



ANDHRA UNIVERSITY TRANS-DISCIPLINARY RESEARCH HUB

Pre. Ph.D., Syllabus for BOTANY / BOTANY AND PLANT SCIENCE

Paper – I: ADVANCED TOPICS IN PLANT SCIENCES

Unit – 1	Recent trends in the classification of algae. Thallus organization; life histories and Economic importance of Algae. Classification and economic importance of Fungi. Mode of reproduction and nutrition in Fungi. Microbes – Nitrogen fixation and cycle. Transmission of plant Viruses.
Unit – 2	Advancements in plant embryological research with the application of modern techniques Ultra structure and biochemical aspects of pollen and embryo sac. Significance of anatomical characters in phylogeny. Modern concepts on fertilisation in angiosperms, Comparative morphology and taxonomy: Role of anatomy, embryology, Palynology and phytochemistry. Recent achievements in Tissue culture with specific examples, application of tissue culture in agriculture and forestry.
Unit – 3	Vegetation types of India. Ecology and human welfare; Conservation and management of Natural resources; Water and Air pollution. Growth hormones and their role in plant systems. Minerals and their role in growth and development. Photosynthetic productivity in field crops in relation to carbon dioxide fixation mechanisms
Unit – 4	Plant genome: Nuclear genome – concept of nucleotype; extent and organisation of repeated DNA sequences. Structure, organisation and expression of chloroplast and mitochondrial genomes. Modern concept of gene: Historical account; Complementation and genetic resolution; Fine structure analysis in Plants. Biology of cell cycle: Determination of mitotic and meiotic cycle duration; metabolic aspects of mitotic and meiotic cycles; Experimental control.
Unit – 5	Somatic cell hybridisation: Protoplast culture, Transformation, Fusion, Somatic hybrids and transgenic plants. Genetic engineering: general principles of recombinant DNA technology and applications. Conservation of crop genetic resources: Necessity; Cryopreservation; gene banks – significance



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Model question Paper

Time: 3hrs

Max marks: **100**
(20 X 5 = 100)

Paper – 1: ADVANCED TOPICS IN PLANT SCIENCES

Answer any **FIVE** questions.

All questions carry equal marks.

1. What is biological nitrogen fixation? Give an account on nitrogen fixation by microbes
2. Describe the applications of tissue culture in agriculture and forestry
3. Discuss the photosynthetic productivity in field crops in relation to CO₂ fixation.
4. What is recombinant DNA technology? Write in detail on its applications.
5. Give a detailed account on somatic hybridization and its importance in crop improvement.
6. Explain any **TWO** of the following
 - A. Thallus organization in Algae
 - B. Modern concepts of fertilization
 - C. Conservation of natural resources
7. Write short notes on any **FOUR** of the following
 - A. Repeated DNA sequences
 - B. Chloroplast genome
 - C. Cyclins
 - D. Cryopreservation
 - E. Gene banks.