

## Semester II Microbiology

### Core III

#### Programme Outcome:

- Knowledge of microbial diversity and classification.
- To understand microbial culture, growth and reproduction.
- To understand the importance of viral pathogenicity, nature of viral transmission.
- To comprehend the importance of Anti-viral drugs and vaccines.

#### Course Outcome:

- Obtaining knowledge pertaining to future scopes and modern trends of microbiology.
- Understanding the experimental approaches to explore the origin of microbes.
- Understanding the morphology, classification and significance of host-vector relationship.
- Learning the mechanism of action of microbial toxins and pathogenicity.
- Obtaining knowledge on pathogenic manifestation of Oncoviruses & HIV.

#### Learning Outcome:

- Finding the historical background and modern experimental approaches to understand the origin and development of microbiology.
- Analysing the general features, classification and pathogenicity of Archea and Eubacteria.
- Deducing knowledge on role of microbes in agriculture and healthcare sector.
- Interpreting the mechanism of antibacterial and anti-viral their mode of action, and importance of vaccines.

#### Unit-1

**History and development of microbiology:** Biogenesis and abiogenesis, Contribution of Francesco Redi, Lazzaro Spallanzani, John Needham, Louis Pasteur, John Tyndall, Joseph Lister, Robert Koch (germ theory), Edward Jenner and Alexander Fleming's experiments on discovery of Penicillin, Modern trends and future scope of Microbiology.

#### Unit-2

**Microbial systems of classification:** General features of Bergey's manual for classification of microbes, Whittaker's five kingdom concept, Carl Woese's 3 domain classification, Lynn Margulis theory of endosymbiotic theory. General features of Archaea: Structure, Nutrition and Reproduction.

General features, pathogenicity of Mycoplasma, Rickettsia and Spirochaetes.

#### Unit-3

**Isolation, culture and maintenance of microorganisms:** Microbial growth, continuous culture (chemostat), Factors influencing growth of microbes, Role of microbes in agriculture

and healthcare industry. Reproduction of Eubacteria, Genetic recombination in bacteria (Transformation, Conjugation and Transduction).

#### **Unit-4**

**Virion and viroids:** General characteristics and classification of viruses, morphology, nature of viral transmission. Bacteriophage replication, Oncoviruses & HIV: structure, transmission, pathogenicity and replication. Microbial toxins: types, mode of actions and pathogenicity (Exo and Endo-toxin). Antibiotics and their mode of action, Anti-virals and vaccine.

#### **PRACTICAL**

1. Study on aseptic techniques in microbiology: various methods of sterilization process.
2. Preparation and formulation of microbial media and methods of inoculation.
3. Methods of isolation of bacteria: spread plate, streak plate, pour plate, serial dilution.
4. Sampling and quantification of microorganisms in air, water and soil.
5. Morphological identification of microorganisms from various habitats through simple staining, differential staining, acid fast staining, spore staining.
6. Methods of microscopic measurements, micrometer (ocular and stage), haemocytometer.
7. Preparation of bacterial growth curve.