

SBM-204 PAPER-4: MICROBIAL BIOTECHNOLOGY

UNIT-I

Microbial biotechnology - Isolation of nucleic acids, DNA sequencing - Maxam -Gilbert and Dideoxy methods. Restriction endonucleases, restriction maps, southern and northern blotting. DNA finger printing technology - RFLP, RAPD, AFLP, QTLs.

UNIT-II

Cloning vectors - Plasmids, properties of plasmids, isolation, cosmids and bacteriophages. Ligation - DNA ligases, ligation of fragments with cohesive ends, blunt end ligation, homo-polymer tailing. Cloning strategies - Shot gun experiments, gene libraries. Isolation of poly mRNA, synthesis of cDNA, cloning of cDNA in bacteria. Isolation of cloned genes, identification of recombinants, structural and functional analysis of recombinants.

UNIT-III

Gene expression - Expression of cloned genes in bacteria, yeast, plant and animal cells, western blotting. Application of recombinant DNA technology in biology and medicine, genetic diseases, gene therapy. Methods of whole cell immobilization, enzyme immobilization, isolation of immobilized enzymes and cells. Enzyme reactors, bioreactors, practical enzyme reactor kinetics.

UNIT-IV

Hybridoma techniques and monoclonal antibody production - Myeloma cell lines, fusion of myeloma cells with antibody producing B-cells, fusion methods. Selection and screening methods for positive hybrids, cloning methods. Production, purification and characterization of monoclonal antibodies. Applications of monoclonals in biomedical research, clinical diagnosis and treatment. Nucleic acid probe technology, Vaccines - development and production, vaccine expression system. Production of rabies vaccine, foot and mouth disease vaccine and hepatitis B vaccine.

UNIT-V

Biofertilizers - Introduction, biofertilizers using Nitrogen fixing microbes - Rhizobium, Azotobacter, Azospirillum, Azolla - Anabaena symbiosis, blue green algae, Mycorrhiza, Actinomycetes. Biopesticides - Toxins from Bacillus thuringiensis Pseudomonas syringae, biological control - use of Baculovirus, MV virus, protozoa and fungi in biological control. Biogases - Commercial production of biogases - microorganisms involved, advantages of biogases.