

Mi.Bi.C. Ist Year, Semester –I

MBT101 Introductory Microbiology, Microbial Techniques and biology of Microorganisms

Unit -I

History and mile stones in Microbiology, meaning, definition and history of microbiology. Contributions of Antony von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Uwanowsky, Beijerinck, Winogradsky and Alexander Fleming. Importance and applications of Microbiology. Virology – basics of virology, history, milestones, taxonomy and significance of virology.

Unit-II

Classification of microorganisms- Haeckel's three kingdom concept, Whittaker's five kingdom concept and three domain concept of Carl Woese and phylogenetic trees. Basis of modern microbial classification and their concepts, nomenclature and taxonomic ranks. General characters of Fungi (Yeasts, Candida) – Algae (Cyanobacteria, Chlorella), Protozoa (Entamoeba, Leishmania, Plasmodium). Isolation and identification of microorganisms – principles and types of stains (simple, differential and negative stains), structural stains- spore, capsule, flagella. Hanging – drop method.

Unit-III

Sterilization and disinfection techniques, principles and methods of sterilization, physical methods- autoclave, hot air oven, pressure cooker, laminar air flow, filter sterilization. Radiation methods – UV rays, gamma rays, ultrasonic methods. Chemical methods – use of alcohols, aldehydes, fumigants, phenols, halogens, and hypochlorites. Phenol coefficient.

Unit-IV

Isolation of pure culture techniques- Enrichment culturing, dilution – plating, streak-plate, spread – plate and micromanipulator. Preservation of microbial cultures – sub culturing, overlaying cultures with mineral oils, lyophilization and sand cultures, storage at low temperature (ultra low temperatures).

Unit-V

Differentiation of prokaryotes and eukaryotes. General characteristics of bacteria, archaeobacteria, rickettsias, mycoplasmas, cyanobacteria and actinomycetes. Outline classification for bacteria as per the second edition of Bergey's bacteriology (upto order level). Ultra structure of a bacterial cell; Invariant components – cell wall, cell membrane, ribosomes, nucleoid. Variant components – capsule, flagella, fimbriae, endospore and storage granules. General characteristics and classification of viruses – animal, plant and microbial. Morphology, structure and replication of TMV, HIV and lambda bacteriophage. Eukaryotes – General characteristics and classification (up to the order level) of eukaryotic microorganisms – micro protozoa, microalgae, molds and yeasts.

MBP-101 INTRODUCTORY MICROBIOLOGY, MICROBIAL TECHNIQUES AND BIOLOGY OF MICROORGANISMS

1. Precautions to work in Microbiology laboratory.
2. Preparation of culture media: Solid/liquid.
3. Isolation of single colonies on solid media.

4. Enumeration of bacterial numbers by serial dilution and plating-spread and streak.
5. Light and compound microscope and its handling.
6. Simple and differential staining (Gram's staining).
7. Spore staining, capsule staining and negative staining.
8. Motility of bacteria by Hanging drop method.
9. Contributions of Microbiology-photographs.
10. Electron micrographic representations of viruses-TMV, HIV, Bacteriophages.
11. Physical methods-autoclave, hot-air oven, pressure cooker, laminar airflow, filter sterilization.
12. Microscopic observation of cyanobacteria (Nostoc, Spirulina), algae (Scenedesmus sp., diatoms) and fungi (Saccharomyces, Rhizopus, Aspergillus, Penicillium, Fusarium).
13. Calibrations of microscopic measurements (Ocular, stage micrometers)-bacteria, fungal spores.

Note: S.No. 5,6,7,8,13 practicals are compulsory for major experiments.