

## HMBCR1012T

### SEMESTER –I

#### C-1: INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY (THEORY)

**Total hours: 52**

**Total Marks: 60**

**Credits: 4**

**Module 1**

**Marks 25**

**Unit 1: History of Development of Microbiology**

**No. of Hours: 8**

Development of microbiology as a discipline, Spontaneous generation vs. biogenesis. Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming Role of microorganisms in fermentation, Germ theory of disease, Development of various microbiological techniques and golden era of microbiology, Development of the field of soil microbiology: Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky, Selman A. Waksman Establishment of fields of medical microbiology and immunology through the work of Paul Ehrlich, Elie Metchnikoff, Edward Jenner

**Unit 2: General characteristics of Algae and fungi**

**• Algae**

**No. of Hours: 6**

History of phycology with emphasis on contributions of Indian scientists; General characteristics of algae including occurrence, thallus organization, algae cell ultra-structure, pigments, flagella, eyespot, food reserves and vegetative, asexual and sexual reproduction. Different types of life cycles in algae with suitable examples: Haplobiontic, Haplontic, Diplontic, Diplobiontic and Diplohaplontic life cycles. Applications of algae in agriculture, industry, environment and food.

**• Fungi**

**No. of Hours: 6**

Historical developments in the field of Mycology including significant contributions of eminent mycologists. General characteristics of fungi including habitat, distribution, nutritional requirements, fungal cell ultra-structure, thallus organization and aggregation, fungal wall structure and synthesis, asexual reproduction, sexual reproduction, heterokaryosis, heterothallism and parasexual mechanism. Economic importance of fungi with examples in agriculture, environment, Industry, medicine, food, biodeterioration and mycotoxins..

**• Protozoa**

**No. of Hours: 6**

General characteristics with special reference to *Amoeba*, *Paramecium*, *Plasmodium*, *Leishmania* and *Giardia*

**Module 2****Marks 25****Unit 3 An overview on Scope of Microbiology****No. of Hours: 2****Unit 4. Diversity of Microbial World****No. of Hours: 12**

**Systems of classification**-Binomial Nomenclature, Whittaker's five kingdom and Carl Woese's three kingdom classification, systems and their utility. Difference between prokaryotic and eukaryotic microorganisms. General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Bacteria) with emphasis on distribution and occurrence, morphology, mode of reproduction and economic importance.

**Unit 5 Bacterial Systematics****No. of Hours: 12**

Aim and principles of classification, systematics and taxonomy, concept of species, taxa, strain; conventional, molecular and recent approaches to polyphasic bacterial taxonomy, evolutionary chronometers, rRNA oligonucleotide sequencing, signature sequences, and protein sequences. Differences between eubacteria and archaebacteria

**HMBCR1012P****C-1: INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY  
(PRACTICALS)****TOTAL HOURS: 39****CREDITS: 2**

1. Microbiology Good Laboratory Practices and Biosafety.
2. To study the principle and applications of important instruments (biological safety cabinets, autoclave, incubator, BOD incubator, hot air oven, light microscope, pH meter) used in the microbiology laboratory.
3. Preparation of culture media for bacterial cultivation.
4. Sterilization of medium using Autoclave and assessment for sterility
5. Sterilization of glassware using Hot Air Oven and assessment for sterility
6. Sterilization of heat sensitive material by membrane filtration and assessment for sterility
7. Demonstration of the presence of microflora in the environment by exposing nutrient agar plates to air.
8. Study of *Rhizopus*, *Penicillium*, *Aspergillus* using temporary mounts
9. Study of *Spirogyra* and *Chlamydomonas*, *Volvox* using temporary Mounts
10. Study of the following protozoans using permanent mounts/photographs: *Amoeba*, *Entamoeba*, *Paramecium* and *Plasmodium*

## **SUGGESTED READING**

1. Tortora GJ, Funke BR and Case CL. (2008). *Microbiology: An Introduction*. 9th edition. Pearson Education
2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). *Brock Biology of Microorganisms*. 14th edition. Pearson International Edition
3. Cappucino J and Sherman N. (2010). *Microbiology: A Laboratory Manual*. 9th edition. Pearson Education Limited
4. Wiley JM, Sherwood LM and Woolverton CJ. (2013) *Prescott's Microbiology*. 9th Edition. McGraw Hill International.
5. Atlas RM. (1997). *Principles of Microbiology*. 2nd edition. WM.T.Brown Publishers.
6. Pelczar MJ, Chan ECS and Krieg NR. (1993). *Microbiology*. 5th edition. McGraw Hill Book Company.
7. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005). *General Microbiology*. 5th edition. McMillan.
8. C.B. Power. *Microbiology*