Course code	Course Title	C	H	I	E	T
17P2BMC4	DEVELOPMENTAL BOTANY	6	6	25	75	100

Unit I Embryology-Pre-fertilization events 20 Hrs

Flower –Definition. Structure of tetra-sporangiate anther. Development of anther wall layers (epidermis, endothecium, middle layers, tapetum); microsporogenesis and microgametogenesis. Pollen wall layers – pollen kit. Pollinium. Structure, types and development of ovule. Megasporogenesis. Megagametogenesis. Embryosac development and its types. Pollination – types.

Unit II Fertilization and post fertilization changes 20 Hrs

Self incompatibility – homomorphic and hetermorphic. Causes and methods to overcome incompatibility. Pollen – pistil interaction, types of stigma and style, events on stigmatic surface, pollen tube growth. Entry of pollen tube into the ovule and embryosac. Double fertilization and triple fusion. Structure and development of dicot embryo (*Capsella*) and monocot embryo (*Najas*). Endosperm and its types. Components of seeds and fruits. Classification, importance and dormancy of seeds. Seed germinations – epigeal and hypogeal. Apomixis – Nonrecurrent, recurrent and adventives. Polyembryony.

Unit III Anatomy 15 Hrs

Tissues - Meristem: Types and theories on meristems – shoot apical meristem - Histogen theory and Tunica corpus. Root apical meristem - Korper-kappe theory. Permanent tissue: simple and complex. Secondary structure of dicot stem and root. Anomalous secondary structure – *Boerhaavia, Bougainvillaea, Amaranthus, Mirabilis* and *Dracaena*.

Unit IV Morphogenesis 15 Hrs

Concept of morphogenesis as a package of development; components – cell division, division planes, their importance; cellular determinants of division planes – cytoskeleton, Pre Prophase Band in orienting karyokinesis and cell plate. Xylogeny – role of light and gravity, role of auxins and enzymes, cambium activity and lignifications (Experiments in *Syringa vulgaris*). Differences in phloem ontogeny.

Unit V Development of organs 20 Hrs

Vegetative meristem: Phyllotaxy, zone of foliar inhibition in apices, signals involved foliar inhibition**.** Development of angiosperm leaf with specific reference to petiole, lamina and leaf tip.Reproductive meristem – Determinate growth and differentiation. ABC model for ontogeny of flower.Polarity and development: Polarity in cuttings, unicellular coenocytes, eggs, spores and transport.Regulation of development: General nature of developmental process, environmental controls, nucleocytoplasmic interactions, genes and development.

REFERENCES

1. Donald Alexander Johansen, Plant Embryology, 1950, California Botanica Company, MASS, U.S.A.
2. Sant Saran Bhojwani and Bhatnagar, S.P., Embryology of Angiosperms, 2008, Vikas Publishing Ltd., Delhi.
3. Nair, P. K. K., Pollen morphology of angiosperms, 1970, Vikas Publishing Ltd., New Delhi.
4. Elizabeth Cutter, Plant Anatomy, 1969, Edward Arnold Publication, London.
5. Fahn, A, Plant Anatomy, 1967, Pergamon Press.
6. Katherine Esau, Anatomy of seed plants, 1979, Wiley Eastern Ltd. New Delhi.
7. Burgess, Plant Cell and Development, 1985, Jeremy Cambridge University Press, Sydney.
8. Graham C. F and Wareing P. F., Developmental control in plants and animals, 1984, Blackwell Scientific Publications, Edinburgh.
9. Mascarenhas, A. F., Handbook of Plant Tissue Culture, 1988, IARI, New Delhi.
10. Kalyan Kumar De, Plant Tissue Culture, 1992, New central book agency (P) Ltd. New Delhi.

PRACTICALS

1. Dissection of mono and dithecous anthers.
2. Pollen morphology observations.
3. Germination of pollens from different species.
4. Haploid production and embryo culture.
5. Dissection of pollinium and embryo – dicot and monocot.
6. Study of root apex, stem apex of living aquatic specimens.
7. Primary structure of stem and root.
8. Secondary structure of stem and root.
9. Leaves – isobilateral and dorsiventral.
10. Nodes – uni, tri and multilacunar.
11. Vegetative division in onion root tips (Mitosis), reproductive divisions (Meiosis).
12. Callus induction in paddy grains / onion leaf on MS media.
13. Callus maintenance by application of chemical pressure.
14. Differentiation - root (Auxin) and shoot (Cytokinin).