

## BSc. Botany

### SEMESTER III

#### Paper IV

#### Angiosperms: Taxonomy, Morphology and Embryology

M.M. 100

#### Unit – I

##### **Systematics:**

Principles of classification, nomenclature; Comparative study of different classifications viz. Linnaeus, Bentham and Hooker, Engler and Prantl, Hutchinson and Cronquist. Herbarium, Names and numbers of National and International Botanical gardens, Hot spots.

#### Unit – II

##### **Systematics:**

Taxonomic study of following families and their economic importance:

##### ***Dicots:***

Acanthaceae, Amaranthaceae, Apiaceae, Apocynaceae, Asteraceae, Bombacaceae, Brassicaceae, Caesalpiniaceae, Convolvulaceae, Cuscutaceae, Cucurbitaceae, Euphorbiaceae, Lamiaceae, Malvaceae, Mimosaceae, Myrtaceae, Nelumbonaceae, Nymphaeaceae, Papilionaceae, Ranunculaceae, Rosaceae, Rubiaceae, Rutaceae, Scrophulariaceae, Solanaceae.

##### ***Monocots:***

Arecaceae, Cyperaceae, Liliaceae and Poaceae

#### Unit - III

##### **Development:**

Meristems: Classification, Root Apical Meristem, Shoot Apical Meristem; Growth and differentiation of Root, Shoot and Leaf; Cambium – Tissue differentiation, secondary growth and its anomalies; General morphology and development of the floral organs; Root-shoot transition, Plant modifications; Phylloclade, Phyllode and Cladode.

#### Unit – IV

##### **Reproduction:**

Structure and development of male and female gametophytes – microsporogenesis, microgametogenesis, megasporogenesis, and megagametogenesis; Embryosac types and development; Double fertilization; Endosperm development and its morphological nature; Embryogeny; Apomixis and Polyembryony.

**BSc. Botany**

**SEMESTER IV**

**Paper - V  
Cytology, Genetics**

M.M. 100

**Unit – I**

Cell structure

Cell organelles-Basic organization and function of nucleus, chloroplast, mitochondria, endomembrane system, peroxisomes and lysosomes

Chromosome composition and organization- nucleosome and solenoid model

**Unit- II**

Salivary gland, lampbrush and B chromosomes.

Cell division – mitosis, meiosis and their significance

Principles of inheritance, incomplete dominance, co-dominance

Gene interaction- Complementary gene interaction, Epistasis, Duplicate gene interaction

**Unit-III**

Linkage , Linkage map (basic concept)

Extrachromosomal Inheritance-variegation in four o'clock plant; shell coiling in snail; kappa particles in *Paramecium*.

Sex determination.

Structural variation in chromosomes - Deletion, Duplication, Inversion, Translocation,

**Unit – IV**

Variations in chromosome number- different types of euploids and aneuploids and their evolutionary importance

Mutation- spontaneous, induced mutations, mutagens, molecular mechanism and evolutionary significance

**BSc. Botany**

**SEMESTER IV**

**Paper - VI  
Plant Physiology**

M.M. 100

**Unit - I**

**Plant - water relations:** diffusion and osmosis, osmotic potential, absorption of water, ascent of sap.

**Transpiration:** significance and factors affecting it; mechanism of stomatal opening and closing.

**Mineral nutrition:** essentiality of elements; sand and water culture; macro- and micronutrients, their roles and deficiency symptoms; mechanism of ion uptake (passive and active)

**Unit – II**

**Enzymes:** discovery, classification and characteristics of enzymes.

**Photosynthesis:** photosynthetic pigments; photochemical reactions- reaction centres, O<sub>2</sub> evolution, photophosphorylation; CO<sub>2</sub> fixation - C<sub>3</sub> and C<sub>4</sub> carbon cycle, CAM plants, photorespiration and glycolate metabolism, factors affecting photosynthesis.

**Unit - III**

**Respiration:** aerobic and anaerobic respiration; respiratory pathways- glycolysis, Krebs cycle, pentose phosphate pathway; electron transport, oxidative phosphorylation, cyanide resistance .

**Lipid metabolism:** fatty acid synthesis and its oxidation ( $\alpha$  and  $\beta$ ).

**Nitrogen metabolism:** nitrogen cycle, biological nitrogen fixation, nitrite and nitrate reduction, nitrogen assimilation.

**Unit – IV**

**Growth:** general aspects and phases of growth; flowering- photoperiodism and vernalization, circadian rhythm; seed germination; bud and seed dormancy; abscission and senescence.

**Phytohormones:** discovery, physiological roles, mechanism of action and applications of auxins, kinetin, gibberellins, abscisic acid and ethylene.

**Plant movement-** nastic and tropic.

## **B.Sc. Semester III - Botany Practical Syllabus**

### **Angiosperms: Taxonomy, Morphology and Embryology;**

T.S. of stems (eg. *Achyranthus*, *Amaranthus*, *Boerhavia*, *Bougainvillea*, *Cucurbita*, *Cuscuta* on *Lantana*, *Dracaena*, *Helianthus*, *Tinospora*, *Zea mays*); roots (*Ficus* aerial root, *Zea mays*, *Tinospora*), leaves (*Ficus*, *Zea mays*) to study anatomical variation and anomalies in secondary growth

Specimens of modifications (eg. Phyllode, phylloclade, cladode etc.).

Study of representative members of important taxonomic families of angiosperms with regard to their habit, inflorescence, floral characters along with floral diagrams and formulas

### **Cytology, Genetics**

Demonstrations related to cell structure, cell organelles, chromosome structure, salivary gland and lampbrush chromosome; laws of inheritance, gene interaction, inheritance ratio etc.

Stages of mitosis and meiosis .

Problems based on chromosome number, gene interaction, ploidy, linkage maps and mechanism of mutation

### **Plant Physiology**

Experiments related to different physiological processes taking place in plants viz. transpiration, photosynthesis, respiration, growth etc.