



## B.Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

**Paper 10a BIOTECHNOLOGY, TISSUE CULTURE AND BIOINFORMATICS**

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

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### I Core Theory

#### UNIT I

**Introduction to Biotechnology:** Definition, branches of biotechnology, history and scope. Current demands from biological resources for food, fodder, feed, timber oil, perfumes, pigments, biofertilisers, therapeutic agents, fermentation etc.

**Terminology:** bioprospecting, biofertilizers, alkaloid, terpenoid, phenols, flavinols.

#### UNIT II

**Enzyme Biotechnology:** Basic concepts. Isolation, purification, production, concentration and package of enzymes. Immobilization and industrial preparation of enzymes.

**Terminology:** biocatalyst, enzyme immobilization.

#### UNIT III

**DNA Technology:** Introduction to DNA molecules. Isolation of genomic DNA and Plasmid. Recombinant DNA technology - restriction enzymes, vectors and DNA delivery systems. Transgenic plants. Ethical issues in production of genetically modified organisms (GMOs).

**Terminology:** genome, cosmid, vector, gene gun, rDNA, microinjection, electroporation.

#### UNIT IV

**Bioinformatics:** Introduction to bioinformatics. Biological Database - Protein and DNA sequence data base, Structure database, literature database, (Pubmed, Medline). Sequence Alignment, Database similarity searching; FASTA; BLAST, Proteomics - protein structure prediction (primary, secondary & tertiary), Human Genome Project.

#### UNIT V

**Plant Tissue culture:** Introduction. Concepts of totipotency. Design and plan of R & and commercial tissue culture laboratory. **Sterilisation Procedures:** Fumigation, wet and dry sterilisation, UV sterilisation, ultra filtration and surface sterilisation. Maintenance of axenic condition. **Media and Explants in *In vitro* cultures:** Micro and macronutrients, vitamins, natural adjuvants like coconut milk and fruit juices. Auxin, cytokinin and other PGRs and other components of media. Solid, liquid and prepacked media. Explants - shoot tip, axillary buds, leaf disc, cotyledons, inflorescence and floral organs.

**Terminology:** Totipotency, Fumigation, ultra filtration, explant, surface sterilisation, surfactant, axenic culture, primordiomorph, endogenous hormone.

## UNIT VI

***In vitro* cultures:** Callus culture - Initiation and maintenance of callus. Micropropagation -direct and indirect morphogenesis, somatic embryogenesis and synthetic seed production. Embryo culture and Anther culture . Cryopreservation and germplasm storage.

**Cell and Protoplast Culture:** Culture systems, isolation of single and aggregate cells and regeneration of plants. Isolation of protoplast, somatic cell hybridization, selection and regeneration of plants.

**Terminology:** Callus, meristamoid, micropropagation, masspropagation, Caulogenesis, rhizogenesis, direct morphogenesis, indirect morphogenesis, somatic embryogenesis, androgenesis, embryo resque.. Protoplast, auxophyton, Steward apparatus, agitator, shaker, osmoticum, fusogen, DMSO, somatic cell hybridization, electroporation, microinjection.

### Suggested Reading

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