



**B.Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY**

**Paper 5a PLANT ANATOMY AND EMBRYOLOGY**

B. Sc. va (Candidates admitted from the academic year 2008-2009)

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### Core Theory

#### ANATOMY

##### UNIT I

Cell Wall, Structure and function. Classification of tissues, simple tissues- Parenchyma, Collenchyma and Sclerenchyma. Complex tissues-Xylem- Primary and Secondary xylem. Tracheids and Vessels and Fibers. Phloem- Primary and Secondary Phloem. Sieve cell and Sieve tube element.

##### UNIT II

Meristems, types of meristems, apical meristems and their organization - Apical Cell theory, Histogen theory, Tunica Corpus, Cytological Zonation theory. Root apex - quiescent center.

##### UNIT III

Vascular cambium - origin, cell types - fusiform initial and ray initial, storied and non-storied cambium. Seasonal activity, function. Primary and Secondary structure in stem and root of dicot and monocot. Anomalous secondary structure in the stem of *Pseudocalyma*, *Dracaena* and root of *Achyranthes*.

##### UNIT IV

Leaf - variation - based on symmetry, environment, photosynthetic process Stomatal type, venation, abscission.

**Key words:** Middle Lamella, Plasmodesmata, Extensin, Bordered pit, Exarch, Endarch, Collateral Vascular Bundle, Radial Vascular Bundle, Perforation plate, Sieve plate, Companion cell, Fusiform initials, Ray initials, Storied cambium, Non-storied cambium, C<sub>3</sub>, C<sub>4</sub>, CAM, Kranz anatomy, Dorsiventral leaf, Isobilateral leaf, Isolateral leaf, Centric leaf, Leaf buttress.

#### EMBRYOLOGY

##### UNIT V

Structure and development of microsporangium, Tapetum - Amoeboid and Secretary. Development of male gametophyte, Pollen - Structure and function. Megasporangium (ovule), types of ovules (Monosporic and

Bisporic only), Integument, Nucellus, Funiculus, Obturator. Development of female gametophyte. Types of female gametophyte.

## UNIT VI

Pollination, Fertilization, Endosperm: Nuclear, cellular, and helobial; ruminant endosperm. Embryo development in *Capsella*, Polyembryony and Apomixis.

**Key words:** Endothecium, Pollen kit, Tetrad, Pollinium, GMU, Micropyle, Endothelium, Obturator, Protogyny, Protandry, Dichogamy, Herkogamy, Heterostyly, Polyspermy, Haustoria, Aleurone tissue, Proembryo, Diplospory, Apospory.

### Suggested Reading

#### Anatomy

Esau, K. 1977 Anatomy of Seed plants. John Wiley & Sons. U.S.A.

Fahn, A 1982 Plant Anatomy. Pergamon Press U.K.

Mauseth, J.D. 1988. Plant anatomy. Benjamin/Cumming Pub. U.S.A.

#### Embryology

Bhojwani, S.S. and Bhatnagar, S.P. 1974. The Embryology of Angiosperms. Vikas Publishing House (P) Ltd.

Johri. B.M. 1984. Embryology of angiosperm. Springer-Verlag, Berlin.

Maheshwari, P. 1971. An Introduction to embryology of angiosperm. McGraw Hill Book Co., London.

## **Paper 6a PLANT ANATOMY AND EMBRYOLOGY**

B.Sc. va (Candidates admitted from the academic year 2008 -2009)

### **Core Practical**

#### **Anatomy**

Simple tissues, shoot, root apical organization.

Dicot, stem and root primary and secondary structure.

Monocot stem and root primary structure. Vascular cambium - Stratified, nonstratified. Anomalous secondary structure: *Pseudocalyma* and *Dracaena* stem, *Achyranthes* root. Leaf - *Polyalthia*, *Nerium*, *Callistemon* and *Chloris*.

Stomata: Anomocytic, Anisocytic, Paracytic, Diacytic and grass type.

#### **Embryology**

Structure of microsporangium from hand section, Pollen types from slides and photographs.

Ovule and embryo sac from permanent slides and photographs.

Embryo dissection from *Tridax* flowers.

Development of embryo from permanent slides and photographs.