

B.Sc. III

Paper I

Immunology and Medical Microbiology

Unit 1. Innate and acquired immunity, humoral and cell mediated immunity, organs and cells involved in immune response, identification and characterization of T and B cells, MHC, antigen characteristics, types of antigens, adjuvants.

Unit 2. Humoral immune response, immunoglobulins – structure and properties, antibody diversity theories, monoclonal antibodies, antigen-antibody reactions, complement system.

Unit 3. Characterization and types of T cells, macrophage activation, cytokines, types of hypersensitivity, cell mediated toxicity, principles of serological test methods.

Unit 4. Diseases caused by specific bacterial pathogens: *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Mycobacterium*, *Salmonella*, *Vibrio*, *Clostridium*, *Enterobacter*, *Mycobacteria*, *Spirochaetes*, *Chlamydiae* and *Rickettsiae*.

Unit 5. Diseases caused by Viruses: HIV, Hepatitis, Rabies, pox, Herpes, oncogenic viruses. Diseases caused by protozoans: *Entamoeba histolytica*, *Plasmodium* species, *Trypanosoma*, *Leishmania*.

References:

1. B Annadurai. A textbook of Immunology and Immunotechnology. S. Chnd
2. R Ananthanarayanan and C K Panicker. Textbook of Microbiology. Orient Longman.

Paper II

Agriculture and Food Microbiology

Unit 1. Microorganisms as biofertilizers (Rhizobial, Cyanobacterial, Mycorrhizal, Azotobacter): production and application of. Microbial biopesticides, recombinant pesticides (special reference to Bt), GMO and their impact.

Unit 2. Microbial diseases of crops: transmission of pathogens, Citrus canker, little leaf of brinjal, red rot of sugarcane, brown rot of potato, black rot, mosaic virus, tomato spot, early and late blight, wilt disease. Control of plant diseases.

Unit 3. Microorganisms important in food microbiology – molds, yeasts, bacteria, principles of food preservation – high and low temperatures, drying, chemical preservatives, food additives.

Unit 4. Food spoilage and food borne infections, general principles underlying food spoilage and contamination, canned food spoilage, spoilages of vegetables, fruits, meat and meat products, milk and milk products, fish, seafood and poultry.

Unit 5. Food produced by microbes: bread, cheese, fermented dairy products, microbial cells as food – single cell proteins, mushroom, fermented Indian foods.

References:

1. Adams and Moss. Food Microbiology. Cambridge.
2. R S Mehrotra. Plant Pathology.
3. Frazier and Westhoff. Food Microbiology. Tata McGraw Hill.

Paper III

Industrial Microbiology

Unit 1. Exploitation of microorganisms and their products, screening, strain development strategies, immobilization methods, fermentation media, raw material used in media production, antifoaming agents, buffers, downstream processing.

Unit 2. Fermentation equipment and its uses, fermentor design, Types of fermentors and fermentations- single, batch, continuous, multiple, surface, submerged and solid state.

Unit 3. Industrial products from microorganisms- antibiotics: production of penicillin, streptomycin. Interferons, vaccines, hormones, vitamins.

Unit 4. Enzymes from microbes: amylase, protease. Organic acids: citric acid, acetic acid, amino acids: glutamic acid, lysine.

Unit 5. Production of alcoholic beverages: beer and wine, biofuels: ethanol, methane, biogas.

References:

1. Whitaker and Stanbury. Principles of Fermentation Technology.
2. Casida. Industrial Microbiology. Tata McGraw Hill.

Practicals

1. Bacteriological analysis of food products.
2. Determining the quality of milk by MBRT.
3. Agglutination reactions – blood group, Widal, VDRL.
4. Enzyme Linked Immunosorbent Assay.
5. Antibiotic sensitivity test by well and disc methods.
6. DLC, TLC.
7. Preservation methods.
8. Isolation and identification of major bacterial pathogens such as *Staphylococcus*, *Streptococcus* etc.