Swami Rama Himalayan University,
Swami Ram Nagar, Jolly Grant, Dehradun-248016

Subject Code: PHDBT110
Subject Name: Advances in Biotechnology **100 Marks**

TIME: 3 HRS

UNIT –I: Microbiology

History, scope and development of microbiology, Microbes and biotechnology: production of alcoholic beverages, pathophysiology of microbes and antibiotics, organic acids, the cultivation of fungi for food-mushrooms, mycorrhizae and their application, mycopesticides, mycotoxins. Biofertilizers and biopesticides; solid wastes; sources and management (composting, vermiculture and methane production). Single cell protein, Waste water treatment-physical, chemical and biological treatment processes; algal blooms and human health, biotechnological application of microbes form extreme environment.

UNIT-II: Recombinant DNA Technology

Introduction to DNA technology and application, Cloning vector (characteristics applications) Plasmids, Phages, Cosmids, YACs, BACs and HACs, Preparation of cloning vectors, suitable markers, Isolation of nucleic acids (Plasmid, RNA & DNA). Basic steps of gene cloning, Cloning Strategies, Screening strategies of recombinants, Synthesis of cDNA, Construction of cDNA and genomic libraries, Blotting techniques (Methodologies and applications) southern, northern and western blotting, Probe labeling and hybridization

UNIT-III: Applications of Genetic Engineering

Nucleic acid sequences as diagnostic tools- New drug/therapies for genetic disease combating, infectious disease, protein engineering, metabolic engineering, Molecular breeding of plants, Production of interferons, DNA vaccines

UNIT-IV: Recent Advances in Life Sciences

DNAi Protein microarray, DNA/Protein markers, DNA finger printing,Gene Knockout, RNAi and Gene silencing, Metagenomics, Stem cell technology, Types of stem cells, Manipulation of stem cells and applications, Bioethics and IPR

UNIT-V: Genomics & Proteomics

Genomics: Introduction to structural, comparative and functional genomics. Introduction to gene networks and epigenetic analysis; Sequencing of genome: Shot gun sequencing, High throughput sequencing; Methods for sequence assembly: Whole genome shot gun approach, Clone contig approach. Techniques used for gene location: Northern hybridization, Zoo blotting, cDNA sequencing.

Proteomics: Techniques used to study proteome: 2-D PAGE, Mass-Spectrometry, MALDI-TOF, Protein sequencing, Identifying protein – protein interactions: Yeast two-hybrid system, Phage display library, Protein microarray. Applications of proteomics.