

Course outcomes:

After successful completion of the course, students will be able to:

- CO 1. Develop theoretical knowledge about origin and evolution of microorganisms,
- CO 2. Learn comparative morphology, structure and reproduction in bacteria, Cyanobacteria, yeast, fungi and viruses
- CO 3. Acquire knowledge on interactions of microorganisms with plants and animals, various diseases caused by microorganisms in humans and the role of antibiotics in controlling the diseases
- CO 4. Learn about the role of microorganisms in spoilage of food and various methods of food preservation.

UNIT I (13 hrs)

Principles of classifications, numerical and molecular taxonomy, Comparative morphology, structure and reproduction in archaebacteria, eubacteria, cyanobacteria, yeast and fungi. Microbial nutrition, nutritional grouping of microorganism. Microbial metabolism: Microbial respiration, aerobic and anaerobic respiration, fermentation, Bacterial photosynthesis. General account of symbiosis, mutualism, antagonism, parasitism and commensalism in microorganisms.

UNIT II (13 hrs)

Principle and applications of Light, Phase contrast, differential interference contrast, fluorescence, Confocal and Electron Microscopy. Stains and staining- Principles of staining, simple staining, negative staining, differential staining, Gram and acid fast staining, flagella staining, capsule and endospore staining. Growth kinetics, factors affecting growth and death; methods of isolation, enumeration, cultivation and preservation of microorganisms. Control of microbes- Sterilisation, disinfection, antiseptic, tyndallisation, pasteurization: Physical- dry heat, moist heat, UV light, ionizing radiation, filtration, HEPA filter, Chemical-phenol and phenolic compounds, (halogen aliphatic alcohol, formaldehyde, ethylene oxide, heavy metals) anionic and cationic detergents.

UNIT III (13 hrs)

Classification, morphology, ultrastructure and life cycle of plant viruses, animal viruses and bacteriophages. DNA viruses: Herpes virus, Adenovirus, WTV; RNA viruses: Polio, Influenza, Corona, Retroviruses (HIV); Bacteriophages: lambda phage, bacteriophage MU, M13, T3, T4. Risk levels and Biosafety laboratories. Biological warfare and Bioterrorism

UNIT IV (13 hrs)

Plant pathogen interactions: *Phytophthora*, *Agrobacterium* and TMV. Animal microbe interactions: Tuberculosis, dermatophytes, Rabies, Mycoplasma and Rickettsia, typhoid, leprosy, cholera; Antibiotics: types, mode of action and drug resistance (Cholera, *Salmonella* and *Staphylococcus*), antimicrobial therapy. Principles of microbial spoilage of food, Methods of food preservation by physical (freezing, canning, pasteurization and irradiation) and chemical (preservatives, lactic antagonism) methods. Microbial food poisoning (botulism, mycotoxins, algal toxins, cholera and salmonellosis).

References

1. Biology of microorganisms. Brock, T.B.& Madigan, M.T., Prentice Hall, 1996
2. Elements of microbiology. Pelczar, M.J. & Chan E.C.S. Mac Graw Hill New York., 1993