28-8-2012

Rajiv Gandhi Proudyogiki Vishwavidyalaya

M.Pharm. (Pharmaceutical Biotechnology)

3rd Semester Elective Course Contents

Elective-I

MPY-301 PBT : Cell and Molecular biology

UNIT-I

1. Membrane structure and Fuction : Structure of model membrane , lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, ion pumps, mechanism of shortings and regulation of intracellular transport, electrical properties of membrane.

2. Structure organization and function intracellular organells: Cell wall, nucleus, mitochondria, golgibodies, lysosomes, endoplasmic reticulam , peroxisomes, plasmids, vacuoles chloroplast , structure & fuction of cytoskeleton and its role in mobility.

UNIT-II

1. Organisation of gene and chromosomes: Operon, interrupted genes, gene families, structure of chromatin and chromosomes, unique and repetitive DNA, hetrochromatin, euchromatin transposons.

2. Cell division and cell cycle: Mitosis and meiosis, their regulation, steps in cell cycle, and control of cell cycle.

3. Microbial physiology: Growth yield and characteristics, strategies of cell division, stress response.

UNIT-III

1.Host parasite interaction: Recognition and entry processes of different pathogens like bacteria, viruses into animal and plant host cell , alternation of host cell behavior by pathogens, virus-induced cell transformation, pathogen-induced diseases in animal and plants, cell- cell fusion in both normal and abnormal cells.

2.cell signaling: Hormones and their receptor, cell surface receptor, signaling through G-Protein coupled receptors, signal transduction pathways, second messengers, regulation of signaling pathways, becterial and plant two compartment signaling system, bacterial chemotaxis and quorum sensing.

UNIT-IV

1.Cellular communication: Regulation of hematopoiesis, genral principal of cell communication, cell adhesion and role of different adhesion molecule, gap junction, extracellular matrix, integrins neurotransmission and its regulation.

2.Cancer: Genetic rearrangement in progenitor cells, oncogenes, tumor suppressor gene, cancer and the cell cycle, virus-induced cancer, metastatis, interaction of cancer cell with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth.

UNIT-V

1**. DNA replication, repair and recombination:** Unit of replication, enzyme involved, replication origin and replication frok, fidelity of replication, extrachromosomal replicon, DNA damage and repair mechanisms.

2. RNA synthesis and processing: transcription factor and machinery, formation of initiation complex transcription activator and repressors, RNA polymerases, capping, elongation and

termination , RNA processing, RNA editing, splicing, poly adenylation, structure and function of different type of RNA, RNA transport.

3.Protein synthesis and processing: Ribosome, formation of initiation complex, initiatin factor and their regulation, elongation and elongation factors, termination, genetic code, aminoacylation of tRNA, tRNA –identity, aminoacyle tRNA synthetase, translational proof-reading, translational inhibitors, post translational modification of proteins.

4. Control of gene expression at transcription and translation level: Regulation of phages, viruses, prokaryotic and eukaryotic gene, expression, role of chromatin in regulating gene expression and gene silencing.

Books recommended

1. Principles of Gene Manipulation: R W Old and S B Primrose
2. Cell and Molecular biology: S. P. Vyas and A. Mehta
3. Genes V and VI: Lewin Benjamin
4. Biochemical Engineering: F C Webb
5. Biochemical Engineering: R Steel
6. Immunoassays- Daniel W Chan and Marie T Perlstein
7. Pharmaceutical Biotechnology, S. P. Vyas and V. K. Dixit
8. Advances in Pharmaceutical Biotechnology: S. P. Vyas and H. D. Kumar
9. Gene Transfer and Expression Protocols- Methods in Molecular Biology, Vol VII, E T Murray (ed)
10. Current protocols in Molecular Biology, Vol. I and II: F M Asubel, John wiley Publishers
11. Current protocols in Cellular Biology, Vol. I and II, John Wiley Publishers
12. Biological Reaction Engineering: I J Dunn, E Heinzle, J ingham, J E Prenosil

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M.Pharm. (Pharmaceutical Biotechnology)

3rd Semester Elective Course Contents

Elective-II

MPY-302 PBT : Clinical Immunology

UNIT-I

Basic Principle:

a. Cells of the immune system.
b. Non specific immunity.
c. The specific immunologic response: Antigen and anti-body binding Immunoglobulins.
d. The humoral immune response.
e. The cellular immune response.
f. Regulation of immune response
g. The complement system : secondary messengers Signaling dynamics , Enzymes and cytokinins in Immunomodulation.
h. B Cell ; T cell ; specific receptor and cell signaling in T cell and B cell activation.

UNIT-II

Clinical/Pathological conditions involving immunological mechanisms:

a. Hypersensitivity.
b. Delayed hypersensitivity.
c. Immunomodulators.
d. Auto-immune diseases.

UNIT-III

Current concept in therapy and research of Immunotherapeutics for:

a. Treatment and management.
b. Tissue transplantations (Immunosuppresants and immunoenhancer)
c. Cancer.
d. Vaccines and sera.
e. Anti fertility drugs and vaccines.
f. Drug allergy.

UNIT-IV

Radioimmunoassay (RIA):

Enzyme multiplied Immuno assay techniques(EMIT)
Fluoroscence polarization Immuno assay(FPIA)
Enzyme linked immunosorbent Assay(ELISA)
Substrat labeled flouroscence Immunoassay(SLFIA)
Prosthetic group labeled Immunoassay(PGLI)

UNIT-V

Fc Receptor

Introduction structure and function of antibodies, conformation of antibodies, Fc8R family, Proteins, transcripts and genes: Gene, structure and action of high affinity. Fc receptor for immunoglobulin E. binding factors. E.
Fc -receptor mediated killing.
Fc -receptor on T and B lymphocytes; macrophages and RBCs.
Immunoglobulin binding factors, Cytokinins, Interleukins receptors and actions.

Books recommended

1. Biotechnology- The Biological Principles: MD Trevan, S Boffey, KH Goulding and P Stanbury.
2. Phamaceutical Biotechnology, S.P. Vyas and V K Dixit.
3. Advances in Pharmaceutical Biotechnolgy: SP Vyas and HD Kumar.
4. Immobilization of cells and enzymes: Hosevear Kennady Cabral and Bicker Staff
5. Virology: Fields.
6. Therapeutic Peptides and Proteins: Formulation, Processing and delivery systems: Ajay K Banga.
7. Modern Biotechnolgy: S.B. Primrose.
8. Immunology:Iweir.
9. Immunology: Ivan Roitt, Johnathan Bronstoff,David Male
10. Medical Microbiology: Mackie and Mac Cartney
11. Text book of Biotechnology: 3rd Ed,H.K.Das
12. S. P Vyas and D.V. Kohli, Methods in Biotechnology and Bioengineering, 2002, CBS Publishers, New Delhi, India.
13. Kuby Immunology, Thomas J. Kindt, Richard A Goldsby
14. Medical Immunology, Tristram G. Parslow, Lange Medical Books/McGraw-Hill Medical Publishing Division, 2001

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M.Pharm. (Pharmaceutical Biotechnology)

3rd Semester Elective Course Contents

Elective-III

MPY-303 PBT : Methods in Biotechnology

UNIT-I

Molecular biology and recombinant DNA methods: Isolation and purification of RNA, DNA (genomic and plasmid) and proteins, different separation methods; analysis of RNA, DNA and proteins by one and two dimensional gel electrophoresis, isoelectric focusing gels; molecular cloning of DNA or RNA fragments in bacterial and eukaryotic systems; expression of recombinant proteins using bacterial, animal and plant vectors; isolation of specific nucleic acid sequences; generation of genomic and cDNA libraries in plasmid, phage, cosmid, BAC and YAC vectors; in vitro mutagenesis and deletion techniques, gene knock out in bacterial and eukaryotic organisms; protein sequencing methods, deletion of post-translational modification of proteins; DNA sequencing methods, strategies for genomic sequencing.

UNIT-II

Histochemical and immunotechniques: Antibody generation, detection of molecules using ELISA, RIA, western blot, immunoprecipitation, flow-cytometry and immunofluorescence microscopy, detection of molecules in living cells, *in situ* localization by techniques such as FISH and GISH.

UNIT-III

Biophysical methods: Analysis of biomolecules using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy, structure determination using X-ray diffraction and NMR; analysis using light scattering, different types of mass spectrometry and surface plasma resonance methods.

UNIT-I V

Radiolabelling techniques: Properties of different types of radioisotopes normally used in biology, their detection and measurement; incorporation of radioisotopes in biological tissue and cells, molecular imaging of radioactive material, safety and guidelines.

UNIT-V

Advanced microscopic techniques: Visualization of cells and subcellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, different fixation and staining techniques for EM, freeze-etch and freeze-fracture methods for EM, image processing methods in microscopy, atomic force microscopy; principle, resolution and application.

Books recommended

1. S. P Vyas and V. K Dixit, Pharmaceutical Biotechnology, 1998, CBS Publishers, CBS Publishers, New Delhi, India.
2. S. P Vyas and D.V. Kohli, Methods in Biotechnology and Bioengineering, 2002, CBS Publishers, New Delhi, India.

3. S.P Vyas and H.D. Kumar, Advances in Pharmaceutical Biotechnology, 2010 , CBS Publishers, New Delhi, India.
4. S.P. Vyas and A. Mehta, Cell and Molecular Biology 2010 ,CBS Publishers, New Delhi, India.
5. Text book of Biotechnology: 3rd Ed, H.K. Das
6. Modern Biotechnolgy: S.B. Primrose
7. Immunology:Iweir
8. Immunology: Ivan Roitt, Johnathan Bronstoff,David Male
9. Immunoassays- Daniel W Chan and Marie T Perlstein
10. Kuby Immunology, Thomas J. Kindt, Richard A Goldsby
11. Medical Immunology, Tristram G. Parslow, Lange Medical Books/McGraw-Hill Medical Publishing Division, 2001

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M.Pharm. (Pharmaceutical Biotechnology)

3rd Semester Elective Course Contents

Elective-IV

MPY-304 PBT : System and Regenerative Cell Biology

UNIT-I

Somatic and Germline Engineering : Culture media ; factors; hormones pH; temperature; ionic balance; essential aminoacid; serum, co-factors etc. Primary cell culture, Secondary cell culture, Cell transformation, immortalization and some established cell lines.

UNIT-II

Cell population growth; inhibition by contact, in suspension culture and solid substrates culture, Embryoculture, transplantation and teratogenesis. Stem cell culture; organogenesis; tissue engineering on biocompatible polymeric templates; surrogate RBC's (prepared by rDNA technology) somatic cell fusion and somatic cell genetics; mammalian cloning technology.

UNIT-III

Tissue Engineering : scaffolds for tissue fabrications- materials for scaffolds-material for hydrogel scaffolds-scaffold fabrication technologies-textile technologies—particulate leaching techniques-phase separation-design of three-dimensional pore architecture-nano-featured and bioactive scaffold-nano-fiber scaffolds-nano composite scaffolds-bioactive scaffold-scaffold for stem cells-micro and nanopatterned scaffold-scaffolds and stem cells-engineering biomaterial to control cell function-building structure into engineered tissues-fibrous protein and tissue engineering.

UNIT-IV

DNA transplantation/transduction using chemical;electrical and mechanical method. Endoosmolytic apart and adjuvants their mechanism of action and role in cytosolic drug/DNA/protein delivery.

UNIT-V

Different cell organelle,separation by gradient centrifugation technique and staining of nucleus , endosomes, mitochondrial and microscopic evaluation;principles of imaging.

Books recommended

1. Industrial Biotechnology: L E Casida
2. Industrial Biotechnology: B M Miller and W Litsky
3. Microbial Technology Vols j and II: H Peppler
4. Advances in Pharmaceutical Biotechnology: Vyas and Kumar
5. Biochemistry of Industrial Microorganisms: C Rainbow and A H Rose
6. Animal Cell Culture: Ian Freshney
7. Microbial Genetics: David Friefelder
8. Biochemical Engineering Fundaments: Bailey and Ollis
9. Biotechnology of Antibiotics and Other Bioactive Microbial Metabolites: Giancarlo Lancini and Roland Lorenzetti
10. Enzyme assays- A Practical Approach: Robert Eisenthal and Michael J Danson

11. S. P Vyas and V. K Dixit, Pharmaceutical Biotechnology, 1998, CBS Publishers, CBS Publishers, New Delhi, India.
12. S. P Vyas and D.V. Kohli, Methods in Biotechnology and Bioengineering, 2002, CBS Publishers, New Delhi, India.
13. S.P Vyas and H.D. Kumar, Advances in Pharmaceutical Biotechnology, 2010 , CBS Publishers, New Delhi, India.
14. Current protocols in Molecular Biology, Vol. I and II: F M Asubel, John wiley Publishers
15. Current protocols in Cellular Biology, Vol. I and II, John Wiley Publishers