

Syllabus | Semester: 5

Course code with name: 13PH0505 Pharmaceutical Biotechnology

Scope: Biotechnology has a long promise to revolutionize the biological sciences and technology. Scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technology makes the subject interesting. Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs. Biotechnology has already produced transgenic crops and animals and the future promises lot more. It is basically a research-based subject.

Objectives: Upon completion of the course the student shall be able to

1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries.
2. Genetic engineering applications in relation to production of pharmaceuticals.
3. Importance of Monoclonal antibodies in Industries.
4. Appreciate the use of microorganisms in fermentation technology.

Teaching and examination scheme:

Teaching scheme (Hours/week)			Total credits	Examination scheme					Total Marks
Theory	Tutorial	Practical		CSE	IA	ESE	Term work	Viva	
3	1	0	6	10	15	75	0	0	100

Theory syllabus:

Teaching hours: 45 Hours

Unit-1

10 Hours

a) Brief introduction to Biotechnology with reference to Pharmaceutical Sciences. b) Enzyme Biotechnology- Methods of enzyme immobilization and applications. c) Biosensors- Working and applications of biosensors in Pharmaceutical Industries. d) Brief introduction to Protein Engineering. e) Use of microbes in industry. Production of Enzymes- General consideration - Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase. f) Basic principles of genetic engineering.

Unit-2

10 Hours

a) Study of cloning vectors, restriction endonucleases and DNA ligase. b) Recombinant DNA technology. Application of genetic engineering in medicine. c) Application of rDNA technology and genetic engineering in the production of: i) Interferon, ii) Vaccines: hepatitis-B, iii) Hormones-Insulin. d) Brief introduction to PCR.

Unit-3

10 Hours

Types of immunity- humoral immunity, cellular immunity: a) Structure of Immunoglobulins. b) Structure and Function of MHC. c) Hypersensitivity reactions, Immune stimulation and Immune suppressions. d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immunity. e) Storage conditions and stability of official vaccines. f) Hybridoma technology- Production, Purification and Applications. g) Blood products and Plasma Substitutes.

Unit-4

8 Hours

a) Immuno blotting techniques- ELISA, Western blotting, Southern blotting. b) Genetic organization of Eukaryotes and Prokaryotes. c) Microbial genetics including transformation, transduction, conjugation, plasmids and transposons. d) Introduction to Microbial biotransformation and applications. e) Mutation: Types of mutation/mutants.

Unit-5

7 Hours

a) Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring. b) Large scale production fermenter design and its various controls. c) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin. d) Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substitutes.

Tutorials will be based on above syllabus.

Teaching hours: 15 Hours

Recommended Books (Latest edition):

1. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of Recombinant DNA: ASM Press Washington D.C.
2. RA Goldshy et. al., : Kuby Immunology.
3. J.W. Goding: Monoclonal Antibodies.
4. J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by Royal Society of Chemistry.
5. Zaborsky: Immobilized Enzymes, CRC Press, Degrand, Ohio.
6. S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell Scientific Publication.
7. Stanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology, 2nd edition, Aditya books Ltd., New Delhi.