M.Pharm Syllabus

Semester 01

Pharmaceutical Biotechnology

Subjects

Subject	PDF page	Open
Modern Pharmaceutical Analytical Techniques	2	Click here
Microbial and Cellular Biology	3	Click here
Bioprocess Engineering and Technology	5	Click here
Advanced Pharmaceutical Biotechnology	7	Click here
Pharmaceutical Biotechnology I	8	Click here

MPB101T - Modern Pharmaceutical Analytical Techniques

Theory

Unit 1

- UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy.
- IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy
- Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.
- Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.

Unit 2

- NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy.

Unit 3

- Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy

Unit 4

- Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following:
- Paper chromatography b) Thin Layer chromatography
- Ion exchange chromatography d) Column chromatography
- Gas chromatography f) High Performance Liquid chromatography
- Affinity chromatography

Unit 5

- Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following:
- Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing
- X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder diffration technique, Types of crystals and applications of X-ray diffraction.

MPB102T - Microbial and Cellular Biology

Theory

Unit 1

- Microbiology Introduction - Prokaryotes and Eukaryotes. Bacteria, fungi, actionomycetes and virus - structure, chemistry and morphology, cultural, physiological and reproductive features. Methods of isolation, cultivation and maintenance of pure cultures. Industrially important microorganisms - examples and applications

Unit 2

- Molecular Biology: Structure of nucleus and chromosome, Nucleic acids and composition, structure and types of DNA and RNA. Central dogma of molecular biology: Replication, Transcription and translation.
- Gene regulation Gene copy number, transcriptional control and translational control.
- RNA processing Modification and Maturation, RNA splicing, RNA editing, RNA amplification. Mutagenesis and repair mechanisms, types of mutants, application of mutagenesis in stain improvement, gene mapping of plasmids-types purification and application. Phage genetics, geneticorganization, phage mutation and lysogeny.

Unit 3

- Cell structure and function Cell organelles, cytoskeleton & cell movements, basic aspectsof cell regulation, bioenergetics and fuelling reactions of aerobics and anaerobics,secondary metabolism & its applications. Cell communication, cell cycle and apoptosis, mechanism of cell division. Celljunctions/adhesion and extra cellular matrix, germ cells and fertilization, histology - thelife and death of cells in tissues.
- Cell Cycle and Cytoskeleton Cell Division and its Regulation, G-Protein CoupledReceptors, Kinases, Nuclear receptors, Cytoskeleton & cell movements, IntermediateFilaments.
- Apoptosis and Oncogenes Programmed Cell Death, Tumor cells, carcinogens & repair.
- Differentiation and Developmental Biology Fertilization, Events of Fertilization, In vitro Fertilization, Embryonic Germ Cells, Stem Cells and its Application.

Unit 4

- Principles of microbial nutrition Physical and chemical environment for microbial growth, Stability and degeneration of microbial cultures.
- Growth of animal cells in culture General procedure for cell culture, Nutrient composition, Primary, established and transformed cell cultures, applications of cell cultures in pharmaceutical industry and research. Growth of viruses in cell culture propagation and enumeration. In-vitro screening techniques-cytotoxicity, anti-tumor, anti-viral assays.

Unit 5

- Microbial pathology Identifying the features of pathogenic bacteria, fungi and viruses.
- Mechanism of microbial pathogenicity, etiology and pathology of common microbial diseases and currently recommended therapies for common bacterial, fungal & viral infections.

- Mechanism of action of antimicrobial agents and possible sites of chemotherapy.

MPB103T - Bioprocess Engineering and Technology

Theory

Unit 1

- Introduction to fermentation technology Basic principles of fermentation Study of the design and operation of bioreactor Ancillary parts and function, impeller design and agitation, power requirements on measurements and control of dissolved oxygen, carbon dioxide, temperature, pH and foam.
- Types of bioreactor CSTR, tower, airlift, bubble column, packed glass bead, hollow fiber, configuration and application Computer control of fermentation process System configuration and application

Unit 2

- Mass transfer Theory, diffusional resistance to oxygen requirements of microorganisms, measurements of mass transfer co-efficient and factor affecting them, effects of aeration and agitation on mass transfer, supply of air, air compressing, cleaning and sterilization of air and plenum ventilation, air sampling and testing standards for air purity.
- Rheology Rheological properties of fermentation system and their importance in bioprocessing.

Unit 3

- Scale up of fermentation process Principles, theoretical considerations, techniques used, media for fermentation, HTST sterilization, advantage and disadvantage, liquid sterilization.
- Cultivation and immobilized culture system Cultivation system - batch culture, continuous culture, synchronous cultures, fed batch culture. Graphical plot representing the above systems.
- Introduction to immobilization Techniques, immobilization of whole cell, immobilized culture system to prepare fine chemicals. Immobilization of enzymes and their applications in the industry. Reactors for immobilized systems and perspective of enzyme engineering.

Unit 4

- Scale down of fermentation process Theory, equipment design and operation, methods of filtration, solvent extraction, chromatographic separation, crystallization turbidity analysis and cell yield determination, metabolic response assay, enzymatic assay, bioautographic techniques and disruption of cells for product recovery.
- Isolation and screening Primary and secondary, maintenance of stockculture, strain improvement for increased yield.

Unit 5

- Bioprocessing of the industrially important microbial metabolites
- Organic solvents - Alcohol and Glycerol
- Organic acids - Citric acids, Lactic acids,
- Amino acids - Glutamic acids, Lysine, Cyclic AMP and GMP
- Antibiotics - Penicillin, Streptomycin, Griseofulvin,

- Vitamins - B12, Riboflavin and Vitamin C Biosynthetic pathways for some secondary metabolites, microbial transformation of steroids and alkaloids Regulation governing the manufacturing of biological products .

MPB104T - Advanced Pharmaceutical Biotechnology

Theory

Unit 1

- Enzyme Technology Classification, general properties of enzymes, dynamics of enzymatic activity,sources of enzymes, extraction and purification, pharmaceutical,therapeutic and clinical application. Production of amyloglucosidase, glucose isomerase,amylase and trypsin.

Unit 2

- Genetic Engineering Techniques of gene manipulation, cloning strategies,procedures, cloning vectors expression vectors, recombinant selection andscreening, expression in E.coli and yeast.
- Site directed mutagenesis, polymerase chain reaction, and analysis of DNAsequences.
- Gene library and cDNA Applications of the above technique in the production of,
- Regulatory proteins - Interferon, Interleukins
- Blood products - Erythropoietin
- Vaccines - Hepatitis-B
- Hormones - Insulin

Unit 3

- Therapeutic peptides Study on controlled and site specified delivery of therapeutic peptides and proteins through various routes of administration.
- Transgenic animals Production of useful proteins in transgenic animals and gene therapy.
- Human Genome The human genome project-a brief study, Human chromosome - Structure and classification, chromosomal abnormalities - Syndromes

Unit 4

- Signal transduction Introduction, cell signaling pathways, Ion channels, Sensors and effectors, ON and OFF mechanisms, Spatial and temporal aspects of signaling, cellular process, development, cell cycle and proliferation, neuronal signaling, cell stress, inflammatory responses and cell death, signaling defects and diseases.
- Oncogenes Introduction, definition, various oncogenes and their proteins.

Unit 5

- Microbial Biotransformation Biotransformation for the synthesis of chiral drugs and steroids.
- Microbial Biodegradation Biodegradation of xenobiotics, chemical and industrial wastes, Production of single-cell protein, Applications of microbes in environmental monitoring.
- Biosensors Definition, characteristics of ideal biosensors, types of biosensors, biological recognition elements, transducers, application of biosensors.

MPB105P - Pharmaceutical Biotechnology I

Practical

- Analysis of Pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
- Simultaneous estimation of multi component containing formulations by UV spectrophotometry
- Experiments based on HPLC
- Experiments based on Gas Chromatography
- Estimation of riboflavin/quinine sulphate by fluorimetry
- Estimation of sodium/potassium by flame photometry
- Isolation and Purification of microorganism from the soil
- Microbial contamination of Water and biochemical parameters.
- Determination of Minimum Inhibitory concentration by gradient plate technique and serial dilution method.
- UV-survival curve and Dark repair
- Sterility test for pharmaceutical preparations
- Sub culturing of cells and cytotoxicity assays.
- Construction of growth curve and determination of specific growth rate and doubling time
- Fermentation process of alcohol and wine production
- Fermentation of vitamins and antibiotics
- Whole cell immobilization engineering
- Thermal death kinetics of bacteria
- Replica plating
- Bio-autography.
- Isolation and estimation of DNA
- Isolation and estimation of RNA
- Isolation of plasmids
- Agarose gel electrophoresis.
- Transformation techniques
- SDS - polyacrylamide gel electrophoresis for proteins
- Polymerase chain reaction technique.

First Hope

SYLLABUS

Click here to visit our website

PHARMACY SYLLABUS

Complete subject and semesters are available on FirstHope app only.

Scan or click here

Click here to get the app >

Available on Google Play

JOIN THE FIRSTHOPE COMMUNITY

Join our Telegram channel

Click here to join Telegram >

Scan or click here

@FirstHopeNotes

Instagram

@firsthope.official

Click here to follow >

YouTube channel

FirstHope-Pharmacy / Live streams

Click here to watch >

WhatsApp channel

Follow FirstHope on WhatsApp

Click here to join >

FirstHope website

firsthope.co.in

Click here to visit >

B.Pharm / D.Pharm / M.Pharm / Pharm.D

Explore complete subject and semester notes in the FirstHope app.