BTPC2002 MICROBIOLOGY (3-0-0)

Module – I (10 hours)
History and scope of Microbioology
Methods in Microbiology: Sterilization, Culture Media, Pure culture technique, enrichment culture technique, Microbial staining methods, Maintenance and preservation of Microorganisms, Culture collection centers.
Microbial growth: Growth curve, measurement of growth, growth yields, synchronous growth, continuous culture, growth as affected by environmental factors such as temperature, acidity, alkalinity, water availability and oxygen.

Module – II (10 hours)
Elementary idea about Cynobacteria, Mycobacteria, Rickettsia, Chlamidias, Mycoplasma, Actinomycetes, Bacteria: Cell structure, genetic recombination in bacteria. Metabolic diversity among micro-organisms: Photosynthesis in micro-organisms (role of chlorophylls, carotenoids and phycobilins), anoxygenic photosynthesis, oxygenic photosynthesis.
Microbial nutrition, Chemoautotrophy, Chemoheterotrophy, Chemoorganotrophy, chemolithotrophy, syntrophy, nitrogen fixation and biofertilizers

Module – III (6 hours)
Archea: Halophyles, Methanogens, Thermophyles Eukarya: Algae, fungi, slime moulds and protozoa (overview). Viruses: Discovery, classification and structure of viruses, Bacterial, plant, animal and tumor viruses, replication of DNA- and RNA- viruses, Examples of Herpes, pox, adenoviruses, retroviruses, viroids and prions.

Module- IV (8 hours)
Normal microflora of skin, oral cavity, gastrointestinal tract, entry of pathogens into the host, Colonization and factors predisposing to infections. Microbial diseases: Disease reservoirs, epidemiological technology, infectious disease transmission, respiratory infections caused by microbes, sexually transmitted diseases, diseases transmitted by animals, insects, ticks. Food and water born diseases, public health and water quality

Module - V (6 hours)
Chemotherapeutic agents: Growth factor analogues, Sulfa drugs, Quinolones Antibiotics: Penicillins and Cephalosporins, broad-spectrum antibiotics, antibiotics from prokaryotes, antifungal antibiotics, mode of action of different antibiotics, resistance to antibiotics, Multiple Drug Registance. Antiviral chemotherapeutic agents.

Course Outcomes (COs):
1. Understand the Structure and Function of Genetic Material: Students will be able to describe the structure of DNA and RNA, as well as their roles in microbial cells.
2. Explain Gene Expression and Regulation: Students will understand how genes are expressed and regulated in prokaryotes and eukaryotes.
3. Conduct Basic Genetic Manipulation Techniques: Students will demonstrate proficiency in techniques such as PCR, gel electrophoresis, and cloning.
4. Analyze Genetic Data: Students will be able to interpret data from genetic experiments and use bioinformatics tools to analyze genetic sequences.

Program outcomes (POs):

1. Knowledge and Understanding of Microbial Physiology and Genetics: Graduates will have a deep understanding of the structure, function, and genetics of microorganisms.
2. Laboratory Skills: Graduates will be proficient in a variety of microbiological techniques, including culturing, staining, and identifying microorganisms.
3. Critical Thinking and Problem-Solving: Graduates will be able to design experiments, analyze data, and draw valid conclusions.
4. Communication Skills: Graduates will be able to effectively communicate scientific information, both orally and in writing.
5. Ethical and Professional Conduct: Graduates will understand and adhere to ethical standards in microbiological research and practice.

Program specific outcomes(Psos)

1. Specialization in Medical Microbiology: Graduates will have specialized knowledge in the field of medical microbiology, including the identification and treatment of pathogenic microorganisms.
2. Biotechnological Applications: Graduates will be skilled in applying microbiological techniques to biotechnology, including the development of microbial products and processes.
3. Environmental Microbiology Expertise: Graduates will understand the roles of microorganisms in environmental processes and be able to apply this knowledge to fields such as bioremediation and environmental monitoring.
4. Advanced Research Competence: Graduates will be capable of conducting independent research, including designing experiments, using advanced techniques, and publishing results.

Books:

1. Brock Biology of Microorganisms, Maidgan,Martinko and Parker, Prentice Hall Inc., New York.
2. Microbiology, Prescott., Harley and Klein, William C Brown Press.
3. General Microbiology, S.B.Sullia and V. Santharam, Oxford & IBH, New Delhi.
4. Text book of Microbiology, R.C. Dubey and D.K.Maheswari, S.Cahnd and Company.
5. Modern concepts of Microbiology, H.D.Kumar and S.Kumar, Vikas Publications.
6. Microbiology: Fundamentals and applications, S.S.Purohit, Agro Botanical Publications, Jaipur.
7. Microbiology, Pelczar, Chan and Creig, Tata Mc Graw Hill Publ.