolution to study the fundamental units of heredity and variations.

Unit 1 Cell Biology:

10 Hrs.

The cell: General organization of prokaryotic and Eukaryotic cells. Ultra-structure & functions of Nucleus, Plastids, Mitochondria, Golgi complex, Endoplasmic reticulum, Lysosomes, Peroxisomes & Vacuoles. Ultra structure & functions of Plasma membrane & Cell wall.

Unit 2: Morphology of Chromosomes: Number, size, shape, types, centromere, SAT-chromosomes, Ultra structure of giant Chromosomes, Ploidy and chromosomal aberrations.

06 Hrs.

Unit 3: Cell division: Mitosis and Meiosis. **Cell cycle:** regulation of cell cycle. 06 Hrs.

Unit 4: Genetics:

22 Hrs.

Mendelism (Laws of inheritance, Monohybrid, Dihybrid Experiments), Gene interaction (Allelic - incomplete dominance, co-dominance Non - allelic - Complementary, Supplementary, Epistasis) Linkage & crossing over, Alleles, Multiple alleles, Sex determination, Sex linked inheritance, Mutations, Problems related to the above topics.

contd...

Unit 5: Evolution :

06 Hrs

Origin of life, Lamarckism, Darwinism, Mutational and Modern concepts of evolution.

Practicals:

1. Study of Microscopes – Light microscope, phase contrast microscope & electron microscope.
2. Cytological techniques (Pre-treatment, fixation, preservation, cytological stains, squash preparation, smear preparation, mounting media and permanent slides preparation).
3. Mitosis preparation (Squash)-onion root tips.
4. Meiosis preparation (Smear)-. Onion/Rhoe Flower buds.
5. Micrometry.
6. Karyotype & Idiogram – Allium cepa.
7. Polytene chromosomes – Drosophila/ Chironomas
8. Heterozygotic translocation in Rheo-discolor
9. Genetic problems.
10. Genetic problems.

Suggested Reading:

1. Gupta P.K.- A Text Book of Cell and Molecular Biology- Rastogi Publication Meerut
2. Strick Burger M. – Genetics - Mc Millan Publishing Co.
3. Sinnott Dunn & Dobzhansky – Principles of Genetics-Tata Macgrow Hill
4. Tamarin – Principles of Genetics -
5. Sharma A.K. and Sharma A - Plant Chromosomes Analysis Manipulation and Engineering – Harward Academic Publishers. Australia.

contd - -

6. L.R. Patki, B.L.Bhalachandra & I.H.Jeevaji- Genetics- S. Chand Publications.
 7. P.S. Verma & Agarwal - Cell Biology & Genetics -
 1. Benjamin Lewen - Gene VI & VII - New York Oxford University Press, USA

Semester-VI
Botany Practical-I
(Cell Biology and Genetics)

Time: 4 Hours

Max Marks: 40

- | | | |
|------|--|--------------|
| Q.1 | Make a temporary micro preparation of the squash/smear of the specimen A. Draw labelled diagrams of any two stages of cell division seen in your preparation and show to the examiner. | 08 |
| Q.2. | Determine the length and breadth of the given material B, by micrometric method. | 06 |
| Q.3. | Solve the genetic problems C & D. | 08 |
| Q.4. | Identify and describe the cytological features with diagrams in slides E, F, G and H.

Submission of 3 mitosis and 2 meiosis slides. | 08

05 |
| | Journal | 05 |

B.Sc VI Semester Practical Examination

Subject: Botany Paper- I

Instructions to Examiners.

Time: 4Hours

Max Marks: 40

- | | |
|---|---------|
| Q.1. Squash/Smear preparation of the specimen -A

(Preparation-4 marks, diagrams-2 marks, oral-2 marks). | 8 marks |
| Q.2. Specimen -B (onion peeling cells or any permanent slide of algal specimen. Calibration-3 marks, diagram-1 mark, measurement of length and breadth -2 marks) | 6 marks |

contd. ~

Q.3. Genetic problems - C and D	8 marks
Q.4. Cytological Slides - D, E, F and G	8 marks.
(one slide from mitosis, two slides from meiosis and one specimen/slide from polytene chromosomes/heterozygotic translocation/karyotype and idiogram. Identification-1/2 mark. diagram-1/2 mark description -2 mark).	
Submission of permanent slides of 3 mitosis and 2 meiosis.	5 marks
Journal	5 marks.

B.Sc.VI Semester Theory Examination

Sub: BOTANY Paper - I

Pattern of Question Paper

Time: 03 hours **Max. Marks: 80**

All questions are compulsory

Q. I Answer any ten out of twelve (01 to 12 sub questions) **10 X 2 = 20**

From Unit 1: Cell Biology: 02 sub questions.

From Unit 2: Morphology of Chromosomes: 02 sub questions.

From Unit 3: Cell division: 02 sub questions.

From Unit 4: Genetics: 05 sub questions.

From Unit 5: Evolution: 01 sub question.

Q. II Answer any six out of eight (13 to 20 sub questions) **6X 5 = 30**

From Unit 1: Cell Biology: 02 sub questions.

From Unit 2: Morphology of Chromosomes: 01 sub question.

From Unit 3: Cell division: 01 sub question.

From Unit 4: Genetics: 03 sub questions.

From Unit 5: Evolution: 01 sub question.

contd...

D. III Descriptive Answers

21. From Unit 1: Cell Biology: 01 sub question. 1 X 10 = 10

OR

From Unit 2: Morphology of Chromosomes-01 sub question.

22. From Unit 3: Cell division: 01 sub question. 1 X 10 = 10

OR

From Unit 4: Genetics: 01 sub question.

23. From Unit 4: Genetics: 01 sub questions. 1 X 10 = 10

OR

From Unit 5: Evolution: 01 sub question.

B.Sc VI semester

(w.e.f 2016 -17)

Botany paper -II

(Molecular Biology, Biotechnology & Immunology)

50 hrs

Objectives: - Molecular Biology, Biotechnology and Immunology has some recent trends in the concern fields. This will help students to pursue research in concerned fields.

Unit 1: Nucleic Acids: DNA & RNA, occurrence, types and chemical compositions.

Experimental evidences for DNA as genetic material. Structure of DNA, Replication, semiconservative method, RNA and types, post transcription changes.

10 Hrs.

Unit 2: Gene Expression: Gene concept, Genetic code & protein synthesis. Regulation of gene expression in prokaryotes & eukaryotes.

08Hrs.

contd ...

Unit 3: Recombinant DNA technology and Bioinformatics:

Enzyme, vector (plasmid PBR 322), marker gene, Steps of cloning technique, PCR and its application, Genomic DNA and cDNA library, Brief concept on Genomics and proteomics.

08 Hrs.

Unit 4: Biotechnology and Genetic engineering of plants:

Basic concepts, principles and scope. Aims, strategies for development of transgenic plants (with suitable example). Agrobacterium-The natural genetic engineer. T-DNA and transposon mediated Gene tagging, intellectual. Property rights, possible ecological risks and ethical concerns.

12Hrs.

Unit 5: Microbial genetic manipulation and Immunology:

Microbial genetic manipulation: Bacterial transformation, selection of recombinant and transformants, genetic improvement of industrial microbes, nitrogen fixers & fermentation technology.

Immunology: Immuno-systems, Immunotechniques in Agriculture, ELISA method to detect Plant diseases & Monoclonal antibodies.

12 Hrs.

Practicals:

1. DNA estimation by DPA diphenyl amine method.
2. RNA estimation by orcinol method.
3. Extraction and estimation of protein from plant source.
1) Salt precipitation method 2) solvent method
4. Culturing of Rhizobium-YEMA media.
5. Culturing of Azotobacteria-ASHBY'S media.
6. Demonstration of Electrophoresis technique
7. Agarose gel electrophoresis.
8. Demonstration and comparison of GM Plants with Non GM Plants (BT- Cotton, BT-Brinjal, BT Tomato).
9. Visit to Biotechnology Research Laboratory.

contd...

Suggested Reading:

1. Cell & Molecular Biology -- By E.D.F. De Robertis -- ISE Publication
2. Basic Biotechnology -- Colin Rateledge & Bjorn Kristiansen -- Cambridge Uni. Press.
3. A Text Book of Biotechnology -- R.C. Dubey -- S. Chand Publication
4. Cell Biology, Genetics Molecular Biology, Evolution & Ecology -- P.S. Verma & V. K. Agarwal
5. Casida L.E. (1984)- Industrial Microbiology, Wiley Easterbs, New Delhi.
6. Roitt- Immunology
7. Kubey - Immunology.
8. Fatima - Immunology

B.Sc. VI Semester

Practical Paper-II

(Molecular Biology, Biotechnology & Immunology)

Time: 4 Hours

Max Marks: 40

- | | | |
|------|--|-----------|
| Q.1. | Estimation of DNA/RNA from the given sample A | 10 Marks |
| Q.2. | Estimation of Protein from the unknown sample B. | 10 Marks |
| Q.3. | Identify and comment C and D. | 5 Marks |
| | Project report submission and Viva voce. | 10 Marks. |
| | Journal. | 05 Marks |

Contd...

B.Sc VI Semester Practical Examination

Subject: Botany Paper- I

Instructions to Examiners.

Time: 4Hours

Max Marks: 40

Q.1.	Sample A- Plant resource (Procedure- 05 marks, Preparation- 03 marks, Tabulation- 02 marks)	10 marks
Q.2.	Unknown Sample B- (Procedure- 05 marks, Observation and results- 05 marks)	10 marks
Q.3.	Specimen C- GM/Non GM plant Material may be given Specimen D- Any biotech instrument/ any bacterial culture may be given	05 marks
	Project report submission and Viva voce.	10 Marks
	Journal	05 marks.

B.Sc.VI Semester Theory Examination

Sub: BOTANY Paper - II

Pattern of Question Paper

Time: 03 hours

Max. Marks: 80

All questions are compulsory

Q. I Answer any ten out of twelve (01 to 12 sub questions) 10 X 2 = 20

From Unit 1: Nucleic Acids: 02 sub questions.

From Unit 2: Gene Expression: 02 sub questions.

From Unit 3: Recombinant DNA technology and Bioinformatics: 02 sub questions.

From Unit 4: Biotechnology and Genetic engineering of plants: 03 sub questions.

Contd---

From Unit 5: Microbial genetic manipulation and Immunology: 03 sub questions.

Q. II Answer any six out of eight (13 to 20 sub questions)

6X 5 = 30

From Unit 1: Nucleic Acids: 02 sub questions.

From Unit 2: Gene Expression: 01 sub question.

From Unit 3: Recombinant DNA technology and Bioinformatics: 02 sub questions.

From Unit 4: Biotechnology and Genetic engineering of plants: 02 sub questions.

From Unit 5: Microbial genetic manipulation and Immunology: 01 sub question.

Q. III Descriptive Answers.

21. From Unit 1: Nucleic Acids: 01 sub question.

1 X 10 = 10

OR

From Unit 1: Nucleic Acids: 01 sub question.

22. From Unit 2: Gene Expression: 01 sub question.

1 X 10 = 10

OR

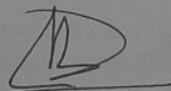
From Unit 3: Recombinant DNA technology and Bioinformatics: 01 sub question.

23. From Unit 4: Biotechnology and Genetic engineering of plants: 01 sub question.

1 X 10 = 10


OR

From Unit 5: Microbial genetic manipulation and Immunology: 01 sub question.



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(00)

Group – II

OPTIONAL / COMPULSORY SUBJECT FOR THE DEGREE IN SCIENCE SUBJECTS

RANI CHANNAMMA UNIVERSITY, BELAGAVI.

B.Sc. IV Semester (w.e.f: 2018 – 19) and onwards.

Subject: BOTANY (optional)

Paper: Diversity of Angiosperms and their systematics, Economic botany and Medicinal botany 52 hrs.

Unit I: Morphology of Angiosperms: 07 hrs.

Study of stems and its modifications, Leaf- types, stipules, Phyllotaxy and their modifications. Study of Inflorescences, flowers (Floral formula and Floral diagram to be included) and fruits.

Unit II: Angiosperm systematics: 10 hrs.

Botanical nomenclature- principles and rules, taxonomic ranks, type concept and principle of priority. Botanical survey of India. Classification of Angiosperms: Systems proposed by Bentham and Hooker, Engler Prantl. Their salient features, merits and demerits. Brief account of APG classification.

Contributions of Cytology (Cytotaxonomy), Phytochemistry (Chemotaxonomy) and Taximetrics (Numerical taxonomy) to taxonomy.

Unit III: Diversity of flowering plants as illustrated by members of the following families: 20hrs

Annonaceae, Brassicaceae, Malvaceae, Rutaceae, Rhamnaceae, Fabaceae, Myrtaceae, Combretaceae, Cucurbitaceae, Apiceae, Rubiaceae, Asteraceae, Apocyanaceae, Asclepiadaceae, Convolvulaceae, Solanaceae, Acanthaceae, Verbenaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Orchidaceae, Liliaceae, Arecaceae and Poaceae.

Unit IV: Economic Botany: 10 hrs

Origin & Distribution, Family, Botanical name and utility of following plants-

Food plants: Rice, Wheat, Maize, Pulses (Bengal gram, Pigeon pea) and Sugarcane

Fibres: Cotton, Jute.

Oil yielding plants: Ground nut, Sunflower, Palm oil, Sandalwood and Citronella oils

Paper & pulp: Bamboo & Eucalyptus

Spices: Ginger, Clove, Cinnamon, Asafoetida and Cardamom

Beverages: Tea & Coffee

Rubber: Hevea sp.


Unit V: Medicinal botany: 05hrs

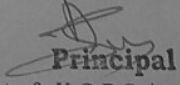
Common medicinal plants in primary health care: -

Tippateega (*Tinosporacordifolia*), Tulsi (*Oscimumsanctum*) Kalabanda (Aloe-vera)

Turmeric (*Curcuma longa*) Ashwagandha (*Withaniasomnifera*) and Sarpagandha

(*Rauwolfiaserpentina*)


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Group – II

OPTIONAL / COMPULSORY SUBJECT FOR THE DEGREE IN SCIENCE SUBJECTS

Science Subjects: (any three subject of equal importance to be chosen as per the grouping given by Rani Channamma University, Belagavi)
DETAILED SYLLABUS OF FOLLOWING PAPERS WITH PRACTICALS

1. BOTANY (optional)

B.Sc. III Semester (w.e.f: 2018 – 19) and onwards.

Subject: BOTANY (optional)

Paper:- Diversity of Cryptogams (Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms). 52 Hrs

Unit I: Algae 10 hrs.

General characters, Pigmentation, Classification by Fritsch (up to class level). Distribution, thallus structure, reproduction and life cycle of Nostoc, Volvox, Oedogonium, Sargassum and Batrachospermum. Economic importance.

Unit II: Fungi 08 hrs.

General characters, Classification (Alexopoulos's system). Distribution, Structure, Reproduction and life cycle of Albugo, Rhizopus, Penicillium and Puccinia. Economic importance of fungi. General account of lichens.

Unit III: Plant Pathology 06 hrs.

General account of Bacteria and Viruses. Introduction and general symptoms of plant diseases. Symptoms, Pathogens and control measures of Late blight of potato, White rust of crucifers, Tikka disease of ground nut.

Unit IV: Bryophytes 06 hrs.

General characters, Classification (Smith). Structure, reproduction and schematic life cycle of Riccia, Anthoceros and Funaria. (Developmental details are not expected). Evolution of sporophytes.

Unit V: Pteridophytes 10 hrs.

General characters and classification. Distribution, Structure (External and Internal) and Reproduction of Psilotum, Selaginella, Equisetum and Nephrolepis (Developmental details are not expected). Stellar evolution. Heterospory and seed habit


Unit VI: Gymnosperms 08 hrs.

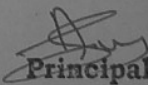
General characters and classification. Distribution, Structure (External and Internal) and Reproduction of Cycas, Pinus and Gnetum (Developmental details are not expected).

Unit VII: Paleobotany 04 hrs.

Geological time scale, fossilization-molds, Impression, Petrification and cast. Study of fossils - Calamitis, Lepidodendron, Lygenopteris.

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 seed habit

8. BOTANY (OPTIONAL)

B.Sc BOTANY (Optional Subjects) Semester System

Semester	Title of the paper	Number of hours/week/paper	Duration of Examination	Internal Assement Marks - 20/10				Semester end Examination Marks
				I Test	II Test	SEM/P ROJ/ASSIGN	ATTE NDA NCE	
I	PLANT ANATOMY & EMBRYOLOGY	04 HOURS	03 HOURS	04	10	03	03	80
	LAB	04 HOURS	04 HOURS	10				40
II	PLANT PHYSIOLOGY / BIOCHEMISTRY AND PHARAMACOGNOSY	04 HOURS	03 HOURS	04	10	03	03	80
	LAB	04 HOURS	04 HOURS	10				40
III	ALGAE FUNGI, BRYO PHYTES, PTERIDOPHYTES, GYMNOSPERMS	04 HOURS	03 HOURS	04	10	03	03	80
	LAB	04 HOURS	04 HOURS	10				40
IV	DIVERSITY OF ANGIOSPERMS AND THEIR SYSTEMATIC	04 HOURS	03 HOURS	04	10	03	03	80
	LAB	04 HOURS	04 HOURS	10				40
V Paper-I	PLANT BREEDING, TISSUE CULTURE, HARVEST TECHNOLOGY AND WEED MANAGEMENT	04 HOURS	03 HOURS	04	10	03	03	80
	LAB	04 HOURS	04 HOURS	10				40
V Paper-II	ECOLOGY, ENVIRONMENTAL BIOLOGY AND PHYTOGEOGRAPHY	04 HOURS	03 HOURS	04	10	03	03	80
	LAB	04 HOURS	04 HOURS	10				40
VI Paper-I	CELL BIOLOGY, GENETICS AND EVOLUTION	04 HOURS	03 HOURS	04	10	03	03	80
	LAB	04 HOURS	04 HOURS	10				40
VI Paper-II	MOLECULAR BIOLOGY, BIOTECHNOLOGY AND IMMUNOLOGY	04 HOURS	03 HOURS	04	10	03	03	80
	LAB	04 HOURS	04 HOURS	10				40

Individual passing is required in theory and practical.

Contd. →

B.Sc. V Semester

(w.e.f : 2016 - 17)

Botany Paper - I

Paper-I: Plant Breeding, Tissue Culture and Horticultural Practices. 50 Hrs

Objectives: This paper includes some topics in horticulture like- Nursery, Green House Technology, Harvest and Weed Management. These will be of much help to the students residing in rural and urban areas to generate employment.

Unit 1: Plant Breeding: History and objectives. Introduction, Selection (Pure line, Mass Selection).

Hybridization- inter specific and inter generic. Mutational & Polyploidy breeding. Germ plasm and its maintenance. Pollen Bank, Quarantine method.

10 Hrs.

Unit 2: Plant Tissue Culture: Scope and Significance. Basic Aspects and Cellular totipotency (Shoot tip, Embryo and Haploid culture techniques). Differentiation and morphogenesis.

10 Hrs.

Unit 3: Introduction to Horticulture, Nursery management and importance.

Methods of propagation - vegetative - rhizome, bulb, corm and sucker (natural).

Artificial- Cutting, layering, grafting and budding. Bonsai - methods and importance.

Nursery management

Introduction, types of nurseries and cultural practices. Seed (propagule) collection, storage and treatment. Manures, fertilizers and pesticides. Methods of irrigation - drip, sprinkler and flood

12 Hrs.

Unit 4: Green House Technology - Introduction, advantages and limitations.

Types of Green Houses- Green House structure, principle

Green house technology as applied to ornamental, vegetable and fruit plants.

08 Hrs.

contd..

Unit 5: Harvest Technology and Weed Management:

Harvest Technology: Flower and fruit plants management. Artificial ripening, maturity indices, methods of picking. Post-harvest technology and management of fruits: grading, processing, storage and packing.

Weed Management: Introduction and significance. Invasive weeds – concept and causes of their dominance. Weed control – physical, chemical and biological methods.

10 Hrs.

Practicals :

1. Study of methods of propagation with help of tubers, bulbs rhizomes, corms suckers, runner and offset.
2. Study of propagation by cutting, layering, grafting and budding.
3. Methods of emasculation and bagging for cross-pollination.
4. Morphology and anatomy of dry and wet stigma.
5. Morphology and anatomy of solid and hollow styles.
6. Study of pollination types.
7. Demonstration of tissue culture techniques.
8. Visit to nursery - poly house /Green house and tissue culture lab.
9. Preparation of MS media for culture.
10. Bonsai techniques.

contd...

Suggested Reading :

1. Chahal – Principles and procedures of plant breeding – L.B. Publication.
2. Sinha and Sinha – Cytogenetics, Plant Breeding and evolution- Vikas Publication.
3. Joshi P. – Genetic Engineering and its applications- Panima Book Distribution, Bangalore.
4. Purohit, S.S. -Molecular basis of cytoplasmic male sterility in crop plants.
5. Sawahel and Wagley, 1997- Plant Genetic Engineering- daya Publishing House, New Delhi.
6. Vyas S.P. and Kohi, D.V. - Methods in Biotechnology and Bioengineering – Daya Publishing House, New Delhi.
7. Vasil.IK. and Thorpe T.A. 1997- Plant cell and Tissue Culture – Kluwer Academic Publishers, The Netherlands.
8. Bhojwani S.S. 1990- Plant Tissue Culture: Applications and Limitation- Elsevier Science Publishers, New York.
9. Text Book of Horticulture – K. Manibhushan Rao – Macmillan India Ltd.
10. Introduction to Horticulture – N. Kumar (First Edition, Rajlakshmi Publication, 1996)

contd...

Semester-V

Botany Practical I

(Plant Breeding, Tissue Culture & Horticultural Practices.)

Time: 4 Hours

Max Marks: 40

- Q.1. Estimate the percentage of pollen viability in the given specimen 'A'
08 Marks
- Q.2. Carry out the Emasculation process in specimen 'B' and describe the hybridization technique (show it to the examiner)
08 Marks
- Q.3. Demonstrate the vegetative propagation method C, and describe the procedure with diagram (show it to the examiner)
07 Marks
- Q.4. Identify & comment D, E, F & G specimens/ slides.
12 Marks
- Q.5. Journal
05. Marks

contd.

B.Sc V Semester Practical Examination

Subject: Botany Paper- I

Instructions to Examiners.

Time: 4Hours

Max

Marks: 40

Q.1. The percentage of pollen viability in the specimen A. 08 marks

(Preparation- 6 marks, tabulation and inference – 2marks)

Q.2. Emasculation process in Specimen B 08 marks

(Preparation-4 marks, description-2 marks, oral-2 marks).

Q.3. Vegetative propagation method C (cutting /Grafting/Layering) 07 marks

(Preparation-3 marks, diagram-1mark, description-2 marks ,oral-1mark)

Q.4. Specimens/slides- D, E, F and G 12 marks.

(one each specimen/slide from pollination, tissue culture, type of stigma, type of style.

Identification-1mark, description -2 marks).

Journal

05 marks.

contd...

B.Sc. V Semester Theory Examination

Sub: BOTANY Paper - I

Pattern of Question Paper

Time: 03 hours

Max. Marks: 80

All questions are compulsory

**Q. I Answer any ten out of twelve (01 to 12 sub questions)
20**

10 X 2 =

From Unit 1 Plant breeding: 02 sub questions.

From Unit 2 Plant tissue culture: 02 sub questions.

From Unit- 3 Introduction to Horticulture, Nursery management and importance-03 sub questions.

From Unit 4 Green House Technology-02 sub questions.

From Unit 5 Harvest Technology and Weed Management: 03 sub questions

Q. II Answer any six out of eight (13 to 20 sub questions)

6X 5 = 30

From Unit 1 Plant breeding: 01 sub question.

From Unit 2 Plant tissue culture: 01 sub question.

From Unit 3 Introduction to Horticulture, Nursery management and importance-03 sub questions.

From Unit 4 Green House Technology-01 sub question.

From Unit 5 Harvest Technology and Weed Management: 02sub questions

Q. III Descriptive Answers.

21. From Unit 1 Plant breeding: 01 sub question.

1 X 10 = 10

OR

From Unit 2 Plant tissue culture: 01 sub question.

22. From Unit 3 – Introduction to Horticulture, Nursery management and importance -01 sub question.

1 X 10 = 10

OR

. From Unit 3 – Introduction to Horticulture, Nursery management and importance-01 sub question.

23. From Unit 5 Harvest Technology and Weed Management: 01 sub question.

1 X 10 = 10

OR

From Unit 5 Harvest Technology and Weed Management: 01 sub question.

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Semester V
(w.e.f 2016-17)

Botany Paper – II

Paper-II: Ecology, Environmental Biology and Phytogeography 50 hrs

Objectives:- This paper has topics on pollution, pollution control and forestry. Considering the present scenario with respect to environment these topics are most valuable.

Unit 1: Plant and environment: Atmosphere (gaseous composition), water (properties of water cycle), light (global radiation, photo synthetically active radiation), temperature, soil (development, soil profiles, physico-chemical properties), and biota.

Morphological, anatomical and physiological responses of plants to water (hydrophytes, xerophytes and epiphytes), temperature (thermoperiodicity and vernalization), light (photoperiodism, heliophytes and sciophytes) and salinity.

12 Hrs.

Unit 2: Population ecology and Ecosystems: Growth curves; ecotypes; ecads, Ecological succession-hydrach and xerarch. Structure of Ecosystems (Pond and Forest): abiotic and biotic components; food chain, food web, ecological pyramids, energy flow.

10 Hrs.

Unit 3: Phytogeography: Botanical regions of world, Vegetation types of Karnataka and India.

06 Hrs.

Unit 4: Conservation of Natural resources: Different types of natural resources and their conservation,

Forest and Forest Management: Forest and its ecological significance, deforestation, forest management and social forestry. Natural depletion of vegetation endangered and threatened economic plants of India and red data book. Wild life management in India, Indian board of wild life, national park and sanctuary.

contd...

Energy resources: conventional and non conventional sources of energy.

Biodiversity: significance, types, depletion, conservation of biodiversity. **12 Hrs.**

Unit 5: Pollution: Introduction, causes, effects and control measures of Water pollution, Air pollution, Soil pollution, Acid rain, Global warming, and Ozone depletion.

Sewage water and waste water types. Methods of effluent treatment of industrial waste water, sludge disposal and its care related to environment. **10 Hrs.**

Practical:

1. Study of frequency and density of herbaceous plants by quadrat method.
2. To determine moisture content and water holding capacity of different types of soils.
3. To estimate the alkalinity of water samples.
4. Ecological instruments.
5. Morphology and anatomical adaptations in three hydrophytes.
6. Morphology and anatomical adaptations in xerophytes: One succulent and one non-succulent, one epiphyte and one halophyte.
7. Waste water analysis, physical chemical parameter, pH, turbidity, TDS, BOD, COD, temperature and any other inorganic elements.
8. Visit to effluent treatment plant to study recycling of waste water near by industry and study the effect of industrial pollution nearby water bodies (Biomagnification & Eutrophication).
9. Assignment of Project related to practical number eight.

contd...

10. Study Tour of minimum two days to study forest types and ecological groups.

Books for Reference:

1. Sharma P.D. (1993)-Ecology and Environment – Rastogi Publication, New Delhi.
2. Mishra R. - Ecology Work Book- Oxford and IBH, New Delhi.
3. Agarwal K.C. (1993)- Environmental Biology- Agro Botanical Publishers, Jodhapur.
4. Mishra K.C. (1992)- Manual of Plant Ecology – Oxford & IBH Publication, New delhi.
5. Kochar P.L. (1980) – Plant Ecology – S. Nagin & Co., Jallandhar.
6. Kormandi E.J. (1984)- concept of Ecology- Printice Hall Ind., New Delhi.
7. Asthana R.K. (1998) – Environmental Problems and Solution- S.Chand & Co. Pvt. Ltd., New Delhi.
8. Verma P.S., V.K. Agarwal (1983) – Environmental Biology - S.Chand & Co. Pvt. Ltd., New Delhi.
9. Subramanyam N.S. A.V.S.S. Samburthy (2000)- Ecology- Narosa Publishing House, New Delhi.
10. Sharma D.P. (1993) – Ecology & Environmental Biology- Rastogi Publication, Meerut.
11. Nebel B.J. (1990) – Environmental Science – Printice Hall Indu. Pvt. Ltd. New Delhi.
12. Trivedi R.K. Etal (1987) – Practical Ecology – Anmol Publication, Jodhapur.
13. Rao K.S. (1971) - Fundamentals of Ecology – W.B. Saunders co. Philadelphia.
14. Shukla R.S. & Chandel P.S. (2000) – Plant Ecology – S.Chand & Co. Pvt. Ltd., New delhi.
15. Odum, E.P 1983. Basic Ecology, Saunders, Philadelphia.

contd...

16. Mackenzie, A et al. 1999. Instant Notes in Ecology. Viva Books Pvt. Ltd Delhi.
17. For laboratory exercises
- a. Krebs, C.J. 1989. Ecological Methodology. Harper and Row, New York.
- b. Ludwig, J.A. and Reynolds, J.F. 1988. Statistical Ecology. Wiley. New York.
- c. Moore, P.W. and Chapman, S.B. 1986. Methods in plant Ecology. Blackwell scientific publications.

Semester-V

Botany Practical II

(Ecology, Environmental Biology and Phytogeography.)

Time: 4 Hours

Max Marks: 40

- Q.1. Give the external and internal features of ecological adaptations with neat labelled diagrams of specimen- A and mention the habitat to which it belongs. 08 Marks
- Q.2. Determine the moisture content & water holding capacity of sample 'B'. 05 Marks
- Q.3. Analyse sewage & waste water sample- C (pH, turbidity, TDS.). 06 Marks

contd ...

- Q.4. a. Identify and describe the features of ecological interest in slide D. 03 Marks
b. Describe the use and working mechanism of ecological instrument E. 03 Marks

Submission of Project (Industrial visit)	05
Marks Submission of Study tour report (Viva voce on Ecology/vegetation types studied during tour & project)	05 Marks
Journal	05 Marks

B.Sc V Semester Practical Examination

Subject: Botany Paper- II

Instructions to Examiners.

Time: 4Hours

Max Marks: 40

- Q.1. Ecology specimen -A 08 marks
(External and internal ecological adaptations- 5 marks, diagram-2 marks, mentioning habitat- 1mark)
- Q.2. Moisture content /water holding capacity of sample -B 05 marks
(Performing experiment and procedure-3 marks, calculation and result-2marks).
- Q.3. Analysis of sewage and waste water sample -C. 06 marks
(PH-2marks, turbidity-2marks, TDS-2marks).

contd...

Q.4. a-Ecological slide- D.	03 marks.
(Identification -1mark, description -2 marks)	
b- Ecological instrument-E	03marks
(Identification-1mark, working mechanism and use -2marks	
Submission of project	05 marks.
Study tour report (Viva voce)	05 marks.
Journal	05 marks.

B.Sc.V Semester Theory Examination

Sub: BOTANY Paper – II

Pattern of Question Paper

Time: 03 hours

Max. Marks: 80

All questions are compulsory

Q. I Answer any ten out of twelve (01 to 12 sub questions) 10 X 2 = 20

From Unit 1: Plant and environment- 03 sub questions.

From Unit 2: Population ecology and Ecosystems-04 sub questions.

From Unit 3: Phytogeography-01 sub question.

From Unit 4: Conservation of Natural resources-02 sub questions.

From Unit 5: Pollution-02 sub questions.

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B.Sc. V Semester

(w.e.f : 2018 - 17)

Botany Paper - I

Paper-I: Plant Breeding, Tissue Culture and Horticultural Practices. 50 Hrs

Objectives: This paper includes some topics in horticulture like- Nursery, Green House Technology, Harvest and Weed Management. These will be of much help to the students residing in rural and urban areas to generate employment.

Unit 1: Plant Breeding: History and objectives. Introduction, Selection (Pure line, Mass Selection),

Hybridization- inter specific and inter generic. Mutational & Polyploidy breeding. Germ plasm and its maintenance. Pollen Bank, Quarantine method.

10 Hrs.

Unit 2: Plant Tissue Culture: Scope and Significance. Basic Aspects and Cellular totipotency (Shoot tip, Embryo and Haploid culture techniques). Differentiation and morphogenesis.

10 Hrs.

Unit 3: Introduction to Horticulture, Nursery management and importance.

Methods of propagation - vegetative - rhizome, bulb, corm and sucker (natural).

Artificial- Cutting, layering, grafting and budding. Bonsai - methods and importance.

Nursery management:

Introduction, types of nurseries and cultural practices. Seed (propagule) collection, storage and treatment. Manures, fertilizers and pesticides. Methods of irrigation - drip, sprinkler and flood

12 Hrs.

Unit 4: Green House Technology - Introduction, advantages and limitations.

Types of Green Houses- Green House structure, principle

Green house technology as applied to ornamental, vegetable and fruit plants.

08 Hrs.

Unit 5: Harvest Technology and Weed Management:

Harvest Technology: Flower and fruit plants management. Artificial ripening, maturity indices, methods of picking. Post-harvest technology and management of fruits: grading, processing, storage and packing.

Weed Management: Introduction and significance. Invasive weeds - concept and causes of their dominance. Weed control - physical, chemical and biological methods.


10 Hrs.

Practicals :

1. Study of methods of propagation with help of tubers, bulbs rhizomes, corms suckers, runner and offset.
2. Study of propagation by cutting, layering, grafting and budding.
3. Methods of emasculation and bagging for cross-pollination.
4. Morphology and anatomy of dry and wet stigma.
5. Morphology and anatomy of solid and hollow styles.
6. Study of pollination types.
7. Demonstration of tissue culture techniques.
8. Visit to nursery - poly house /Green house and tissue culture lab.
9. Preparation of MS media for culture.
10. Bonsai techniques.



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6. BIOTECHNOLOGY (Optional)

SEMESTER-VI

PAPER 6.1: INDUSTRIAL AND ENVIRONMENTAL BIOTECHNOLOGY

Total hour allotted – 60 Hrs.

PART A: INDUSTRIAL BIOTECHNOLOGY


1. Introduction to industrial biotechnology, Basic principle of fermentation technology.
2. **Design of fermentor and types:** Introduction, aseptic operation of fermenter, control and measurement Equipment & fermentor, pH, impeller, sparger, batch, aeration, Agitation, temperature control & foam control, types of fermentors – typical, airlift, Bubble up fermentor.
3. Screening & isolation of industrially important microorganisms
4. **Downstream process:** Introduction, removal of microbial & other solid matter, Foam separation, filtration, centrifugation and application
5. **Fermentation media:**
Natural and synthetic media, Sterilization techniques- Heat, Radiation, and filtration methods.
6. **Production of microbial products:**
Lactic acid, Alcohol, penicillin & amylase.
7. **Fermented foods:**
Fermented foods-Yoghurt, Buttermilk, Dosa, cheese, Tempeh
Microbial foods-Single cell protein (SCP) and single cell oils (SCO).
8. **Plant cell suspension culture for the production of food additives:**
Saffron and capsaicin and shikonin.
9. **Technique of mass culture of algae:** *Spirulina*.
10. Microbial polysaccharides and polyesters; production of xanthan gum and Polyhydroxy alkanoids (PHA).


PART B: ENVIRONMENTAL BIOTECHNOLOGY

1. Renewable and non-renewable resources of energy.
2. Impact of conventional and non conventional fuels on environment.
3. Biodegradation (xenobiotic compounds—simple, aromatic and petroleum products) and bioremediation.
4. Solid waste management: Biogas production and its advantage.
5. Microbial ore leaching and recovery: Biomining.
6. Treatment of municipal waste and industrial effluents.
7. Study of Vermicomposting.
8. Study of Air, water and Soil pollution.
9. Environmental protection Act and related issues.
10. Concept of global warming, ozone depletion (green house effect, acid rain & Ecofarming)

PRACTICAL 6.2 INDUSTRIAL AND ENVIRONMENTAL BIOTECHNOLOGY

1. Identification of industrially important microorganisms; *E.coli*, *Saccharomyces Cereviceae*, *Spirulina*.
2. Algal and Fungal culture – *Spirulina*, *Agaricus*, *Yeast* and *Aspergillus*.
3. Study of sugar fermentation by microorganisms by acid and gas production.
4. Preparation of wine from Grape, Banana / sweet potato.
5. Study of Bio gas plant.
6. Production of Biofertilizers, Vermi composting.
7. Estimation of Lactic acid.
8. Estimation of Lactose.
9. Bacteriological examination of water by MPN method.


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3. CHEMISTRY (OPTIONAL)

FIFTH SEMESTER B.Sc. COURSE

Chemistry

Paper-I

Code : 14BSCCHET51

Teaching Hours : 50 Hours

Inorganic Chemistry:

Coordination Chemistry-I 07 hours
Review of terms- double salts, complex salts, central metal ion, ligand, types of ligands, complex ion and coordination number. IUPAC nomenclature
Valence bond theory of coordination compounds with reference to $[\text{Fe}(\text{CN})_6]^{3-}$, $[\text{Fe}(\text{CN})_6]^{4-}$, $[\text{FeF}_6]^{3-}$, $[\text{Zn}(\text{NH}_3)_4]^{2+}$, $[\text{Ni}(\text{CN})_4]^{2-}$ and its limitations.
Isomerism- Ionisation, hydrate, linkage, geometrical and optical in coordination compounds with respect to coordination number 4 and 6.

Theory of gravimetric analysis 04 hours
Principles of gravimetric analysis- super saturation, von Weimar equation, conditions of precipitation, coprecipitation and post precipitation. Separation of precipitate from mother liquor, washing, properties of wash liquid, drying and ignition of precipitate, weighing form.

Inorganic polymers 04 hours
Inorganic polymers, Types, comparison with organic polymers, silicones, phosphonitrilic halides- formation, structure and applications.

Green Chemistry 03 hours
The need for green chemistry and eco-efficiency, green methods, green products, recycling of wastes, 12 principles of green chemistry.

Organic Chemistry:

Heterocyclic Compounds 05 hours
Classification, molecular orbital picture and Aromatic character of furan, thiophene, pyrrole and pyridine, synthesis of the following compounds.
i) Furan, thiohene and pyrrole from 1,4- diketones.
ii) Pyridine by Hantzsch synthesis.
Electrophilic substitution reactions of pyrrole, furan and pyndine(chlorination and nitration), comparison of basicities of pyridine, piperidine and pyrrole.



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UNIT-I Cell Biology

Cell Biology: Ultra structure of animal cell, Cell theory & cell cycle. 1hr
Ultra Structure & function of cell organelles: Plasma membrane, 8hrs
Endoplasmic reticulum, Ribosome's, Golgi-complex,
Lysosomes, Mitochondria and Nucleus.

UNIT-II Cell Biology

Chromosomes: Structure & types of chromosomes. Ultra structure 2hrs
of chromosome. 2hrs
Cell division: Types- mitosis & meiosis.
Cellular Aging & Cell Death: Concept of Aging theories, Effect of 2hrs
Aging on Cell organelles. Apoptosis, Necrosis-Definition
& significance. 3hrs
Cancer Biology: Introduction, Characteristics of cancer cells.
Carcinogens, cause & prevention.

UNIT-III Histology

Histo chemical Techniques: Cytoplasmic & Nuclear stains. 3hrs
Preparation of histological slides.
A). Study of histological structure and functions of the following 8hrs
Mammalian organs.
a). Tongue b). Salivary glands
c). Stomach d). Intestine
e). Liver f). Kidney

UNIT-IV Histology

B). Study of histological structure and Endocrine functions of the 9hrs
following Mammalian organs
a) Pituitary b) Pancreas c) Adrenal d) Thyroid
e) Parathyroid f) Thymus g) Testes h) Ovary

UNIT-V Ethology (Animal Behaviour)

Ethology: Introduction Definition, Scope of ethology. Brief 2hrs
Contributions of Konard Lorenz, Niko Tinbergen and
Karl Von Frisch.

Types of Animal Behaviour: 7hrs

- 1). Innate Behaviour: Taxes, Reflexes, Instincts & Motivation.
- 2). Learned Behaviour: Habituation, Imprinting, Conditioned, Reflexes and Insight learning.
- 3). Social behaviour: Types of animal society & Colony in Honey Bees and Monkey troops.
- 4). Territoriality & Courtship Behaviour in Scorpion, Stickle Back Fish & Peacock.
- 5). Study of nesting behavior and mimicry in animal.
- 6). Biological clock, Circadian rhythm and Chronobiology.

Animal Communication: Chemical, visual and Audio. Function of

Parental care: Concepts, Fishes, Amphibians and Birds.	2hrs 3hrs
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PRACTICALS

	Total Practicals-12 hrs
1) Study of permanent cytology slides of Mitosis & Meiosis.	2hrs
2) Study of temporary preparation of Mitotic stages from onion Root tip cells.	2hrs
3) Study of temporary preparation of Meiotic stages from onion Flower bud/Grass Hooper testis.	2hrs
4) Preparation and observation of permanent histological slides Stomach, Intestine, Liver, Pancreas, Kidney, Adrenal Thyroid, Testis & Ovary.	4hrs
5) Study of mimicry in leaf insect, Chameleon, Butterflies, Stick Insect, Ants, Wasps and Spiders.	1hr
6) Study of Nest and nesting material.	1hr
7) Internal Practical Test	1hr

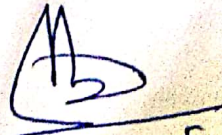
NOTE:

1. With the help of Charts/Models/Diagrams/Printouts & Xerox Sheets are used in practical demonstration
2. Compulsory field visit to study Mimicry, Habitats and Community.
3. Submission of field visit report carries 5 marks.

REFERENCE BOOKS

1. Introduction to Histology. Gauba R.K. Tata Mc Graw Hill New Delhi.
2. Cells and Tissues: Introduction to Histology ND Cells :Rogers:A.W. AcademicPress .
3. Basic medical Histology :Biology of cells & tissues & organs Kessel R.G. oupNew York.
4. Text Book of Histology :Bloom and Fawcett.Saunders Publ.Philadelphia.
5. Bailey's Text Book of Histology.Bailee Baltimore,Willims andWilkins.
6. Text Book of Ecology : Odum.
7. Introduction to animal behavior:Aubrey Manning and Marian.S.DawkinsCambridge Uni Press.
- 8.Essentials of organizational behavior:Stephan Robbins,Prentice Hall of IndiaNew Delhi.
9. Animal Behaviour :McFarland D ELBS with Longman.
10. Ethology " Barnett.
11. An introduction to Behavioural Ecology J.R. Krebs & N.B. Davies Black wellScientific Publ.
12. Text Book of Animal Behaviour: Fatik Baran mandal. PHI Learning Pvt Ltd newDelhi.
13. Animal Behaviour :Reena Mathur,Rastogi and Coimpani.
14. Cell Biology -Chennarayappa - Unniversity Press

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15. Cell & Molecular Biology - P. K. Gupta , Rastogi Publishers, NewDelhi
16. Cytology- Verma & Agrawal,S.Chand & Co.Publisher
17. Concepts of Cell Biology- Verma & Agrawal,S.Chand & Co Publisher
18. Cell & Molecular Biology- De Robertes & De Robertes
19. Cytology - C.B.Pawar,Himalaya Publisher House, Bombay.
20. Molecular Cell Biology: Harvey Lodish,David Baltimore et

precipitate from mother liquor, washing, properties of wash liquid, drying and ignition of precipitate, weighing form.

Inorganic polymers

04 hours

Inorganic polymers, Types, comparison with organic polymers, silicones, phosphonitrilic halides- formation, structure and applications.

Green Chemistry

03 hours

The need for green chemistry and eco-efficiency, green methods, green products, recycling of wastes, 12 principles of green chemistry.

Organic Chemistry:

Heterocyclic Compounds

05 hours

Classification, molecular orbital picture and Aromatic character of furan, thiophene, pyrrole and pyridine, synthesis of the following compounds.

i) Furan, thiohene and pyrrole from 1,4- diketones.

ii) Pyridine by Hantzsch synthesis.

Electrophilic substitution reactions of pyrrole, furan and pyndine(chlorination and nitration), comparison of basicities of pyridine, piperidine and pyrrole.

Organic Synthesis via enolates

05 hours

Acidity of α -hydrogens, synthesis of ethylacetoacetate(EAA) by Claisen condensation and its mechanism, synthesis of diethyl malonate, keto-enol tautomerism of EAA

Synthesis of following compounds using EAA and diethyl malonate:

i) ketones ii) carboxylic acids iii) heterocyclic compounds iv) dicarboxylic acids.

Alkaloids

06 hours

Definition, source, classification and general characteristics, Hofmann exhaustive methylation with pyridine as an example.

Isolation, constitution and confirmation by synthesis - Coniine, hygrine and nicotine.

Physical Chemistry:

Microwave Spectroscopy

05 hours

Classification of molecules, rotational spectra of rigid diatomic molecules, criteria for showing the spectra, energy levels of rigid rotator, selection rules (final equations only), determination of bond length and moment of inertia of HCl molecule.

Phase rule

05 hours

Terminology and explanation of the terms involved. Applications of phase rule- One component system-water and sulphur systems Two-component systems- Bismuth-Cadmium system and KI - water system. Eutectic and freezing mixture.

Vibrational spectrum

06 hours

Simple harmonic oscillator, Hooke's law, energy level of simple harmonic oscillator model of diatomic molecule (final equations only), selection rules, zero point energy determination of force constant and qualitative relation between force constant and bond dissociation energies. Vibrational degrees of freedom of molecules (Linear and non linear).

Reference books for inorganic chemistry

- | | |
|--|--------------------|
| 01. Advance Inorganic Chemistry Vol-I and II | Gurudeep Raj |
| 02. Advance Inorganic Chemistry | Satya Prakash |
| 03. Modern Inorganic Chemistry | R.D. Madan |
| 04. Inorganic Chemistry | James Huheey |
| 05. Concise Inorganic Chemistry | J.D. Lee |
| 06. Inorganic Chemistry | Shriver and Atkins |

Books recommended for organic chemistry:

- | | |
|--------------------------------|-------------------|
| 01. Organic Chemistry | LL. Finar Vol-1 |
| 02. Organic Chemistry | Morrison and Boyd |
| 03. Advanced Organic Chemistry | Jerry March |

Books recommended for physical chemistry:

- | | |
|---------------------------------------|--------------|
| 01. Fundamentals of Molecular Spectra | C.N. Banwell |
| 02. Molecular Spectroscopy | S. Chandra |
| 03. Molecular Spectroscopy | White |
| 04. Chemical Kinetics | K.J. Laidler |
| 05. Surface Chemistry | Gregg |

Chemistry

Paper-II

Code : 14BSCCHET52

Teaching Hours : 50 Hours

Inorganic Chemistry:

Industrial Chemistry-I

08 hours

Alloys-Significance, types of alloys (ferrous and non ferrous alloys), preparation (fusion and electro-deposition) and their applications.

Abrasives- Classification, Mohr scale of hardness, Manufacture and application of carborundum, alundum, tungsten carbide.

Glass - physical and chemical properties of glass, raw materials, manufacture using tank furnace, Annealing of glass, types, composition and uses of glasses.



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Q. II Answer any six out of eight (13 to 20 sub questions) $6 \times 5 = 30$

From Unit 1: Plant and environment- 02 sub questions.

From Unit 2: Population ecology and Ecosystems-02 sub questions.

From Unit 3: Phytogeography-01 sub question.

From Unit 4: Conservation of Natural resources-02 sub questions.

From Unit 5: Pollution-01 sub question.

Q. III Descriptive Answers.

21. From Unit 1: Plant and environment- 01 question. $1 \times 10 = 10$

OR

From Unit 2: Population ecology and Ecosystems-01 question.

22. From Unit 3: Phytogeography-01 question.

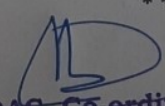
OR

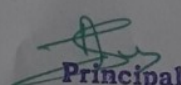
From Unit 4: Conservation of Natural resources-01 question. $1 \times 10 = 10$

23. From Unit 5: Pollution-01 question. $1 \times 10 = 10$

OR

Short notes From Unit 1: Plant and environment & From Unit 4: Conservation of
Natural resources -01 question each. $2 \times 5 = 10$


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3.3 Ecocriticism and Indian Writing in English

Objectives:

- To understand complex and various representation of nature
- To critically understand different strategies representing ecological disaster, threat apocalypse and ideas of nature
- To understand environmental crisis and representation

Unit- I

1. Essay from Glotfelty and Harold Fromm (Eds.) *The Ecocriticism Reader: Landmarks in Literary Ecology* (Introduction: *Literary Studies in an Age of Environmental Crisis*, a-f, i, ii, iii.); University of Georgia Press 1996
2. *Ecocriticism at the MLA: A Round Table* (ASLE News 11.1 (Spring 1999))
<https://www.asle.org>- Definitions of Eco criticism archive. ASLE
3. *Narrative Scholarship: Story telling in Eco Criticism* by Gretchen Leglee, University of Alaska, Anchorage
<https://www.asle.org>- Definitions of Eco criticism archive. ASLE

Unit- II

1. Rabindranath Tagore: *The Tame Bird was in a cage*
2. A. K. Ramanujan: *A River*
3. Arun Kolatkar: *Between Zejuri and Railway Station*
4. Nissim Ezekiel: *Poet, Lover, Birdwatcher*

Unit- III

1. Rabindranath Tagore: *Red Oleanders* - play - *Dalita kavasi*
2. Kalidas: *Abhigyan Shakuntalam* - play

Unit- IV

1. Bhabani Bhattacharya: *So Many Hungers* - Novel
2. Arundhati Roy: *The God of Small Things* - Novel

Suggested Reading

1. Harold Bloom et. al.: *Deconstruction and Criticism*. (Routledge Kegan Paul, 1979)
2. Garrick Davis (Ed) *The Best of the New Criticism*
3. Sarup, M. : *An Introductory Guide to Post -Structuralism*.
4. Selden, R. : *Practicing Theory and Reading Literature: An Introduction*.
5. Mills, S. : *Feminist Readings : Feminists Reading*.

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- ① Forbidden Love
- ② Belrayal
- ③ Indian History
- ④

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