B. Sc. 6th SEMESTER
DISCIPLINE SPECIFIC ELECTIVE (DSE)

BT616D: BIOTECHNOLOGY: PLANT BIOTECHNOLOGY & BIOPROCESS ENGINEERING

CREDITS: THEORY: 4, PRACTICAL: 2

THEORY (4 CREDITS)

Unit-I

Concept of Plant cell Totipotency. Organization of Root apical meristem and shoot apical meristem. Plant Tissue Culture media composition (M.S media and others) Role of micro, macro nutrients, vitamins & hormones in plant tissue culture; Initiation and maintenance of Callus and Suspension cultures. Shoot Tip Culture; Production and applications of Haploids. Isolation, culture & fusion of Protoplast; Cybrids; Somatic Embryogenesis. Cryopreservation.

Unit-II

Gene Transfer in Plants using Agrobacterium tumefaciens, featutes of Ti plasmid, role of virulent proteins in T-DNA transfer. Concept of Binary vectors. Vectorless Gene Transfer (Gene Gun, whisker method, electroporation, Polyethylene glycol) General Concept of Transgenic Plants, and their utility, Golden Rice, Bt Cotton. Issues with Genetically Modified plants

Unit-III

Kinetics and growth of microbial cells. Methods for measuring cell growth. Concept of Fermentation; Types of fermenters. Batch type Continuous type. Substrate and Product inhibition of Product Biosynthesis, Effect of pH, Temperature and inducers on Product Synthesis; Fermentation Media composition and Sterilization;

Unit-IV

Bioreactors: Design and Types, Agitation and Aeration, Impeller and Sparger. Steps involved in Down Stream Processing; Separation of Cells and Broth, Sedimentation, Filtration, Centrifugation, Solvent extraction, Chromatography: Gel filtration, ion-exchange and Affinity (all the above methods are with special reference to product recovery in bioprocess technology) Immobilization of enzymes, Industrial Applications of Enzymes.

PRACTICALS (2 CREDITS):

1. Preparation of plant tissue culture media.
2. Explant culture (embryo/ovary).
3. Protoplast isolation.
4. Immobilization of sheep RBC's in alginate.

BOOKS RECOMMENDED:

1. Plant Biotechnology: Slater, Scott and Fowler.
2. introduction to Plant Biotechnology: H.S. Chawla
3. Principles of Fermentation technology: Stanbury and Whitaker.