

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

**Subject Code: PHDMB110**

**Subject Name: Advances Microbiology**

**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: Pathogenesis and Antimicrobial Chemotherapy**

Pathogenicity islands; Mechanism of pathogenesis: Mechanism of bacterial adhesion, colonization and invasion, Protein toxins (Classification and mode of action), Cytoskeletal modulation of host cell; Mechanism of action of antimicrobial agents; Methods of drug susceptibility testing: Kirby-Bauer's disc diffusion method, Stokes method, Agar dilution method, Broth dilution method, E-strip method; Emergence of drug resistance in bacteria (MRSA, ESBL and MDR TB); Resistance mechanism; Various types of vaccines for prevention of infectious diseases; National immunization program and immunization schedule.

**UNIT-III**

**Significance of microbial activities** in the environment, Role of microorganisms in the cycling of bio-elements (carbon, nitrogen, phosphorus, Sulphur); bioremediation, microbial degradation of pesticides and other recalcitrant chemicals xenobiotics). Global warming and possible control measures.

**Microorganism in mineral leaching and recovery:** Microbial degradation of petroleum and hydrocarbons; Bio-deterioration of paper-leather-wood- textiles-cosmetics; Metal corrosion and control. Microbial inoculants in agriculture; GMO and their impact; Microbial plastics

**UNIT-IV**

**Microbial Production and Spoilage of Pharmaceutical Products**

Manufacturing procedures and in process control of pharmaceuticals; Pharmaceuticals produced by microbial fermentations, Vaccines: Multivalent subunit vaccines, Purified macromolecules, Synthetic peptide vaccines, Immuno-adhesions, Recombinant antigen vaccines, Vector vaccines, Anti-idiotypic vaccines, Targeted immune stimulants, New generation vaccines; Microbial contamination and spoilage of pharmaceutical products and their sterilization.

## **UNIT-V**

### **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