BOTANY COMPONENT - DSE

DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE 03)

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the core course			Eligibility criteria	Pre-requisite of the course (If any)
		Lecture	Tutorial	Practical/ Practice		
Developmental Biology of Plants ALS BOT DSE 03	**4**	**2**	**0**	**2**	**Class 12th Pass with Science**	**NIL**

Learning Objectives:

The learning objectives of this course are follows:

- to acquaint the students with internal basic structure and cellular composition of the plant body.
- to correlate structure with important functions of different plant parts.
- to study of various tissue systems and their development and functions in plants
- to have knowledge of the flowering and fruiting, reproduction process, role of pollinators, ovule and seed development.

Learning Outcomes:

By studying this course, students will be able to:

- gain knowledge of various cells and tissues, meristem, epidermal and vascular tissue system in plants.

- get an insight of various aspects of growth, development of the tissues and differentiation of various plant organs.
- gain the knowledge of basic structure and organization of plant parts in angiosperms and its correlation with morphology and functions.
- get acquainted with pollen development and pollination, ovule development and fertilization, endosperm development and its importance.

Unit 1: Meristematic and permanent tissue: (4 Hours)

Meristems and derivatives- structural organization of shoot and root apices; permanent tissue: simple and complex tissues.

Unit 2: Dermal System (2 Hours)

Epidermis, stomata, trichomes and glands

Unit 3: Organs (4 Hours)

Structure of dicot and monocot root, stem and leaf

Unit 4: Secondary Growth (4 Hours)

Vascular cambium – structure and function, Secondary growth in root and stem, periderm.

Unit 5: Anther (4 Hours)

Structure and development, microsporogenesis, Pollen Development, structure of pollen and pollen wall (Basic Concepts).

Unit 6: Ovules (4 Hours)

Structure and types, megasporogenesis and mega gametogenesis, mature embryo sac.

Unit 7: Pollination and Fertilization (4 Hours)

Pollination mechanisms and adaptations; double fertilization; sexual incompatibility- basic concepts

Unit 8: Endosperm and Embryo (3 Hours)

Types and function of endosperm, embryogenesis, dicot and monocot embryo

Unit 9: Seed development (1 Hours)

Basic concepts of seed development

PRACTICAL (60 Hours)

1. Study of root and shoot apex through permanent slides and photographs.
2. Tissues (parenchyma, collenchyma, sclerenchyma and their types); Macerated xylary elements, Phloem (Permanent slides/ Photographs/ Digital resources)
3. To cut transverse section of stem: Monocot: *Zea mays*; Dicot: *Helianthus*; Study of secondary growth in *Helianthus* stem.
4. To cut transverse section of root: Monocot: *Zea mays*; Dicot: *Cicer*; Study of secondary growth in *Helianthus* .
5. Study of structure of Dicot and Monocot leaf.
6. Study of anther structure (young and mature).
7. Calculation of percentage of germinated pollen in a given medium through hanging

drop/sitting drop method.

8. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.
9. Female gametophyte: Mature embryo sac (photographs). Ultrastructure of mature egg apparatus cells through electron micrographs.
10. Dissection of embryo and endosperm from developing seeds.

Essential/ Recommended readings:

1. Bhojwani, S.S., Bhatnagar, S.P. (2011). *Embryology of Angiosperms*, 5th edition. New Delhi, Delhi: Vikas Publication House Pvt. Ltd.
2. Mauseth, J.D. (1988). *Plant Anatomy*. San Francisco, California: The Benjamin/Cummings Publisher.
3. Franklin, E. R. (2006). *Esau's Plant Anatomy: Meristems, Cells, And Tissues of the Plant Body: Their Structure, Function, and Development.* New Jersey, U.S.: John Wiley & Sons, Inc., Hoboken.
4. Shivanna, K.R. (2003). *Pollen Biology and Biotechnology.* Delhi, Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.

Suggestive readings:

1. Raghavan, V. (2000). *Developmental Biology of Flowering plants*. Netherlands, Europe: Springer.

2. Johri, B.M. (1984). *Embryology of Angiosperms.* Netherlands, Europe: Springer-Verlag.

3. Bhojwani S.S., Dantu P.K. and Bhatnagar, S.P. (2015) The Embryology of Angiosperms, 6th edition. Vikas Publication House Pvt. Ltd. New Delhi.

4. Tayal, M.S. (2021). Plant Anatomy, 4th Edition. Meerut, U.P.: Rastogi publications.

5. Crang, R., Lyons-Sobaski, S., and Wise, R., (2018) Plant Anatomy: A Concept-Based Approach to the Structure of Seed Plants, 1st Edition, Springer Nature Switzerland AG.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.