UNIT-I

1. Infection: types of infection, sources of infection, reservoirs and vehicles of infection, predisposing factors.
2. Host-parasite relationship governing the infection and establishment of disease. factors affecting virulence.
4. Mode of spread of infection; Respiratory, skin, wound & burn infection, venereal infections, alimentary tract infection, blood borne infection and nosocomial infection.

UNIT-II

1. Infections caused by Gram positive cocci and Gram negative cocci: Source of infection. Pathogenicity, Epidemiology & Lab diagnosis of Staphylococcus, Streptococcus and Neisseria (meningitis, gonorrhea)
3. Infection caused by Gram Positive bacilli: Source of infection, Pathogenicity, Epidemiology & Lab diagnosis of Corynebacterium diphtheriae, Bacillus anthracis, Clostridium tetani, Vibrio cholerae.

UNIT-III

Morphology, pathogenesis, immune response, diagnosis and prevention of
1. Pox viruses (Variola, Vaccinia, Small pox) Herpes Simplex type I and type II, Picorna viruses (Enteroviruses and Polioviruses).
2. Paramyxoviruses (Rubulavirus and Parainfluenza viruses), Orthomyxoviruses (Measles & Mumps viruses).
3. Hepatitis viruses (Type A, B, C, D, E), Arboviruses (Alphavirus and Flaviviruses), Rhâbdo viruses (Rabies virus).
4. Oncogenic viruses, HIV virus.
UNIT-IV


4. Definition, Causative agent, Source of infection, Epidemiology, Symptomatology & Diagnosis of Candidiasis, Aspergillosis and Histoplasmosis.

UNIT-V

1. Antimicrobial agents: Histroy, Antibiotics, Antifungal and Antivirals (common drugs, their spectrum and mode of action).

2. Methodologies for testing of antibacterial, antifungal, and antiviral drugs (*in vivo* and *in vitro* infectivity models), mechanism drug resistance.

3. Preclinical development: Safety profile of drugs (Pyrogenicity, Toxicity – hepato, - nephro, -cardio and neurotoxicity), Toxicological evaluation of drug (LD50, Acute, subacute and chronic toxicity), Mutagenicity (Ames test, micronucleus test) and Carcinogenicity.


Reference Books


4. Virology; Renato Dulbecco and Harold S. Ginsberg, Fourth edition, J.B. Lippincott Company, USA


6. Medical Microbiology; Jawetz, Melnick, & Adelberg’s, Fifth edition, MacGrow Hills

7. Medical Bacteriology, Medical Mycology and AIDS; N.C. Dey, T.K. Dey and D. Sinha, New Central Book Agency (P) Ltd.


UNIT-I
1. Enzymes used in DNA technology: Restriction and modification enzymes, polymerases, ligase, kinases and phosphatases. Linkers and adapters.
2. Cloning vectors: Plasmids, Phages (Lambda and M13) Plasmids, Cosmids and Expression vectors.
3. Cloning vectors for Yeast (shuttle vector and YAC) and cloning vector for animal cells. SV-40. Vaccinia and Retroviruses.

UNIT-II
1. Screening of clones from libraries: Expression based screening, Interaction based screening.
3. Mutagenesis: Site directed mutagenesis, Transposon mutagenesis.

UNIT-III
1. DNA Sequencing: Sangers method, Maxamam Gilbert method, Thermocycle sequencing and Pyrosequencing.
3. Oligonucleotide synthesis, Restriction mapping, S1 nuclease and RNase mapping.
4. Polymerase Chain Reaction (PCR): Principle, Types and variants of PCR (Touch-Down PCR, Hot start PCR, Inverse PCR, RT-PCR, multiplex PCR, nested PCR. Real-time PCR.

UNIT-IV
1. Molecular typing: RFLP (Ribotyping, IS based), RAPD, AFLP, VNTR, SNP, Whole genome sequence. GIS
3. Transgenic animals: Strategies and methods.

UNIT-V
1. Applications of Recombinant DNA Technology in Medicine, Molecular diagnostics, recombinant and DNA vaccines.
3. Applications of Recombinant DNA Technology in Agriculture and Industry.
4. Biosafety & ethical considerations for GMOs.
Reference Books
UNIT-I
1. Industrially important strains of bacteria, fungi, and actinomycetes. Novel microbes for fertilizer industry.
2. Isolation and screening of the industrially important strain from diverse ecosystems.
3. Method of strain improvement, mutagenesis, strain breeding by protoplast fusion, sexual and para sexual recombination.

UNIT-II
1. Downstream processing: filtration of fermentation broths recovery of biological products by distillation, superficial fluid extraction.
2. Detection, analysis and quality control of fermentation products and raw materials.
3. Industrial production of alcohols: vinegar, wine and alcohol.
4. Industrial production of solvents: glycerol, acetone, and butanol.

UNIT-III
1. Industrial production of citric acid and glutamic acid.
2. Microbial production of enzyme of industrial important: amylase and proteases.
3. Methods of whole cell immobilization, enzyme immobilization and application.
4. Industrial production of antibiotics, penicillin and streptomycin.

UNIT-IV
1. Hygiene and safety in fermentation industries.
2. Microbial production of Vitamin B\textsubscript{12} and B\textsubscript{12}.
3. Microbial production of Interferon, Insulin, flavours and fragrances.

UNIT-V
1. Microbial production of vaccines.
3. Microbial transformations: Steroid biotransformation
4. Intellectual property rights (IPR) and protection (IPP)

Reference Books:

2. Biotechnology - A Text Book of Industrial Microbiology by Cruger.
3. Fermentation Biotechnology: Industrial Perspectives by Chand.
UNIT-I
1. Microbial ecology: basic concepts, types and microbial habitats, factors affecting microbial population.
2. Microbial interactions: competition, commensalism, parasitism, mutualism, commensalisms, synergism.
3. Population ecology: characteristics of population, population growth curves (r and k selection), population regulation.

UNIT-II
1. Microbiology of air: microorganism of air, enumeration of air micro flora.
2. Significance of air micro flora.
3. Brief account of air borne transmission of bacteria, fungi, pollens and viruses.
4. Air borne diseases and their prevention.

UNIT-III
2. Role of microorganisms in organic matter decomposition (cellulose, hemi cellulose, lignin).
4. Microbial degradation of xenobiotics, petroleum and oil spills in environmental decay, behaviours and degradable plasmid.

UNIT-IV
1. Water microbiology: aquatic microorganisms; fresh water and sea water microflora.
Microorganisms and water quality, water pollution.
2. Water purity test and indicator organisms, method used in environmental studies –BOD, COD, DO.

UNIT-V
2. Bioremediation of contaminations.
3. Extremophiles –acidophilic, alkalophilic, thermophilic microbes with adaptation and application in ecosystem.
4. Microbial biofilms: physiology, morphology, biochemistry of microbial biofilms, mechanism of microbial adherence, beneficial and harmful role of biofilms.
Reference Books

2. Environmental chemistry, A.K. De, Wiley Eastern Ltd., New Delhi
3. Environmental Science, Physical Principles and applications; Egbert Boeker et. al.
6. Environmental Biotechnology Theory and Application by Gareth M. Evans and Judith C. Furlong, John Wiley and Sons, LTD, U.S.A.
7. Ecology and Environment by P.D. Sharma, Rastogi Publications, New Delhi, India