B.Sc. II Year **Semester – III**

BBO -C301
DSC-3 Plant Anatomy and Embryology

MM : 100
Time : 3 hrs
L Credit
4 4
Total Hours: 60

Sessional : 30
ESE : 70
Pass Marks : 40

Learning objective:

- To understand the importance of plant anatomy and embryology.
- To acquire knowledge of meristematic and permanent tissues.
- To acquire an overall knowledge on adaptive and protective systems, secondary growth.
- To become familiar with structural organization of flower, pollination and fertilization.
- To acquire an overall knowledge on plant embryology and histology.
- To become familiar with general techniques used in plant anatomy and embryology.

Learning outcomes:

- Understand basics of plant anatomy and embryology.
- Adaptive and protective systems, secondary growth..
- Explain structural organization of flower, pollination and fertilization.
- Understand the various methods and techniques used in plant anatomy and embryology.
- Take the decisions for carrier point of views in research, industries and academia entrepreneurships etc.

Unit 1: Tissue: Meristematic and Permanent Tissues **(14 Lectures)**

Structure of dicot and monocot root, stem and leaf. Root and shoot apical meristems; Simple and complex tissues.

Unit 2: Adaptive and Protective Systems, Secondary Growth **(16 Lectures)**

Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes. Vascular cambium – structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood).

Unit 3: Structural Organization of Flower: Pollination and Fertilization **(10 Lectures)**

Structure of anther and pollen. Structure and types of ovules. Types of embryo sacs, organization and ultra structure of mature embryo sac. Pollination mechanisms and adaptations; Double fertilization and triple fusion. Seed-structure appendages and dispersal mechanisms.

Unit 4: Embryo and Endosperm **(10 Lectures)**

Endosperm types, structure and functions. Dicot and monocot embryo; Embryo-endosperm relationship.

Unit 5: Apomixis and Polyembryony **(10 Lectures)**

Definition, types and practical applications.

DSC-3 SEMESTER-III BBO-C351(LAB COURSE-CC-03)

1. Study of meristems through permanent slides and photographs.
2. Tissues (parenchyma, collenchyma and sclerenchyma); Maccrated xylary elements, Phloem (Permanent slides, photographs)
3. Stem: Monocot: *Zea mays;* Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
4. Root: Monocot: *Zea mays*; Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
5. Leaf: Dicot and Monocot leaf (only Permanent slides).
6. Adaptive anatomy: Xerophyte (*Nerium* leaf); Hydrophyte (*Hydrilla* stem).
7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).
8. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.
9. Female gametophyte: *Polygonum* (monosporic) type of Embryo sac Development (Permanent slides/photographs).
10. Ultrastructure of mature egg apparatus cells through electron micrographs.
11. Pollination types and seed dispersal mechanisms (including appendages, aril, caruncle) (Photographs and specimens).
12. Dissection of embryo/endosperm from developing seeds.
13. Calculation of percentage of germinated pollen in a given medium.

Suggested readings:

Anatomy

1. Dickinson, W.C. 2000 Integrative Plant Anatomy. Harcourt Academic Press, USA.
2. Fahn, A. 1974 Plant Anatomy. Pergmon Press, USA and UK.
3. Mauseth, J.D. 1988 Plant Anatomy. The Benjammin/Cummings Publisher, USA.
4. Esau, K. 1977 Anatomy of Seed Plants. Wiley Publishers.
5. Plant Anatomy By Pandey B. P. Publisher: S Chand & Co Ltd. ISBN: 9788121901451.
6. An Introduction to Plant Structure and Development. Charles B. Beck, University of Michigan, Ann Arbor.

Embryology

1. Maheswari, P(1963) :Recent Advances in the Embryology of Angiosperms(Ed.) International Society of Plant Morphologists- University of Delhi.
2. Swamy. B.G.L. & Krishnamoorthy. K.V.(1980): From flower to fruit. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
3. Maheswari, P.(1985): An Introduction to the Embryology of Angiosperms Tata McGraw Hill Publishing Co.,Ltd., New Delhi.
4. Bhojwani, S.S. & Bhatnagar, S.P. (2000) : The Embryology of Angiosperms (4th Edition) Vikas Publishing House (P) Ltd., UBS Publisher's Distributors, New Delhi.