

## M.Sc. (FINAL) BOTANY

### PAPER-VIII F APPLIED PLANT TISSUE CULTURE

#### UNIT-I

Laboratory organization, water purification systems (including demineralization and reverse osmosis), methods of sterilization (including ozonization, air purification), growth of callus and cell cultures, asynchronous and synchronous cultures, regeneration, methods of micropropagation and their use in forestry, horticulture, agriculture and floriculture. Somatic embryogenesis and synthetic seeds, cryopreservation and germplasm storage. Micropropagation technology at commercial level.

#### UNIT-II

Haploids – production of homozygous lines and uses. Methods of direct and *Agrobacterium* mediated gene transfer, electroporation, microinjection, particle-gun technology. Transgenic plants. Strategies for crop improvement with special mention of herbicides, virus and insect resistant plants. Protoplast isolation and culture. Somaclonal and Gametoclonal variations.

#### UNIT-III

Role of plant tissue culture in plant pathology – meristem tip culture for virus free plants, culture of obligate parasites. Screening of germplasm and selection of disease resistant lines.

Selection procedure in cell culture; for environmental stress and herbicide resistance.

Methods of cell immobilization, Ri-plasmid and hairy root cultures, process of elicitation and bio-conservation of bio-molecules.

#### UNIT-IV

Approaches and factors affecting the production of secondary metabolites. Principle classes of secondary metabolites. Production of pharmaceutically important drugs – alkaloids, anti tumour agents, saponins and sterols, food aditives and insecticides.

#### UNIT-V

Bioreactors; types of bioreactors- stirred tank, air-lift, membrane type process and operation. Bioreactor for production of biomass (secondary metabolites and for micropropagation), mass-scale for commercialization. Plant tissue culture industry in India.