

BOTANY

B. Sc. II (Semester III) THEORY

Angiosperm Systematics, Anatomy & Embryology

UNIT I: Angiosperm Systematics and Biodiversity.

- 1.1 Angiosperms: Origin and Evolution (Pteridospermean and Bennititalean Theory)
 - 1.2 Botanical Nomenclature: Principles of rules, Taxonomic Ranks, Type concept, Valid publication.
- 1.3 Herbarium – Concept & significance, Royal Botanical Garden, Kolkata.
- 1.4 Concept of biodiversity, Ex situ and In situ conservation
- 1.5 Concept & importance of Biodiversity.

UNIT II: Angiosperm Systematics

- 2.1 Systems of Classification: Bentham and Hooker's System, Engler and Prantle's system.
- 2.2 Systematic studies & economic importance of following Families
Dicotyledons (Polypetalae): Malvaceae, Brassicaceae, Leguminosae, Apiaceae,

UNIT III: Angiosperm Systematics

- 3.1 Systematic studies & economic importance of following Families
Dicotyledons (Gamopetalae): Asteraceae, Asclepiadaceae, Apocynaceae, Solanaceae, Verbenaceae, Lamiaceae.
- 3.2 Dicotyledons (Monoclamydeae): Euphorbiaceae.
- 3.3 Monocotyledons: Liliaceae, Poaceae.

UNIT IV: Anatomy

- 4.1 Types of Tissues: Meristematic – Types of meristems Permanent – Simple and complex.
- 4.2 Characteristics of growth rings, Sapwood and heartwood.
- 4.3 Anatomy of root: Primary structure in dicot and monocot root, normal secondary growth in dicot root.

UNIT V: Anatomy

- 5.1 Anatomy of stem: Primary structure in monocot and dicot stem, normal secondary growth in dicot stem.
- 5.2 Anomalies in primary structure in *Boerhavia* stem, secondary structure in *Bignonia* and *Dracaena* stem.
- 5.3 Leaf Anatomy: Internal structure in *Nerium* and *Maize* leaf.

UNIT VI: Embryology

- 5.1 Microsporangium, microsporogenesis, development of male gametophyte.

5.2 Megasporangium, types of ovules, megasporogenesis, development of female gametophyte (monosporic, Bisporic & tetrasporic).

5.3 Double fertilization and triple fusion.

5.4 Embryo – Classification of embryo.

5.5 Endosperm types & significance, Suspended animation

B.Sc. II (Semester III)

PRACTICAL

LABORATORY EXERCISES

1. Embryology of Angiosperms:
 - i. Observation of wide range of flowers available in the locality and methods of their pollination.
 - ii. Study through permanent slides of T.S. of anthers, microsporogenesis, L.S. of ovule, types of endosperms and embryo of Capsella .
 - iii. Mounting of T.S. of anthers, Pollen grains and pollinia.
2. Anatomy of angiosperms : Preparation of double stained slides of root, stem and leaves of angiosperms mentioned in the syllabus.
3. Taxonomy : Description of ten plants belonging to different families in technical language and identification upto family level.
4. Long and short excursion is essential

Note : Field tour reports should be supported by exhaustive field notes and photographic representation of plant species studied

Brassicaceae- *Brassica*, **Malvaceae**- *Hibiscus*, *Sida*, *Malvastrum*,

Fabaceae- *Crotalaria*, *Indigifera*, *Tephrosia*, **Caesalpinoideae**- *Caesalpinea*, *Cassia*, **Mimosoideae**- *Prosopis*, *Acacia*, **Apiaceae**-*Corindrum*, **Apocynaceae**- *Vinca*, *Thevetia*, **Asclepiadaceae**- *Cryptostegia*, *Calatropis*, **Solanaceae**- *Datura*, *Solanum*, *Withania*, **Euphorbiaceae**- *Croton*, *Jatropha*, *Euphorbia*, , **Lamiaceae**-*Oscimum*, *Hyptis*, **Asteraceae**- *Tridax*, *Lagasca* **Verbanaceae** – *Lantana*, *Clerodendron*.

B. Sc. II (Semester IV)
THEORY

Cell Biology, Genetics and Biochemistry

UNIT I: Cell Biology

- 1.1 Cell concept – Prokaryotic and Eukaryotic cell
- 1.2 Cell wall –Structure and Functions
- 1.3 Plasma membrane –Structure (models) and Functions
- 1.4 Nucleus – Ultra structure (nuclear membrane, nuclear pore complex and nucleolus) and functions
- 1.5 Chloroplast- Structure and Functions

UNIT II: Cell Biology Structure and functions of-

- 2.1 Endoplasmic Reticulum
- 2.2 Golgi complex
- 2.3 Vacuole
- 2.4 Ribosome
- 2.5 Peroxisome
- 2.6 Mitochondria
- 2.7 Cell cycle: Mitosis and Meiosis

UNIT III: Genetics

- 3.1 Chromosome- Morphology, Types, Centromere & Telomere
- 3.2 Chromosomal aberrations –
 - 3.2.1 Structural aberrations: Deletion, Duplication, Inversion and Translocation
 - 3.2.2 Numerical aberrations: Euploidy and aneuploidy

UNIT IV: Genetics

- 4.1 Mendelism: Mendel's law of Dominance, Segregation and Independent assortment, Incomplete dominance
- 4.2 Interaction of genes- Complementary, Supplementary and Epistasis
- 4.3 Problems based on Mendelism and Interaction of Genes

UNIT V: Genetics

- 5.1 Linkage – Concept, Types and theories
- 5.2 Crossing over: Concept, Types and theories
- 5.3 Gene mutations- Spontaneous and Induced
- 5.4 Extra-nuclear Genome- Mitochondrial DNA and Chloroplast DNA

UNIT VI: Biochemistry

- 6.1 Nomenclature of Enzymes
- 6.2 Characteristics of Enzymes
- 6.3 Concept of holoenzymes, coenzymes and cofactors
- 6.4 Theories for Mechanism of action of Enzymes

6.5 Structure and functions Carbohydrates: Monosaccharides (Glucose), Disaccharides Galactose) and Polysaccharides (Starch)

B.Sc. II (Semester IV)

PRACTICAL

I Cell Biology (Any Two)

1. Isolation of mitochondria from plants
2. Isolation of chloroplast
3. Squash preparation for the study of various stages of mitosis
4. Smear preparation for the study of various stages of meiosis.

II Genetics

1. To prove Mendel's Monohybrid ratio.
2. To prove Mendel's Dihybrid ratio.
3. Problems based on Interaction of genes

III Biochemistry

1. To study the enzyme activity of catalase.
2. To demonstrate test for glucose in grapes, & sucrose in cane sugar / beet root.
3. To demonstrate test for protein.
4. To demonstrate the lipid test in oily seeds.
5. To demonstrate the test for starch / cellulose.
6. To demonstrate the activity of enzyme amylase from germinating Wheat grains.