

Course: B. Sc., Subject: Botany

S. No.	Semester	Module Nature	Modules (Paper)	Hours/Week	Credits	Max. Marks (75+25)	
2	2	CORE-2 Paper-2	Theory	Diversity of Archaeogniatae & Anatomy	04	04	100
			Practical	-do-	03	02	40+10
3	3	CORE-3 Paper-3	Theory	Taxonomy & Embryology	04	04	100
			Practical	-do-	03	02	40+10
4	4	CORE-4 Paper-4	Theory	Plant physiology & Metabolism	04	04	100
			Practical	-do-	03	02	40+10

I B. Sc - BOTANY SYLLABUS THEORY

PAPER-II SEMESTER- II

Paper –II T: Diversity of Archaeogniatae & plant Anatomy

Total hours of teaching 60 hrs @ 4 hrs per week

UNIT – I: BRYOPHYTA

(12hrs)

- 1. Bryophyta:** General characters and classification (up to classes).
- 2. Structure, reproduction** and Life history of *Marchantia*, and *Funaria*
- Evolution of Sporophyte in Bryophytes.

UNIT - II: PTERIDOPHYTA

(12 hrs)

- 1. Pteridophyta:** General characters and Classification (up to classes).
- 2. Structure, reproduction** and life history of *Lycopodium*, and *Marsilea*
- Heterospory and seed habit
- Stelar Evolution in Pteridophytes

UNIT – III: GYMNOSPERMS

(12 hrs)

- 1. Gymnosperms:** General characters and classification (upto classes).
- Morphology, Anatomy, reproduction and life history of *Pinus*, *Gnetum*

UNIT –IV: Tissues And Tissue systems

(12 hrs)

- 1. Tissues** – meristematic and permanent tissues (simple and complex)
- Shoot apical meristem and its histological organisation
- Root apical meristem and its histological organization

UNIT – V. Secondary growth

(12 hrs)

- Anomalous secondary growth in *Dracaena*, *Boerhavia* and *Bignonia*
- Wood structure – general account. Study of local timbers Teak, Rosewood, Red sanders and *Terminalia tomentosa*

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PRACTICAL SYLLABUS: PAPER II-SEMESTER -II

Paper-IIP: Diversity of Archaeogniatae & plant Anatomy

Total hours of laboratory Exercises 45 hrs @ 3 per week

1. Morphology (vegetative and reproductive structures) , anatomy of the following taxa :
a) *Marchantia*, b) *Funaria* c) *Lycopodium* d) *Pinuse* *Gnetum*
2. Anatomy
 1. Demonstration of double staining technique.
 2. Tissue organization in root and shoot apices using permanent slides
 3. Preparation of double staining slides
 4. Anomalous secondary structure: Examples as given in theory syllabus.
 5. Microscopic study of wood in T.S., T.L.S. and R.L.S.
 6. Field visits

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PRACTICAL SYLLABUS: PAPER I-SEMESTER -II

IIP: Diversity of Archaeogniatae & plant Anatomy

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|---|---------------|
| 1. Section cutting of A material
(Slide 3 marks, diagrams-3 marks, Identification-3 marks) | 9 Marks |
| 2. Section cutting of B material
(Slide 3 marks, diagrams-3 marks, Identification-3 marks) | 9 Marks |
| 3. Section cutting of C material
(Slide 4 marks, diagrams-3 marks, Identification-3 marks) | 10 Marks |
| 4. Identification of spotters D,E,and F | 3x4 =12 marks |
| 5. Record (submission compulsory) | 10 marks |

Total : 50 Marks

Key:

- A. Bryophyta/Pteridophyta material
 - B. Gymnosperm material.
 - C. Anatomy material
 - D. Whole specimen or permanent slide of Bryophyta/ Pteridophyta
 - E. Whole specimen or permanent slide of Gymnosperm
 - F. Whole specimen or permanent slide of wood
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PAPER –III; SEMESTER -III

(Paper-III T: Plant Taxonomy and Embryology)

Total hours of teaching 60 hrs @ 4 hrs per week

UNIT – I: Introduction to PLANT TAXONOMY (12 hrs)

1. Fundamental components of taxonomy (identification, nomenclature, classification types and phylogeny)
2. Salient features and comparative account of Bentham & Hooker and Engler & Prantl classification
3. Role of chemotaxonomy, cytotaxonomy and taxometrics in relation to Taxonomy

UNIT –II: SYSTEMATIC TAXONOMY (12 hrs)

1. **Nomenclature and Taxonomic resources:** An introduction to International code of Botanical Nomenclature; Principles, Rules and Recommendations.
2. Systematic study and economic importance of plants belonging to the following families
Annonaceae, Caparidaceae, Rutaceae, Curcubitaceae, and Apiaceae

UNIT –III: SYSTEMATIC TAXONOMY (12 hrs)

1. Systematic study and economic importance of plants belonging to the following families
Asteraceae, Sapotaceae, Asclepiadaceae, Verbenaceae, Lamiaceae, Euphorbiaceae
Orchidaceae and Poaceae.

UNIT – IV: EMBRYOLOGY (12hrs)

1. Introduction : History and Importance of Embryology.
2. Anther structure, Microsporogenesis and development of male gametophyte.
3. Ovule structure and types; Megasporogenesis; Monosporic; Bisporic and Tetrasporic types of female gametophyte/embryosac development
4. Pollination -Types, Fertilization.

UNIT –V: EMBRYOLOGY AND PALYNOLOGY (12 hrs)

1. Endosperm Development and types.
2. Embryo - development and types:
3. Polyembryony and Apomixis - an outline.
4. **Palynology:** Principles and applications.

Suggested Reading

T. Pullaiah. 2007. Taxonomy of Angiosperms. Regency Publications, New Delhi.

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PAPER-III- SEMESTER-III

Practical – III P: Plant Taxonomy AND Embryology

Total hours of laboratory Exercises 45 hrs @ 3 per week

Suggested Laboratory Exercises:

1. Systematic study of locally available plants belonging to the families prescribed in theory Syllabus.
2. Demonstration of herbarium techniques
3. Structure of pollen grains using whole mounts (*Catharanthus, Hibiscus, Acacia, Grass*).
4. Demonstration of Pollen viability test using *in-vitro* germination (*Catharanthus*).
5. Study of ovule types and developmental stages of embryo sac using permanent slides / Photographs.
6. Structure of endosperm (nuclear and cellular); Developmental stages of dicot and monocot Embryos using permanent slides / Photographs
7. Isolation and mounting of embryo (using *Symopsis / Senna / Crotalaria*)
8. Field visits
9. Preparation and submission of 25 herbarium specimens for evaluation during the practical Examination.

II B. Sc - BOTANY SYLLABUS SEMESTER- IV THEORY

PAPER – IV

Paper IV -T: Plant Physiology and Metabolism

Total hours of teaching 60 hrs @ 4 hrs per week

UNIT – I: Plant – Water relations

(12 hrs)

1. Importance of water to plant life, physical properties of water,
2. Diffusion, imbibition and osmosis; water, osmotic and pressure potentials,
3. Absorption, transport of water, ascent of sap
4. Transpiration – types, stomata structure and movements.

UNIT –II: Mineral nutrition and Fertilizers

(12 hrs)

1. Mineral Nutrition: Essential macro and micro mineral nutrients and their role, mineral uptake (active and passive), deficiency symptoms
2. Nitrogen cycle- biological nitrogen fixation
3. Enzymes: Nomenclature, characteristics, mechanism and regulation of enzyme action, enzyme kinetics, factors regulating enzyme action.

UNIT –III: PHOTOSYNTHESIS

(12 hrs)

1. Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red drop and Emerson enhancement effect, concept of two photosystems, mechanism of photosynthetic electron transport and evolution of oxygen, photophosphorylation, carbon assimilation pathways: C₃, C₄, and CAM.
2. Photorespiration.

3. Translocation of organic substances: Mechanism of phloem transport, source-sink relationships.

UNIT –IV: PLANT METABOLISM

(12 hrs)

1. Respiration: Aerobic and Anaerobic, Glycolysis, Krebs cycle, electron transport system, mechanism of oxidative phosphorylation, pentose phosphate pathway.
2. Lipid Metabolism: Structure and functions of lipids, conversion of lipids to carbohydrates, Beta-oxidation.
3. ATP-Synthesis; Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic mechanism (oxidative and photophosphorylation), ATP synthase, Boyer's conformational model, Racker's experiment, Jagendorf's experiment; role of uncouplers

UNIT –V: GROWTH AND DEVELOPMENT

(12 hrs)

1. Growth and development: Definition, phases and kinetics of growth, Physiological effects of phytohormones - auxins, gibberellins, cytokinins, ABA, ethylene
2. Physiology of flowering and photoperiodism, role of phytochrome in flowering.
3. Stress Physiology: Concept and plant responses to water, salt and temperature stresses.

II B. Sc – BOTANY SEMESTRE- IV. PRACTICAL SYLLABUS

PAPER- IV - Plant Physiology and metabolism)

Total hours of laboratory Exercises 45 hrs @ 3 per week in 15 sessions

Suggested Laboratory Exercises:

1. Osmosis – by potato osmoscope method
2. Determination of osmotic potential of vacuolar sap by plasmolytic method using leaves of Rhoeo / Tradescantia.
3. Structure of stomata (dicot & monocot)
4. Determination of rate of transpiration using cobalt chloride method.
5. Demonstration of transpiration by Ganong's photometer
6. Demonstration of ascent of sap/Transpiration pull
6. Effect of Temperature on membrane permeability by colorimetric method
7. Study of mineral deficiency symptoms using plant material/photographs.
8. Separation of chloroplast pigments using paper chromatography technique.
9. Rate of photosynthesis under varying CO₂ concentration
10. Effect of kind of light intensity on oxygen evolution during photosynthesis using Wilmontt's bubbler.

