Subject Code : P8BC8

CORE COURSE - VIII – MICROBIOLOGY

Unit 1 Morphology and Ultrastructure

Ultrastructure of bacteria, fungi, algae and protozoa. Classification of microbes, molecular taxonomy. Cell walls of eubacteria (peptidoglycan) and related molecules. Outer membrane of Gram– negative bacteria. Cell wall and cell membrane synthesis, flagella and motility, cell inclusions like endospores, gas vesicles.

Purple and green bacteria, cyanobacteria, homoacetogenic bacteria, Acetic acid bacteria, Budding and appendaged bacteria, spirilla, spirochaetes, Gliding and sheathed bacteria, Pseudomonads, Lactic and propionic acid bacteria. Endospore forming rods and cocci, Mycobacteria, Rickettsia and Mycoplasma. Archaebacteria.

Unit 2 Microbial growth and metabolism

Microbial growth– definition. Mathematical expression of growth, growth curve, measurement of growth and growth yields, synchronous growth, continuous culture, factors affecting growth. Microbial metabolism– overview. Photosynthesis in microbes. Role of chlorophylls, carotenoids and phycobilins, Calvin cycle. Chemolithotrophy; Hydrogen– iron– nitrite oxidising bacteria; nitrate and sulfate reduction; methanogenesis and acetogenesis, fermentations– diversity, syntrophy-role of anoxic decompositions. Nitrogen metabolism, nitrogen fixation, hydrocarbon transformation.

Unit 3 Microbiological Techniques

Methods in microbiology. Currents methods in microbial identification. Pure culture techniques. Theory and practice of sterilization. Principles of microbial nutrition, construction of culture media, Enrichment culture techniques for isolation of chemoautotrophs, chemoheterotrophs and photosynthetic microbes.

Unit 4 Viruses

Bacterial, plant, animal and tumor viruses. Classification and structure of viruses. Lytic cycle and lysogeny. DNA viruses; positive and negative strand, Double stranded RNA viruses. Replication; example of Herpes, pox, adenoviruses, Retroviruses. Viroids and prions.

Unit 5 Medical Microbiology

Disease reservoirs; Epidemiological terminologies. Infectious disease transmissions. Respiratory infections caused by bacteria and viruses; Tuberculosis, sexually transmitted diseases including AIDS; Vector borne diseases, water borne diseases. Public health and water quality. Pathogenic fungi. Antimicrobial agents, Antibiotics. Penicillins and cephalosporins, Broad

spectrum antibiotics. Antibiotics from Prokaryotes, Antifungal antibiotics– Mode of action, Resistance to antibiotics. Lantibiotics.

Books recommended

1. Madigan et al. Brock Biology of microorganisms 10th ed. Prentice Hall, 2002.
2. Davis et al Microbiology 4th ed. Lippincott Williams and Wilkins, 1989.
3. Joklik et al. Zinsser's Microbiology Mc Graw-Hill Professional, 1995.
4. Pelczar et al. Microbiology 5th ed. Mc Graw Hill, 2000.
5. Stainer Ry et al. General Microbiology 5th ed. Prentice Hall 1986.
6. Brooks et al. Jawetz, Melnick and Adelberg's Medical Microbiology. Lange Med. 1998.
7. Prescott et al. Microbiology. Mc Graw Hill, 1999.
8. Encylopedia Microbiology– 2nd ed. Lederberg Vol. 1 to 4. Acad. Press 2000