



ANDHRA UNIVERSITY TRANS-DISCIPLINARY RESEARCH HUB

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

Paper 1: PLANT CELL AND TISSUE CULTURE

Unit - 1	Plant cell and tissue culture: introduction, history, scope. Basic concepts of tissue of culture: tissue culture cycle, types of cultures. Concept of cellular differentiation, totipotency. Culture media: composition and effects of media components, phytohormones – effects in tissue culture. Sterilization methods
Unit - 2	Pathways of regeneration – biochemical and molecular aspects of tissue culture cycle. Technique and applications of cryopreservation and germplasm storage. Organogenesis and adventitious embryogenesis.
Unit - 3	Fundamental aspects of morphogenesis, somatic embryogenesis. Methods of androgenic and gynogenic haploid production-dihaploids and application in agriculture. Embryo rescue. Cell culture: establishment, plating efficiency, induction and selection of mutants.
Unit - 4	Free cell cultures: production of secondary metabolites/natural products. Somatic hybridization: protoplast isolation, fusion and culture, hybrid selection and regeneration, possibilities, achievements, limitations, merits and demerits. Cybrids. Protoplasts in genetic transformation.
Unit - 5	Applications of plant tissue culture: clonal propagation, artificial seeds and its applications, somaclonal variation and its applications. Plant tissue culture in forestry.



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Model Question Paper

Paper - I: PLANT CELL AND TISSUE CULTURE

Time: 3 hours

Max. Marks: 100

(20 X 5 = 100)

Answer any **FIVE** questions.

All questions carry equal marks.

1. What is Totipotency and explain about concept of cellular differentiation.
2. Explain about different sterilization methods used in tissue culture.
3. What is somatic embryogenesis? Describe the principle and protocol to induce somatic embryogenesis.
4. Explain about types of cell cultures and production of secondary metabolites through cell culture techniques.
5. Discuss about soma clonal variations and its applications.
6. Explain any **TWO** of the following
 - A. Cryopreservation and germplasm storage
 - B. Importance of di-haploids in agriculture.
 - C. Protoplast culture and its merits and demerits
 - D. Production and applications artificial seeds
7. Write short notes on any **FOUR** of the following
 - A. Plant tissue culture in forestry.
 - B. Haploid production.
 - C. Cybrids.
 - D. Embryo rescue
 - E. Adventitious embryogenesis