

field visit

2016-17

SECOND YEAR

2016-17

PAPER - II

ANATOMY, EMBRYOLOGY, TAXONOMY AND MEDICINAL BOTANY

UNIT - I: ANATOMY

1. **Meristems:** Types, histological organization of shoot and root apices and theories.
2. **Tissues and Tissue Systems:** Simple, complex and special tissues.
3. Leaf: Ontogeny, diversity of internal structure; Stomata and epidermal outgrowths.
4. **Stem and root anatomy,** Vascular cambium - Formation and function. Anomalous Secondary growth-general account. *Ex: Stem-Achyranthes, Boerhavia, Bignonia, Dracaena; Root- Beta vulgaris*
5. **Wood structure:** General account. Study of local timbers - Teak (*Tectona grandis*), Rosewood, (*albergia latifolia*), Red sandal, (*Pterocarpus santalinus*) Nalamaddi; (*Terminalia tomentosa* (*T. alat*) Peddagi (*Pterocarpus marsupium*), and Neem (*Azadirachta indica*)

UNIT - II: EMBRYOLOGY

6. Introduction to Embryology. Anther structure, Microsporogenesis and development of male gametophyte.
7. Ovule structure and types; Megasporogenesis; types and development of female gametophyte.
8. Pollination - Types; Pollen - pistil interaction. Fertilization.
9. Endosperm - Development and types. Embryo - development and types; Polyembryony and Apomixis - an outline
10. Palynology: Pollen morphology, NPC systems, application of Palynology.

UNIT - III: TAXONOMY

11. Introduction : Principles of Plant Systematics, Systematics vs Taxonomy, Types of classification : Artificial, Natural and Phylogenetic

field visits

2018-19

2019-20

B.Sc (CBCS) BOTANY- II YEAR
Semester-III - Paper-III
Taxonomy of Angiosperms and Medicinal Botany

19-20

16-17

DSC-1C (4 hrs./week)

Theory syllabus

Credits-4
(60 hours)

UNIT - I

1. Introduction: Principles of plant systematics, Types of classification: Artificial, Natural and Phylogenetic; Systems of classification: Salient features and comparative account of Bentham & Hooker and Engler & Prantle. An introduction to Angiosperm Phylogeny Group (APG). (7h)
2. Current concepts in Angiosperm Taxonomy: Embryology in relation to taxonomy, Cytotaxonomy, Chemotaxonomy and Numerical Taxonomy. (4 h)
3. Nomenclature and Taxonomic resources: An introduction to ICBN, Vienna code - a brief account. Herbarium: Concept, techniques and applications. (4 h)

UNIT-II

4. Systematic study and economic importance of plants belonging to the following families:
Polypetalae : Annonaceae, Capparidaceae, Rutaceae, Fabaceae (Faboideae/papilionoideae, Caesalpinoideae, Mimosoideae), Cucurbitaceae
5. Gamopetalae: Apiaceae, Asteraceae, Asclepiadaceae, Lamiaceae
6. Monochalmydeae: Amaranthaceae, Euphorbiaceae, Monocotyledons: Orchidaceae and Poaceae. (15h)

UNIT - III

7. Ethnomedicine: Scope, interdisciplinary nature, distinction of Ethnomedicine from Folklore medicine. (3h)
8. Outlines of Ayurveda, Sidda, Unani and Homeopathic systems of traditional medicine. Role of AYUSH, NMPB, CIMAP and CDRI. (5 h)
9. Plants in primary health care: Common medicinal plants – Tippateega (*Tinospora cordifolia*), tulasi (*Ocimum sanctum*), pippallu (*Piper longum*), Karakaya (*Terminalia chebula*), Kalabanda (*Aloe vera*), Turmeric (*Curcuma longa*). Evaluation of crude drugs. (7h)

UNIT-IV

10. Traditional medicine vs Modern medicine: Study of selected plant examples used in traditional medicine as resource (active principles, structure, usage and pharmacological action of modern medicine: Aswagandha (*Withania somnifera*), Sarpagandha (*Rauwolfia serpentina*), Nela usiri (*Phyllanthus amarus*), Amla (*Phyllanthus emblica*) and Brahmi (*Bacopa monnieri*). (8h)
11. Pharmacognosy: Introduction and scope. Adulteration of plant crude drugs and methods of identification - some examples. Indian Pharmacopoeia. (4h)
12. Plant crude drugs: Types, methods of collection, processing and storage practices. (3h)

Soyers
A.C.V.

BL

(m.w)

II. Minor Experiments

6. Karyotype study using cytological preparation of dividing root tip cells of onion/photographs/permanent slides
7. Study of polytene chromosomes using salivary glands from *Chironomus* /prepared slides/ photographs.
8. Solving genetic problems related to monohybrid, dihybrid ratio and interaction of genes (Minimum of six problems in each topic). See annexure-I
9. Demonstration of soil texture (composition of clay, sand silt etc.) pH.
10. Estimation of water purity in given water samples
11. Estimation of Ca^{2+} in given water samples
12. Estimation of chlorides in given water samples

III. Scientific Observations

13. Study in the ultra structure of cell organelles using electron microphotographs.
14. Geographical spotting of certain endemic and endangered plant species of A.P.
15. Minimum of two field visits to local areas of ecological/ conservation of biodiversity Importance (Sacred grove/ Reserved Forest / Botanical garden/ Lakes etc.)

IV. Critical notes on spotters of scientific interest

16. Salivary gland chromosome
17. Lampbrush chromosome
18. Solenoid model of chromosome structure
19. Operon model
20. *Mirabilis jalapa*
21. *Eichhornia* // *Hydrilla*
23. *Pistia*
24. *Nymphaea*
25. *Vallisneria*
26. *Asperagus*
27. *Opuntia*
28. *Euphorbia antiquorum*
29. *Rhizophora*
30. *Azocentia*

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Soyles
A. C. V.

B. C.

(L. M. W.)

field visits
2018-19

2018-19

2016-17

B.Sc (CBCS) Botany- I year
Semester-I - Paper-I
Microbial Diversity of Lower Plants

DSC - 1A (4 hrs./week)

Theory Syllabus

Credits- 4
(60 hours)

UNIT - I

1. Brief account of Archaeobacteria, Actinomycetes. (4h)
2. Cyanobacteria: General characters, cell structure, thallus organisation and their significance as biofertilizers with special reference to *Oscillatoria*, *Nostoc* and *Anabaena*. (6h)
3. Lichens: Structure and reproduction; ecological and economic importance. (5h)

UNIT- II

4. Viruses: Structure, replication and transmission; plant diseases caused by viruses and their control with reference to Tobacco Mosaic and Rice Tungro. (7h)
5. Bacteria: Structure, nutrition, reproduction and economic importance. An outline of plant diseases of important crop plants caused by bacteria and their control with reference to Angular leaf spot of cotton and Bacterial blight of Rice. (8h)
6. General account of Mycoplasma with reference to Little leaf of brinjal and Papaya leaf curl

UNIT-III

7. General characters, structure, reproduction and classification of algae (Fritsch) and thallus organization in algae. (3h)
8. Structure and reproduction of the following:
Chlorophyceae- *Volvox*, *Oedogonium* and *Chara*. (5h)
Phaeophyceae- *Ectocarpus* (2h)
Rhodophyceae- *Polysiphonia*. (3h)
9. Economic importance of algae in Agriculture and Industry. (2h)

UNIT-IV

10. General characters and classification of fungi (Ainsworth). (3h)
11. Structure and reproduction of the following:
(a) Mastigomycotina- *Albugo*
(b) Zygomycotina- *Mucor*
(c) Ascomycotina- *Saccharomyces* and *Penicillium*.
(d) Basidiomycotina- *Puccinia*
(e) Deuteromycotina- *Cercospora*. (10h)
12. Economic importance of fungi in relation to mycorrhizae and mushrooms. General account of mushroom cultivation (2h)

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A. C. et

B. C.
L. M. et

17. Seed storage: Seed banks, factors affecting seed viability, genetic erosion. Seed production technology; seed testing and certification.
18. Horticulture techniques: Introduction, Cultivation of ornamental and vegetable Crops, Bonsai and landscaping.
19. Floriculture: Introduction. Importance of green house, polyhouse, mist chamber, shade nets; Micro irrigation systems. Floriculture potential and its trade in India.
20. Vegetative Propagation of plants: Stem, root and leaf cuttings. Layering and bud grafting. Role of plant growth regulators in horticulture.

field visit
2017-18

Practical - IV :

PHYSIOLOGY, TISSUE CULTURE, BIOTECHNOLOGY, SEED TECHNOLOGY AND HORTICULTURE

(Total Hours of Laboratory Exercises : 90 @ 3 h/Week in 30 sessions)

Suggested Laboratory Exercises:

I. Major Experiments

1. Determination of osmotic potential of vacuolar sap by plasmolytic method using leaves of *Rhoeo / Tradescantia*.
2. Determination of stomatal frequency using leaf epidermal peeling.
3. Separation of chloroplast pigments using paper chromatography technique.
4. Estimation of protein by biuret method.
5. Estimation of DNA

II. Minor Experiments

6. Determination of rate of transpiration using cobalt chloride method.
7. Determination of catalase activity using plant material/photographs.
8. Demonstration of seed dressing using fungicide to control diseases.
9. Demonstration of seed dressing using biofertiliser (*Rhizobium*) to enrich nutrient supply.
10. Demonstration of Micropropagation using explants like axillary buds and shoot meristems.

QUESTION PAPER
B.Sc (BOTANY) III- Year
Paper- IV: Physiology, Tissue culture, Biotechnology,
Seed. Technology and Horticulture

Time : 3 Hrs

Max.Marks : 50.

- I. Major Experiment (ONE) : 15 Marks
- II . Minor Experiment (ONE) : 10 Marks
- III. Scientific Observations (ONE) : 5 Marks
- IV Critical notes on spotters of scientific interest (FIVE) (5x2) : 10 Marks
- V. Project Work : 5 Marks
- VI Record : 5 Marks

Signature of the Examiner

1)

2)

1. Prospecting of plants for alternative (non-conventional) energy sources.
- ✓ 2. Phytoremediation of polluted soils / water.
3. Biodiversity of a habitat.
4. Biodiversity of a selected sacred groove.
5. Study of a natural ecosystems around.
6. Explore the food chain in the local natural ecosystem.
7. Agrobiodiversity of a region.
8. Threatened plants of a region.
- ⑨ 9. Survey of root-nodule forming plants of a region.
10. Invasive plants of a region.
11. Identification of C4 and CAM plants of a region.
12. Mineral deficiency of selected element in plants and its control.
13. Breaking of seed dormancy (of a tree species).
14. Seed variability of commercially available seeds.
15. Applications of antitranspirants.
16. Factors affecting photosynthesis (light, CO₂ , temperature).
17. Effects of water stress on growth and development of plants.
18. Micropropagation of endangered or threatened medicinal plants.
- ⑩ 19. Production of synthetic seeds.
- ⑪ 20. Application of plant growth regulators for rooting of stem cuttings.
21. Prolongations of self- life of vegetables / edible fruits /flowers.
22. Applications of plant growth regulators in Horticulture.
23. Prolongation of self life of vegetables / edible fruits / flowers.
24. Mineral deficiency of selected elements in plants and its control.
25. Seed quality, storage ad viability of selected crop plant.
- ⑫ 26. Colonel propagation of Horticulture plants.

&
SCHEME FOR EVALUATION

Time: 3 h

Maximum Marks: 50

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Note: Questions to be set based on prescribed Laboratory Exercises in the following pattern

I. Major Laboratory Exercise: 15 Marks

❖ For in-depth testing of scientific and major technical skill of students.
Perform/conduct the experiment or prepare the given material by taking sections and doing staining for scientific study.

Scheme for valuation: Procedure- 3 marks + Experimentation -6 marks + Observations or Recording of results – 3 marks + Discussion – 3 marks (Total: 15 marks).

II. Minor Laboratory Exercise: 10 Marks

❖ To test minor technical skill of students.
Make suitable minor preparation of the given plant material(s) for scientific study.

Scheme for valuation: Preparation- 5 marks + Identification - 3 marks + Discussion – 2 marks (Total: 10 marks).

III. Scientific Observation and data analysis: 5 Marks

Using specimens/ scientific data in a Figure / Photograph/ Table/ Diagram etc.

Scheme for valuation: Observations -2 marks + Identification- 1 mark + analysis - 2 marks (Total: 5 marks).

IV. Critical notes on (FIVE) spotters of scientific interest 10 Marks

Using specimens/ slide/ Photograph/ data in a Figure or Table

Scheme for valuation: Identification – 1mark + Notes- 1 mark for each spotter (Total: 10 marks for five spotters).

V. Project Work: 5 Marks

VI. Record(s) and Submission: (Scientific preparations/ collection like preserved specimens, slides, herbarium, working models, clippings of scientific articles, etc.) **5 Marks**

Suggested Titles Related to Third Year Syllabus: (For Project Work)

THIRD YEAR

field Trips &
project work

Paper- III : CELL BIOLOGY, GENETICS, ECOLOGY AND BIODIVERSITY

UNIT-I: Cell Biology

1. *Plant cell envelops*: Ultra structure of cell wall, molecular organization of cell membranes.
2. *Nucleus*- Ultrastructure, Nucleic acids - Structures and replication of DNA; Types and functions of RNA.
3. *Chromosomes*: Morphology, organization of DNA in a chromosome. Euchromatin and Heterochromatin, Karyotype.
4. *Special types of chromosomes*: Lampbrush, polytene and B - chromosomes.
5. *Cell division*: Cell cycle and its regulation ; mitoses, meiosis, and their significance.

UNIT- II: Genetics

6. *Mendelism* : Laws of inheritance. Genetic interactions - Epistasis, Complementary, Supplementary and inhibitory genes.
7. *Linkage and crossing over*: A brief account, construction of genetic maps - 2 point and 3 point test cross data.
8. *Mutations*: Chromosomal aberrations - structural and numerical changes; Gene mutations, transposable elements.
9. *Gene Expression*: Organization of gene, transcription, translation, mechanism and regulation of gene expression in prokaryotes (Eac.and Trp Operons).
10. Extra nuclear genome: Mitochondria! and plastid DNA, Plasmids.

UNIT-III: Ecology

11. **Concept and components of Ecosystem.** Energy flow, food chains, food webs, ecological pyramids, biogeochemical cycles Carbon. Nitrogen. Phosphours.
12. Plants and environment: Ecological factors Climatic (light and temperature), edaphic and biotic. Ecological adaptations of plants.

13. Population ecology: Natality, Mortality, growth curves, ecotypes, ecads.
14. Community ecology: Frequency, density, cover life forms, biological spectrum, Ecological succession (Hydrosere, Xerosere).
15. Production ecology: Concepts of productivity, GPP, NPP, CR (Community -- Respiration) and secondary production, P/R ratio and Ecosystems.

UNIT - IV : Biodiversity and Conservation

16. Biodiversity: Concepts, Convention on Biodiversity - Earth Summit. Types of biodiversity.
17. Level, threats and value of Biodiversity.
18. Hot spots of India - endemism. North Eastern Himalayas, Western Ghats.
19. Agro-biodiversity: Vavilov centres of crop plants.
20. Principles of conservation: IUCN threat - categories, RED data book- Threatened & endangered plants of India. Role of organizations in the Conservation of Biodiversity - IUCN, UNEP, WWF, NBPGR, NBD.

Practical- III :

CELL BIOLOGY, GENETICS, ECOLOGY AND BIODIVERSITY

(Total Hours of Laboratory Exercises:
90 @ 3 h/Week in 30 sessions)

Suggested Laboratory Exercises:

I. Major Experiments

1. Demonstration of cytochemical methods: Fixation of plant material and nuclear staining for mitotic and meiotic studies.
2. Study of various stages of mitosis using cytological preparations of onion root tips.
3. Study of various stages of meiosis using cytological preparation of onion flower buds
4. Study of plant community by quadrat method
5. Estimation of chemical oxygen demand (COD) in a given water sample.

II. Minor Experiments

6. Karyotype study using cytological preparation of dividing root tip cells of onion/photographs/permanent slides
7. Study of polytene chromosomes using salivary glands from *Chironomus* / prepared slides/ photographs.
8. Solving genetic problems related to monohybrid, dihybrid ratio and interaction of genes (Minimum of six problems in each topic). See **annexure-I**
9. Demonstration of soil texture (composition of clay, sand silt etc.) pH.
10. Estimation of water purity in given water samples
11. Estimation of OR in given water samples
12. Estimation of chlorides in given water samples

III. Scientific Observations

13. Study in the ultra structure of cell organelles using electron microphotographs.
14. Geographical spotting of certain endemic and endangered plant species of A.P.
15. Minimum of two field visits to local areas of ecological/ conservation of biodiversity Importance (Sacred grove/ Reserved Forest / Botanical garden/ Lakes etc.)

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20. *Mirabilis jalapa*
21. *Eichhornia* II. *Hydrilla*
23. *Pistia*
24. *Nymphaea*
25. *Vallisnaria*
26. *Asperagus*
27. *Opuntia*
28. *Euphorbia antiquorum*
29. *Rhizophora*
30. *Avecenia*