KAKATIYA UNIVERSITY - WARANGAL - TELANGANA 2020-21

Under Graduate Courses (Under CBCS 2020 – 2021 onwards)

B.Sc. BOTANY II Year

SEMESTER – III

Tree Rings

PLANT ANATOMY AND EMBRYOLOGY

Theory:	4 Hours/Week;	Credits: 4	Marks: 100 (Internal: 20; External: 80)
Practical:	3 Hours/Week	Credits: 1	Marks: 25

UNIT – I

Meristems: Types, histological organization of shoot and root apices and theories.

1. Tissues and Tissue Systems: Simple, complex and special tissues.
2. Leaf: Ontogeny, diversity of internal structure; stomata and epidermal outgrowths.

UNIT –II

4. Stem and root anatomy: Vascular cambium - Formation and function.
5. Anomalous secondary growth of Stem -*Achyranthes, Boerhaavia, Bignonia, Dracaena;* Root— *Beta vulgaris.*
6. Wood structure: General account. Study of local timbers — Teak *(Tectona grandis),* Rosewood, *(Dalbergia latefolia),* Red sanders, *(Pterocarpus santalinus)* Nallamaddi *(Terminalia tomentosa)* and Neem *(Azadirachta indica).*

UNIT-III

7. History and importance of Embryology.
8. Another structure, Microsporogenesis and development of male gametophyte.
9. Ovule structure and types; Megasporogenesis; types and development of female gametophyte.

UNIT- IV

10. Pollen morphology, pollination and fertilization, Pollination Types, Pollen - pistil interaction, Double fertilization.
11. Seed - structure appendages and dispersal mechanisms.
12. Endosperm - Development and types. Embryo - development and types; Polyembryony and Apomixis -- an outline.

References:

1. Bhattacharya et. al. 2007. A textbook of Palynology, Central, New Delhi.
2. Bhojwani, S. S. and S. P. Bhatnagar. 2000. The Embryology of Angiosperms (4th Ed.), Vikas Publishing House, Delhi.
3. M.R.Saxena- A textbook of Palynology.
4. Vashista- A textbook of Anatomy.
5. P.K.K.Nair- A textbook of Palynology.
6. Esau, K. 1971. Anatomy of Seed Plants. John Wiley and Son, USA.
7. Johri, B. M. 1984. Embryology of Angiosperms. Springer-Verleg, Berlin.
8. Kapil, R. P. 1986. Pollination Biology. Inter India Publishers, New Delhi.
9. Maheswari, P. 1971. An Introduction to Embryology of Angiosperms. McGraw Hill Book Co., London.
10. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press

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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 Archaebacteria, 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)Mastigimycotina- *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)

17. Seed storage: Seed banks, factors affecting seed viabiligy, 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. Imporatance 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.

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 / Tradenscantia.*
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.

SEC..

19-20

16-17

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

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, Caesalpinioideae, 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)

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

Practical syllabus

(45 hours)

1. Systematic study of locally available plants belonging to the families prescribed in theory syllabus
   (Minimum of one plant representative for each family) (24h)
2. Demonstration of herbarium techniques. (3 h)
3. Identification,medicinal value & active principle present in the following plants : Tulasi (*Ocimum sanctum*), Karakaya (*Terminalia chebula*), Kalabanda (*Aloe vera*). (6 h)
4. Ethnomedicinal value/practice of the following plants :
   Aswagandha (*Withania somnifera*), Sarpagandha (*Rauwolfia serpentina*), Amla (*Phyllanthus emblica*) and
   Brahmi (*Bacopa monnieri*). (6h)
5. Pharmacognosy:
   Powder analysis : Pippalu (*Piper longam)*, Nela usiri (*Phyllanthus niruri*),
   Study of Organoleptic (sectional study) of the following:
   Tippateega (*Tinospora cordifolia*)and Turmeric (*Curcuma longa*). (6h)
6. Candidate have to submit at least 30 herbarium sheets

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 marsupiun),* 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

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 OT 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 11. Hydrilla*
23. *Pistia*
24. *Nymphaea*
25. *Vallisnaria*
26. *Asperagus*
27. *Opuntia*
28. *Euphorbia antiquorum*
29. *Rhizophora*
30. *Avecenia*

II. Minor Experiments

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