

MICROBIOLOGY

1. Introduction to Microbiology Scope and application to pharmacy field. Whittaker's Five Kingdom concept, historical development - biogenesis Vs. abiogenesis, Germ theory of fermentation, Germ theory of disease, the contribution of Leeuwenhoek, Robert Koch, Jenner, Louis Pasteur and Ehrlich. 2. Microscopy and staining technique the principle, ray diagram, construction, working and applications of light compound, dark field, phase contrast, Fluorescence & electron microscope. The concept of resolving power, Magnification power, numerical aperture and angular aperture and working distance. The principle application of oil immersion microscopy. Theory of staining, principle and technique of staining procedure - Monochrome, Gram, acid-fast, negative, capsule, endospore.

3. Biology of Microorganisms Cultural characteristics, pure culture techniques a) Bacteria - Morphology and fine structure of bacteria, Nutritional requirement and type of culture media, growth and growth curve of bacteria, physical condition for growth, measurement of bacterial growth (Counting Methods), Reproduction in bacteria, genetic exchange - transformation, conjugation, and transduction, development of drug resistance by recombination and mutation, preservation of bacterial culture. Biochemical properties (sugar fermentation and IMVIC test). Pathogenesis of Staphylococcus, Mycobacterium. Salmonella Introductory study of disease-causing rickettsia, the importance of actinomycetes in antibiotic production.

4. Fungi and Viruses b) Fungi:- Introduction, general characteristics, morphology, the industrial and medical significance of Saccharomyces Cerevisiae, Penicillium and Aspergillus, Candida Albicans, Epidermophyton, and trichophyta. c) Viruses: - Introduction, structure and general properties Bacteriophages - Lytic and Lysogenic cycle, Epidemiological uses of Bacteriophages, human viruses - Cultivation and Multiplication virus-host cell interaction, Pathogenesis of HIV and Prions, types of Tumor viruses.

5. Aseptic Technique The omnipresence of microorganisms, the importance of asepsis, sources of contamination and methods of prevention, Principle, construction & working of laminar airflow bench.

6. Sterilization & Disinfection a) Concept and classification, principle and methods of sterilization, Mechanisms of cell injury. b) Construction working & applications of moist heat & dry heat sterilizer, gamma radiation sterilizer, filtration sterilizer. Indicators of sterilization, microbial death, kinetic terms-D value, z value. c) Terminology of chemical antimicrobial Agents, Chemical classification of different disinfectants, characteristics of ideal disinfectants, factors affecting the action of disinfectants, evaluation methods (RW Coeff.), Kelsey Sykes test, Chick Martin test.

7. Microbial spoilage Types of spoilage, factors affecting spoilage of pharmaceutical products.

9. Vaccines & Sera Manufacturing (seed lot system) and quality control of bacterial vaccines & Toxoids (Tetanus, TAB, Cholera, BCG, DPT), Viral vaccine (Polio- Salk Sabin, Rabies, MMR, Hepatitis, Chickenpox, influenza), Antisera (diphtheria, tetanus), antiviral Antisera (rabies). Preparation of allergenic extracts & diagnostics.

10. Microbial Assay Importance, general methods of assay of antibiotics (Cup & plate method, paper disc method, turbidometry, dilution method), methods for fungicidal & antiviral compounds, assay, microbial limit tests.

BIOTECHNOLOGY

1. Plant Cell and Tissue Culture Structure of plant cell, DNA, Genes and chromosomes. 1. Cell and tissue culture, a. Requirements. b. Callus culture, suspension culture, batch culture. c. The concept of somatic hybridization, somatic embryogenesis.

2. Processes and applications, a. Isolation and immobilization of enzymes and plant cells and application. b. Protoplast and cell fusion. c. Germplasm conservation. d. Production of secondary metabolites by plant tissue culture. e. Gene transfer techniques. 2. Animal Cell Culture Introduction to animal cell culture, medium used in ATC. Use of FCS, primary culture, secondary culture, cell line. Cloning: concept and application with technical hurdles. Transgenic animals as a source of food, organs and tissues, concept of xeno transplant.

3. Fermentation Technology and Industrial Microbiology 1. Fermentation as a biochemical process, types of fermentation. 2. Fermenter - working and construction, accessory components, modification. 3. Fermentation monitoring and in situ recovery of products.

4. Recombinant DNA Technology Basic concepts a) Introduction. b) Role of a restriction endonuclease, DNA ligase, DNA polymerase, Reverse transcriptase.

5. Process and Applications a) Constructing Recombinant DNA molecules. DNA Clones sources of DNA for cloning. DNA vectors, role of expression vectors. Host cell for recombinant work. Method for screening and selecting transformants.