

## **M.Sc. (FINAL) BOTANY**

### **PAPER -V**

### **TAXONOMY OF ANGIOSPERMS, PLANT DEVELOPMENT AND REPRODUCTION**

#### **UNIT-I**

1. Taxonomic hierarchy - Species, genus, family and other categories; principles used in assessing relationships, delimitation of taxa and attribution of rank.
2. Principles of nomenclature.
3. Systems of angiosperm classification - Phenetic versus phylogenetic systems; cladistics in taxonomy, broad outline and relative merits and demerits of major systems of classification (Bentham and Hooker; Engler and Prantl; Hutchinson; Takhtajan; Thorne; Dahlgren).

#### **UNIT-II**

4. Taxonomic evidence - Role of morphology, anatomy, embryology, palynology, cytology, phytochemistry, genome analysis and nucleic acid hybridization in taxonomy.
5. Range of floral variation and trends of evolution in the Ranales, Centrospermales, Tubiflorales, Amentiferae and Helobiales.

6. Distribution, morphological characteristics, range of floral variation, trends of evolution and systematic position of the following families :

Combretaceae, Cactaceae, Compositae, Araceae, Lemnaceae, Poaceae, Orobanchaceae, Loranthaceae and Lentibulariaceae.

7. Phylogeny of angiosperms.

#### **UNIT-III**

8. Unique features of plant development; differences between animal and plant development.
9. Shoot development- Organization of the shoot apical meristems (SAM), cytological and molecular analysis in SAM.
10. Root development - Organization of root apical meristem (RAM), vascular tissue differentiation; lateral roots; root hairs; root-microbe interaction.
11. Reproduction : Flower - its evolution; foliar stamens; open carpels; primitive living angiosperms; floral anatomy; inferior ovary; placentation and its evolution.

#### **UNIT-IV**

12. Male gametophyte - Structure of anthers; microsporogenesis; role of tapetum; pollen germination, pollen tube growth and guidance.

13. Female gametophyte - Megasporogenesis, organization of the embryo sac, types of embryo sacs; synergid and antipodal haustoria.
14. Pollination, pollen-pistil interaction; fertilization, double fertilization, *in vitro* fertilization.
15. Endosperm - Types, ultrastructure, endosperm haustoria, their extension, persistence and function.

#### UNIT-V

16. Embryo-Polarisation of Zygote, embryogenic types, organogenesis of mono and dicot embryos. Structure and function of suspensor, physiological and morphogenetical relationship of endosperm and embryo, embryo culture
17. Polyembryony - Types; genetic, somatic and pollen embryo.
18. Apomixis.
19. Embryo culture.

## M.Sc. (FINAL) BOTANY

### PAPER-VI

### PLANT PHYSIOLOGY AND METABOLISM

#### UNIT-I

Energy Flow : Principles of thermodynamics, free energy and chemical potential, redox reactions, structure and function of ATP, Types and mechanism of Phosphorylations.

Fundamentals of enzymology : General aspects, allosteric mechanism, regulatory and active sites, isoenzymes, kinetics of enzymatic catalysis, Michaelis-Menten equation and its significance.

Membrane transport and translocation of water and solutes : Plant-water relations, mechanism of water transport through xylem, root-microbe interactions in facilitating nutrient uptake, comparison of xylem and phloem transport, phloem loading and unloading, passive and active solute transport, membrane transport proteins.

#### UNIT-II

Signal transduction : Overview, receptors and G-proteins, phospholipid signaling, role of cyclic nucleotides, calcium-calmodulin cascade, diversity in protein kinases and phosphatases, specific signaling mechanisms, e.g., two-component sensor-regulator system in bacteria and plants, sucrose-sensing mechanism.