

## MINOR (MI)

**MI – 1: Introduction and Scope of Microbiology**

**Credits 04 (Full Marks: 75)**

**MI – 1T: Introduction and Scope of Microbiology**

**Credits 03**

**Course contents:**

### **Unit I: History and Development of Microbiology**

Scope of Microbiology, Contributions of Anton von Leeuwenhoek, Louis Pasteur, Alexander Fleming, Robert Koch, Germ theory of disease, Theory of biogenesis and abiogenesis.

### **Unit II: Diversity of Microorganisms**

Microorganism's position in Whittaker's five kingdom and Carl Woese's three kingdom classification systems, General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Prokarya: Archaea and Bacteria, Eukarya : Algae, Fungi and Protozoa), Definitions and citing examples of Protozoa ; Methods of nutrition, locomotion & reproduction - Amoeba, and *Plasmodium*.

### **Unit –III: Instrumentation**

Bright Field Microscope, Principles and application Electron Microscope (TEM and SEM), Phase contrast microscope, Fluorescence microscope, Sterilization process: Autoclave, Tyndallization, Hot Air Oven, Filtration.

### **Unit-IV: Microbiological techniques**

Culture media: natural media, synthetic media, complex media, selective and differential media, enriched and enrichment media, Pure culture isolation: Streaking, serial dilution and plating methods (spread plate and pour plate); maintenance and preservation/stocking of pure cultures; Bacterial staining: Gram and acid fast staining, Negative-staining, Physical methods of microbial control: high and low temperature, filtration, desiccation, osmotic pressure, radiation Chemical methods of microbial control: disinfectants, types and mode of action.

### **Suggested Readings:**

1. Microbiology: An Introduction. 9th edition. Pearson Education. Tortora GJ, Funke BR and Case CL. (2008).
2. Brock Biology of Microorganisms. 14th edition. Pearson International Edition. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014)
3. Principles of Microbiology. 2nd edition. W.M.T. Brown Publishers, Atlas RM. (1997).
4. Microbiology. 5th edition. McGraw Hill Book Company. Pelczar MJ, Chan ECS and Krieg NR. (1993).
5. General Microbiology. 5th edition. McMillan. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005).

## **MI-1P: Introduction and Scope of Microbiology (Practical)**

**Credits 01**

### **General Experiments**

1. To study the principle and applications of important instruments used in the microbiology laboratory
2. Preparation of culture media for bacterial cultivation
3. Sterilization of medium using Autoclave and assessment for sterility
4. Sterilization of glassware using Hot Air Oven and assessment for sterility
5. Demonstration of presence of micro flora in the environment by exposing nutrient agar plates to air.
6. Demonstration of Gram's staining procedure.
7. Demonstration of sub culturing techniques.
8. Preservation of bacterial culture at low temperature.

### **Suggested Readings:**

1. Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited. Cappucino J and Sherman N. (2010).
2. Practical Microbiology, Dubey and Maheshwari ,S.Chand Publication, First edition 2002

## **MI-2: Prokaryotic microbes: Bacteria and Virus**

**Credits 04 (Full Marks: 75)**

## **MI-2T: Prokaryotic microbes: Bacteria and Virus**

**Credits 03**

### **Course contents:**

#### **Unit 1: Cell organization of bacteria**

Cell size, shape and arrangements, capsule, flagella and pili, Composition and detailed structure of gram-positive and gram-negative cell wall and archaeal cell wall, Structure, chemical composition and functions of bacterial and archaeal cell membranes, Ribosomes, inclusions, nucleoid, plasmids, structure, formation and stages of sporulation

#### **Unit 2: Bacterial growth and control**

Culture media: Components of media, Synthetic or defined media, Complex media, enriched media, selective media, differential media, enrichment culture media

Pure culture isolation: Streaking, serial dilution and plating methods, cultivation, maintenance and stocking of pure cultures, cultivation of anaerobic bacteria

Growth: Binary fission, phases of growth

#### **Unit 3: Bacterial Systematics and Taxonomy**

Taxonomy, nomenclature, systematics, types of classifications Morphology, ecological significance and economic importance of different group of bacteria.

#### **Unit 4: Introduction to Viruses**

Properties of viruses; general nature and important features Subviral particles; viroids, prions and their importance Isolation and cultivation of viruses

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