**M.Sc. Biotechnology IV Semester**

**BT - XVII: Pharmaceutical Biotechnology Marks: 100 Hours: 45**

**UNIT -I :. Chemotherapy**

Antimicrobial Drug. Mechanism of action of antimicrobial agents.

Microbial Resistance to antibiotics and antimicrobial agents (Types and Mechanism).

Types of Antibiotics: Classification of antibiotics with example. General characteristics of an Secondary Metabolites: Types and Medicinal Applications

**UNIT-II : Chemotherapeutics Agents**

Structure, Mechanism of Action and Applications of Antibacterial drug: Sulfonamides, Quinolones. Antiviral drug: Amantadine, Azidothymidine. Antifungal drug: Nystatin, Griseofulvin.Mechanism of action of Anticancer drugs, Drugs acting on CNS, Insulin, Blood factor VIII.

**UNIT-III: Protein Engineering**

Methods of protein sequencing: mass spectrometry, Edman degradation, Tryptic and/or Chymotryptic Peptide Mapping. Isolation and purification of proteins, Stability and activity based approaches of protein engineering, Chemical and Physical Considerations in Protein and Peptide Stability, Different methods for protein engineering, Site-directed mutagenesis, gene shuffling, and direct evolution. Mapping of protein interactions: Two hybrid, phage display,etc.

**UNIT IV: Discovery and Development**

History, drug targeting, Molecular Biology and Combinatorial drug discovery, Rational Drug designing. Computer Aided Drug Discovery, Concept of Chemoinformatics, Pharmacokinetics, Pharmacodynamics. Drug delivery systems, Liposomes.

**Unit V: Clinical Trials**

Phases of Clinical trials of drugs, Preclinical drug evaluation of its biological activity, potency and toxicity-Toxicity test in animals including acute, sub-acute and chronic toxicity, ED50 and LD50 determination, special toxicity test like teratogenecity and mutagenecity.

Introduction to Indian, International Pharmacopoeia and global regulatory guidelines.

**Text & References :**

1. Hugo W. B. and Russell A. D. - Pharmaceutical Microbiology -Wiley India
2. Ashutosh Kar-Pharmacology and Pharmacobiotechnology-New Age
3. FSK Barar- Pharmaceutical- Essentials of Pharmaceuticals- S.Chand
4. B.Glick and J Pasernak -Molecular Biotechnology –ASM Press.
5. Doble- Drug Designing-McGraw Hill
6. S.P. Vyas, Dixit- Pharmaceutical Biotechnology-CBS
7. B.Razdan-Medicinal Chemistry-CBS
8. Satoskar, Bhandarkar- Pharmacology and Pharmacotherapeutics- Popular
9. Purohit, Saluja- Pharmaceutical Biotechnology-Student Edition
10. Ramawat K.G; Merillon J.M - Biotechnology: Secondary Metabolites-Oxford
11. Ed. R.H. Thomson-Chemistry of Natural Products-Springer
12. Jogdand S.N - Biopharmaceuticals, Himalaya Publishing

**Practical: (Lab course work VII)**

1. Estimation of penicillin/streptomycin by biological assay.
2. Estimation of penicillin/streptomycin by chemical assay.
3. Assay of antimicrobial activity of Penicillin, Chloramphenicol, streptomycin
4. Determination of Minimum Inhibitory Concentration (MIC) of Antibiotic
5. Determination of shelf life of antibiotics (Expired drugs)
6. Sterility testing of commercial pharmaceuticals.
7. Study of microbial spoilage of pharmaceuticals.
8. Sterility testing of injectable as per IP.
9. Effect of chemical disinfectant on growth of bacteria
10. Study of Pharmacopeia and global regulatory guidelines in pharma industry
11. Study of dug action by using Zebra fish (*Danio rerio)* as model organism
12. Visit to Pharmaceutical industry