Jiwaji University, Gwalior-474011
(Madhya Pradesh)

Syllabus

PG Diploma in Biochemistry
(2025-26)

01 Year PG Diploma Programme
NEP 2020, Ordinance No – 14(2)

19/09/2025

For 1-Years PG Diploma Programme

Scheme A-1
PG Diploma in Biochemistry – Major Practicum Component

Year / Semester		Course Type			Total Credits
		Core Courses	**Practicum Courses**	**Internship/ Apprenticeship/ Seminar Or VAC (CHM/EESC)**	
First Year	**Sem-I**	CC-11: Biomolecules and Bioinstrumentation (6 Credits)	PC-11 Biomolecules and Bioinstrumentation (4 Credits)	Internship/ Apprenticeship/ Seminar (2 Credits)	22
		CC-12: Cell Biology and Immunology (6 Credits)	PC-12: Cell Biology and Immunology (4 Credits)		
	Sem – II	CC-21 Molecular Biology and Recombinant DNA Technology (6 Credits)	PC-21 Molecular Biology and Recombinant DNA Technology (4 Credits)	VAC (CHM/EESC) (2 Credits)	22
		CC-22: Intermediary Metabolism And Enzymology (6 Credits)	PC-22: Intermediary Metabolism And Enzymology (4 Credits)		

Jiwaji University, Gwalior

For 1 Year PG Diploma Programme in Biochemistry
NEP 2020, Ordinance No. – 14(2)

Scheme A-1 PG Diploma in Biochemistry – Major Practicum Component

Course Structure and Scheme of Examination

First Year

PG Diploma in Biochemistry I Semester

S. No.	Course Code	Course Name	Total Marks	Credit (s)	End Semester Exam Marks		Internal Marks	
					Max.	Min.	Max.	Min.
1.	CC-11	Biomolecules and Bioinstrumentation	100	6	60	24	40	16
2.	CC-12	Cell Biology and Immunology	100	6	60	24	40	16
3.	PC-11	Biomolecules and Bioinstrumentation	100	4	60	24	40	16
4.	PC-12	Cell Biology and Immunology	100	4	60	24	40	16
5.		Internship/Apprenticeship or Seminar	100	2	-	-	100	40
		Grand Total	500	22				

19/09/2025

Jiwaji University, Gwalior

For 1 Year PG Diploma Programme in Biochemistry
NEP 2020, Ordinance No. – 14(2)

Scheme A-1 PG Diploma in Biochemistry – Major Practicum Component

Course Structure and Scheme of Examination

First Year

PG Diploma in Biochemistry II Semester

S. No.	Course Code	Course Name	Total Marks	Credit (s)	End Semester Exam Marks		Internal Marks	
					Max.	Min.	Max.	Min.
1.	CC-21	Molecular Biology and Recombinant DNA Technology	100	6	60	24	40	16
2.	CC-22	Intermediary Metabolism And Enzymology	100	6	60	24	40	16
3.	PC-21	Molecular Biology and Recombinant DNA Technology	100	4	60	24	40	16
4.	PC-22	Intermediary Metabolism And Enzymology	100	4	60	24	40	16
5.		VAC (CHM/EESC)	100	2	100	40	-	-
		Grand Total	500	22				

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19/09/2025

CC-11: Biomolecules and Bioinstrumentation (Theory Course)

Total Hrs: 90 **Credit: 6**

UNIT I

1. Classification of carbohydrates, structure and function of monosaccharides, disaccharides
2. Homo and hetero-polysaccharides: Structure, types and functions
3. Glycoconjugates: Proteoglycans, Glycoproteins, Glycolipids: Structure and biological roles.of carbohydrates as informational molecules
4. Lipids: Types, structure, properties and biological roles; Fatty acids, saponifiable and non-saponifiable lipids
5. Lipoprotein, lipopolysaccarides and other hybrid molecules: Types, properties and functions

UNIT II

1. Amino acids : Structure, classification, abbreviations, properties and functions, peptides and polypeptides, Synthesis of peptides and protein sequencing
2. Proteins : Properties, covalent structure, secondary, tertiary and quaternary structure
3. Enzymes : Classification, mechanism of action, allosteric enzymes, multienzyme complex and basic concepts of Enzyme kinetics
4. Water soluble vitamins : Structure, distribution, interaction and biological functions
5. Fat soluble vitamins: Structure, distribution, interaction and biological functions

UNIT III

1. Nucleotides : Structure of purine and pyrimidine bases, nucleosides, nucleotides
2. DNA : Structure and Conformation, denaturation, degradation, modification, repair, recombination and rearrangement
3. RNA : Structure, types and functions Centrifugation: Basic principle, type, instrumentation and applications
4. Spectroscopy: Basic principles of colorimetry, and UV visible spectrophotometry, instrumentation and applications; Infra red spectroscopy – Principle, instrumentation and applications
5. Fluorimetry: Principle, instrumentation and applications

UNIT IV

1. Chromatography: Principle, types, instrumentation and applications
2. Affinity chromatography, HPLC and FPLC
3. Electrophoresis: Principle, types and applications, Isoelectricfocussing and isotachophoresis – Principle & Applications
4. Atomic absorption and flame emission spectroscopy: Principle, instrumentation and applications
5. Polarimetry, ORD and CD: Principle, instrumentation and applications

UNIT V

1. NMR and ESR: Principle, instrumentation and applications
2. X ray crystallography: Principle, instrumentation and applications
3. Mass Spectrometry: Principal, Mass Analyzers and Applications
4. Microscopy: Light, phase contrast, interference, fluorescence and polarization microscopy, Electron microscopy: Principle and Applications, Confocal Microscopy: Principle and Applications
5. Radioactivity: Principle, Geiger Muller Counter, liquid scintillation counter, solid scintillation counter, gamma counter

19/09/2025

Suggested Readings:

1 Principles of Biochemistry by Nelson, Cox and Lehninger
2 Biochemistry by G. Zubay
3 Biochemistry by Stryer
4 Biochemistry by Garrett and Grisham
5 Biochemistry, D Voet and JG. Voet , J Wiley and Sons.
6 Biochemistry, D Freifilder, W.H. Freeman & Company.
7 Laboratory Techniques in Biochemistry and molecular Biology, Work and Work
8 A Biologist's guide to Principles and Techniques of Practical Biochemistry, Wilson & Goulding
9. Physical Biochemistry: Applications to Biochemistry and Molecular Biology by Freifelder
10. Biochemical Techniques: Theory and Practice by Robyt and White
11. Principles of Instrumental Analysis by Skoog and West
12. Analytical Biochemistry by Holme and Peck
13. Biological Spectroscopy by Campbell and Dwek
14. Organic Spectroscopy by Kemp
15. A Biologist's Guide to Principles and Techniques of Practical Biochemistry by Wilson and Goulding
16. Principles of Instrumental Analysis by Skoog, Hollar and Nicman

19/09/2025

PC-11: Biomolecules and Bioinstrumentation (Practicum Course)

Total Hrs: 60 **Credit: 4**

1 Qualitative analysis of carbohydrates
2 Qualitative analysis of proteins & amino acids,
3 Qualitative analysis of lipids,
4 Analysis of oils : iodine number, saponification value, acid number
5 Titration of amino acids
6 Colorimetric determination of pKa
7 Quantitative estimations of proteins- Biuret, Bradford, Lowery's, Spectrophotometric
8 Quantitative estimation of Carbohydrates
9 Verification of Beer's law
10 Determination of absorption maxima
11 Electrophoresis of Proteins-native and under denaturing conditions.
12 Amino acid and carbohydrate separations by paper & thin layer chromatography
13 Gas chromatography
14 Ion exchange and gel filtration chromatography
15 Separation of blood cells by density gradient centrifugation

Suggested Readings:

1. Plummer, D.T – An Introduction to Practical Biochemistry, Tata McGraw-Hill, 3rd Edition, ISBN (eBook)-9780070994874, P Book-0070994870
2. Jayaraman, J – Laboratory Mannual in Biochemistry, New Age International, 2nd Edition, ISBN (eBook)-9788122420976, P Book-8122420978
3. Varley, H., Gowenlock, A.H. and Bell, M. – Practical Clinical Biochemistry, CBS Publishers & Distributors, 6th Edition, ISBN (eBook)-9788123904871, P Book-8123904875
4. Sadasivam, S. & Manickam, A. – Biochemical Methods, New Age International, 2nd Edition, ISBN (eBook)-9788122418393, P Book-8122418399
5. Wilson, K. & Goulding. K.S. – Principles & Techniques of Practical Biochemistry, 4th Edition, ISBN (eBook)-9780340555750, P Book-0340555750

19/09/2015

CC-12: Cell Biology and Immunology (Theory Course)

Total Hrs: 90 **Credit: 6**

UNIT I

1. Cellular and Chemical Foundations of Life; Comparative Study of Prokaryotic & Eukaryotic Cells
2. An overview of Tools & Techniques used in Cell Biology; Experimental Models to study cell and molecular biology
3. Cell Membrane: Physicochemical Properties; Molecular Organization – asymmetrical organization of lipids, proteins and carbohydrates; and Functions, Molecular Models and Biogenesis of Cell Membrane
4. Transport of Small Molecules Across Cell Membranes: Types and Mechanism, Active Transport by ATP-Powered Pumps: Types, properties and mechanisms
5. Transport of proteins into mitochondria, chloroplast, endoplasmic reticulum and nucleus

UNIT II

1. Processing of Proteins in Endoplasmic Reticulum and Golgi Apparatus
2. Transport by vesicle formation: Endocytosis and Exocytosis,
3. Mechanism of vasicular transport
4. Intracellular Digestion: Ultra structure and Functions of Lysosomes, peroxisomes
5. Cell Motility and Shape: Structure and Functions of Microfilaments, microtubules and intermediate filaments

UNIT III

1. Intracellular communication through cell junctions: Structure, organization and functions of Occluding Junctions, Anchoring Junctions and Communicating Junctions
2. Molecular Mechanism of Cell-Cell Adhesion: Ca^{++} dependent and Ca^{++} independent cell-cell adhesion, Extra-cellular Matrix & their receptors in Animals: Molecular Composition, Organization and Functions; Integrins: Molecular Structure, Types and Distribution: Cell Signaling: Overview, signaling pathways and signaling in plants
3. Immune response: Innate immune mechanisms and characteristics of adaptive immune response: Antigens, epitopes, Hepten: Factors affecting immunogenicity, Super antigens, Anatomical organization of immune system: Primary lymphoid and Secondary lymphoid organs. Ontogeny and Phylogeny of lymphocytes, Lymphocyte traffic
4. Cell of the immune system: Hematopoiesis, Mononuclear cells and granulocytes, Antigen presenting cells, Lymphocytes and their subsets; Inflammation; its mediators and the process, Cell adhesion molecules and their role in inflammation, lymphocyte homing, tissue injury and immune response leading to an inflammatory reaction, role of anaphylatoxins, granulocytes in inflammatory process
5. Major histocompatibility systems: Structure of MHC I and II molecules, polymorphism, distribution variation and function. Organization of MHC complex in Mouse and Humans. Association of MHC with disease; Recognition of antigens by T and B Cells: Antigen processing, Role of MHC molecules in antigen presentation and Co-stimulatory signals; T – cell receptor complex, T-cell accessory membrane molecules, activation of T cells, Organization and arrangement of T-receptor genes

UNIT IV

1. B-cell receptor complex, Activation of B-cells, Immunoglobulins: Molecular structure, types and functions. Antigenic determinants on immunoglobulins; Molecular mechanism of antibody diversity: Organization of genes coding for constant and variable regions of heavy chains and light chains. Mechanisms of antibody diversity, Class switching; Antigen-Antibody interaction, avidity & affinity measurement

19/09/2023

2. Monoclonal antibodies: Production, characterization and applications in diagnosis, therapy and basic research, Antibody engineering; Complement system, components, activation pathways, and regulation of activation pathways, Complement deficiencies, Role of complement system in immune responses
3. Cytokines: Structure and functions, cytokine receptors, signal transduction mediated by cytokine receptors, cytokine regulation of immune responses, cytokine related diseases and therapeutic applications of cytokines, Cytotoxic T cells and their mechanism of action, NK cells and mechanism of target cell destruction.
4. Antibody dependent cell mediated cytotoxicity, Delayed type hypersensitivity. Techniques of Cell mediated immunity
5. Immunoregulation mediated by antigens, antibodies, immune complexes

UNIT V

1 Hypersensitivity: Definition, IgE mediated hypersensitivity, mechanism of mast cell degranulation, mediators of type-I reactions and consequences. Type II reactions, Immune complex mediated hypersensitivity and Delayed type hypersensitivity
2. Autoimmunity: Organ specific diseases, Systemic diseases, Mechanisms of autoimmunity and therapeutic approaches
3. Immunodeficiency syndromes: Primary immunodeficiencies and Secondary immunodeficiencies and their diagnosis and therapeutic approaches
4. Vaccines: Active and passive immunization, Whole organism vaccines, Macromoleculesas vaccines, Recombinant-vector vaccines, DNA Vaccines, Synthetic peptide vaccines and sub-unit vaccines
5. Immunodiagnostics : Precipitation techniques, Agglutination, Fluorescence techniques, ELISA, RIA, Western blotting and Immno-histochemical techniques

Suggested Readings

1. Molecular Biology of the Cell, Alberts, *et al*
2. Molecular Cell Biology, Lodish, et al
3. Working with Molecular Cell Biology: A study Companion, Storrie *et al*
4. Cell and Molecular Biology: Concepts and Experiments, Gerald Karp
5. The Cell: A Molecular Approach, G.M. Cooper
6. The Word of the Cell, Becker *et al*
7. Cell Proliferation and Apoptosis, Hughes and Mehnet
8. Essential Cell Biology, Alberts *et al*
9. Biochemistry and Molecular Biology of Plants, Buchanan *et al*
10. Harpers Biochemistry Murray *et al*
11. Kubey, Immunology, R.A. Goldsby, Thomas J. Kindt, Barbara, A. Osbarne. (Freeman).
12. Immunology-A short Course, -Eli Benjamini, Richard Coico, Geoffrey Sunshine.
13. Immunology by Tizzard
14. Fundamentals of immunology by William Paul.
15. Immunology by Roitt *et al*
16. Immunology by Abbas

19/09/2025

PC-12: Cell Biology and Immunology (Practicum Course)

Total Hrs: 60 **Credit: 4**

1. Sub cellular fractionation
2. Chromosome Preparation: Mitosis – Onion root tip, rat/mouse cornea, rat/mouse bone marrow, human lymphocytes
3. Chromosome Preparation: Meiosis – Rat/mouse testis, Grasshopper testis
4. Polytene chromosome preparation from Drosophila salivary gland
5. Identification of tissue typing: Histological preparation of tissue
6. Identification of different biomolecules in different tissues by histochemical techniques
7. Electron microscopy: Demonstration and good photographs for interpretation
8. Blood Film preparation and identification of cells.
9. Double diffusion and Counter Immunoelectrophoresis.
10. Immuno-electrophoresis; Radial Immunodiffusion.
11. Agglutination techniques: Direct & Indirect
12. Immunization and production of polyclonal antibodies
13. ELISA
14. Western –blotting.

Suggested Readings:

1. Chaitanya, K.V. – Cell and Molecular Biology: A Lab Manual, PHI Learning, ISBN (e Book)-9789354432613, P. Book-9788120348004
2. Varley, H., Gowenlock, A.H.. and Bell, M. – Practical Clinical Biochemistry, Heinemann Medical Books, 6th Ed, ISBN 9788123914991
3. Vasudevan, D.M., Sreekumari, S. and Vaidyanathan, K. – Textbook of Biochemistry for Medical Students, Jaypee Brothers Medical Publishers, 8th Edition, ISBN (eBook)-9789354657630, P Book-9789354657630

19/09/2025

CC-21: Molecular Biology and Recombinant DNA Technology
(Theory Course)

Total Hrs: 90 **Credit: 6**

UNIT I

1. DNA Replication : General features of Replication; DNA Replication Machinery in Prokaryotes & Eukaryotes
2. Enzymology of DNA Replication : DNA Polymerases; Primases; Ligases; Helicases; Topoisomerases; Gyrases and Single Stranded Binding Proteins and Regulation of DNA Replication
3. Transcription in Prokaryotes : Initiation, elongation and termination and Structure and functions of prokaryotic promoter; Structure and functions of RNA Polymerase; Sigma factors – Types and functions;
4. Control of Transcription in Prokaryotes: Intrinsic termination and rho factor dependent termination; attenuation and antitermination
5. Regulation of Gene Expression in Prokaryotes : Operon concept, induction and repression, Structure and regulation of lactose and tryptophan operons

UNIT II

1. Transcription in Eukaryotes : RNA Polymerases – Types and properties; Promoter – Types, structure and properties;
2. Transcription factors – Types and properties; Enhancers – Structure and properties; Response Elements,
3. Post-transcriptional Modification Eukaryotes – 5' and 3' modification of mRNA
4. Post-transcriptional Processing of pre tRNA, pre mRNA transcripts, pre rRNA and Catalytic RNA
5. Genetic Code: Evidence and properties; Wobble hypothesis; Translational adaptors and amino acyl tRNA synthetases;

UNIT III

1. Translation: Successive stages of protein synthesis in prokaryotes and its comparison with eukaryotes; Post-translational Modification: Types and Significance
2. Regulation of Gene Expression in Eukaryotes: *cis*-acting DNA Elements; Chromatin organization and regulation of gene expression; Regulation at the level of processing of transcripts; RNA Editing; DNA methylation and gene regulation; Regulation of gene expression by hormones; Regulation of gene expression at translational level
3. General concept, principle and applications of Recombinant DNA Technology; Enzymes: Nucleases and restriction endonucleases – properties and types; phosphomonoesterases; polynucleotide kinase; DNA ligase; DNA polymerase I; RNA Dependent DNA Polymerase; terminal deoxynucleotidyl transferase; poly A polymerase
4. Prokaryotic host-vector system: Characteristics of *E. coli* as host; vectors for cloning in *E. coli* (plasmid, bacteriophage and plasmid- phage); Other Prokaryotic host vector systems: Characteristics of Gram positive and Gram negative organisms as host and suitable vectors for cloning
5. Shuttle vectors: Features and Applications, Expression vectors for cloning in prokaryotes: Features and Applications, Factors affecting expression of cloned genes in prokaryotes

Approved
19/09/2019

UNIT IV

1. Cloning in Yeast: Properties of yeast as host for cloning and different types of vectors designed for cloning in yeast
2. Cloning in animals system: Animal system as a model host, Methods of introduction of foreign DNA in animal system;
3. Vectors for cloning in animal system – SV 40, bovine papilloma virus, adenovirus, vaccinia virus, baculovirus and retrovirus vectors
4. Methods for Constructing rDNA and cloning: Inserts; vector insert ligation; infection, transfection and cloning; Methods for selection and screening of recombinant clones
5. DNA Libraries: Types, advantages and disadvantages of different types of libraries; Different methods for constructing genomic and full length cDNA libraries

UNIT V

1. Gross anatomy of cloned insert – size, restriction mapping and location
2. Fine anatomy of DNA segment – General principle of chemical and enzymatic methods of nucleotide sequence analysis
3. Localization of cloned segments in genomes – molecular and chromosomal location; Methods for determination of copy number of a cloned gene in genome
4. Mutant construction: Introduction, deletion, insertion and point mutation
5. Biosafety Measures and Regulations for Genetically Engineered Products

Suggested Readings

1. Lewin's Genes XII
2. Molecular Biology by Tropp
3. Molecular Biology by Turner *et al*
4. Cell and Molecular Biology: Concepts and Experiments by Gerald Karp
5. Transcriptional Regulation in Eukaryotes by Carey and Smale
6. Translational control of gene Expression by Sonenberg *et al*
7. Chromatin and Gene Regulation by Turner
8. An Introduction to Genetic Analysis by Griffiths *et al*
9. Genome by T.A. Brown
10. Concepts of Genetics by Klug and Cummings
11. Proteins by Creighton
12. Molecular Cell Biology by Lodhish *et al*
13. Principles of Gene Manipulation and Genomics by Primrose & Twyman
14. Gene Cloning & DNA Analysis: An introduction by T.A. Brown
15. Recombinant DNA – By Watson et al
16. Biotechnology: Theory and Techniques (Vol I & II), by Chirikjian
17. Molecular Genetics of Bacteria by Dale
18. Molecular Cloning (Vol I, II & III) by Sambrook & Russell
19. Applied Molecular Genetics, by Miesfeld
20. Genes and Genome by Singer & Berg
21. Molecular Biotechnology by Glick & Pasternak
22. Plant Molecular Biology (Vol I & II) by Gilmartin & Bowler

19/09/2025

PC-21: Molecular Biology and Recombinant DNA Technology (Practicum Course)

Total Hrs: 60 **Credit: 4**

1. Isolation of genomic DNA and restriction digestion
2. Size fractionation of restricted DNA fragments by Agarose Gel Electrophoresis
3. Quantitation of DNA
4. Determination of Amax of purified DNA fragments
5. Determination of Tm of nucleic acid
6. Isolation of RNA
7. Fractionation of poly $(A)^+$ RNA
8. Bacterial Culture and antibiotic selection media. Preparation of competent cells
9. Isolation of plasmid DNA
10. Restriction digestion of plasmid DNA and analysis
11. Cloning in plasmid vectors
12. Gene expression in *E .coli* and analysis of gene product
13. Polymerase Chain Reaction

Suggested Readings

1. Lewin's Genes XII
2. Molecular Biology by Tropp
3. Cell and Molecular Biology: Concepts and Experiments by Gerald Karp
4. An Introduction to Genetic Analysis by Griffiths *et al*
5. Principles of Gene Manipulation and Genomics by Primrose & Twyman
6. Gene Cloning & DNA Analysis: An introduction by T.A. Brown
7. Recombinant DNA – By Watson et al
8. Biotechnology: Theory and Techniques (Vol I & II), by Chirikjian
9. Molecular Cloning (Vol I, II & III) by Sambrook & Russell
10. Molecular Biotechnology by Glick & Pasternak

19/09/2025

CC-22: Intermediary Metabolism and Enzymology (Theory Course)

Total Hrs: 90 **Credit: 6**

UNIT I

1. First and second laws of thermodynamics
2. Concept of free energy, ATP Cycle, ATP as high energy compound, functions of ATP
3. Other high energy biological compounds
4. Basic Concepts of intermediary metabolism
5. Carbohydrate metabolism: Glycolysis, Kreb's cycle, glycogenolysis, glycogenesis, pentose phosphate pathway, glyconeogenesis, glyoxalate pathway

UNIT II

1. Regulation of carbohydrate metabolism
2. Inborn errors of carbohydrate metabolism
3. Electron transport and oxidative phosphorylation
4. Biosynthesis and degradation of lipids
5. Regulation of lipid metabolism and Inborn errors of lipid metabolism

UNIT III

1. Nitrogen assimilation
2. Biosynthesis and degradation of amino acids and regulation of amino acid metabolism; Inborn errors of amino acid metabolism
3. Nucleic acid metabolism; Inborn errors of nucleic acid metabolism and Integration of metabolism and metabolomics
4. Enzyme: Historical aspects, classification and nomenclature, EC number; Mechanism of enzyme catalysis and action
5. Sub cellular localization and organization of enzymes; Methods of enzyme assay: continuous and sampling techniques, coupled enzyme assay and methods and significance of enzyme turnover number; specific activity

UNIT IV

1. Enzyme purification techniques: objectives and strategy; methods of homogenization; method of isolation; purification and crystallization
2. Criteria of purity and tabulation of purification data; stable storage of enzymes; Characterization of purified enzyme
3. Coenzymes, Cofactors and Isoenzymes
4. Enzyme Kinetics: Equilibrium and steady state theory, rate equation and determination of Km and Vmax, Factors affecting rate of enzyme reaction: pH, temperature and pressure
5. Enzyme inhibition: reversible and irreversible inhibition, their type, inhibitor constant and its significance; Rapid reaction techniques, Efficiency of enzymes in non-aqueous environment

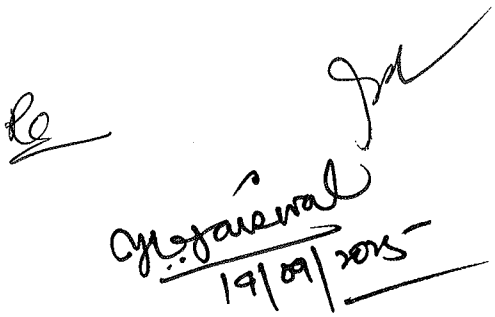
UNIT V

1. Protein-ligand binding: types, cooperativity, Hill and Scatchard plot, Allosteric enzymes: Models of allostery, types and kinetics, Regulation of enzymes
2. Mechanism of action of Chymotrypsin; Ribonuclease; Lysozyme; Metallo-enzymes
3. Enzymes during aging and Degradation of enzymes
4. Enzyme immobilization; techniques; experimental procedures and effect of immobilization on kinetic parameters
5. Principle and Industrial application of immobilized systems, Biosensors, Enzymes in Medical diagnosis and enzyme therapy

19/09/2025

Suggested Readings

1. Principles of Biochemistry by Nelson, Cox and Lehninger
2. Biochemistry by G. Zubay
3. Biochemistry by Stryer
4. Biochemistry by Garrett and Grisham
5. Biochemistry, D Voet and JG. Voet , J Wiley and Sons.
6. Biochemistry, D Freifilder, W.H. Freeman & Company.
7. Laboratory Techniques in Biochemistry and Molecular Biology, Work and Work
8. A Biologist's guide to Principles and Techniques of Practical Biochemistry, Wilson & Goulding
9. The Nature of Enzymology by R.L. Foster
10. Enzymes by Dixon and Webb
11. Fundamentals of Enzymology by Price and Stevens
12. Enzyme Catalysis and Regulation by Hammes
13. Enzyme Reaction Mechanisms by Walsch
14. The Enzymes vol I and II by Boyer
15. Enzyme Structure and Mechanism by Alan Fersht
16. Enzyme Assays: A Practical Approach by Eisenthal and Danson
17. Enzyme Biotechnology by G. Tripathi



PC-22: Intermediary Metabolism and Enzymology (Practicum Course)

Total Hrs: 60 **Credit: 4**

1. To observe the catabolism of carbohydrates by micro-organisms
2. To observe the production of gas by micro-organisms during fermentation
3. To demonstrate the production of pyruvate and acetaldehyde during fermentation of glucose by yeast
4. To demonstrate biological oxidation and electron transport in heart muscle tissue
5. To observe the effect of fasting on the metabolism of rats
6. Urease estimation in plant tissues
7. Assay of Acid phosphatase in plant seeds
8. Assay of Alkaline phosphatase in Kidney and Liver
9. Determination of optimum pH, temperature & time
10. Determination of Km value of alkaline phosphatase
11. Acetylcholinesterase estimation in Rat /Goat Brain
12. Enzyme purification: Ammonium sulphate precipitation, Ion exchange chromatography, molecular sieve chromatography.
13. Determination of purity of enzyme by PAGE
14. Determination of molecular weight of enzyme by Gel Filtration
15. Immobilization of HRP (Horse reddish peroxidase).
16. Sub-cellular fractionation of rat liver and marker enzyme assays.

Suggested Readings

1. Principles of Biochemistry by Nelson, Cox and Lehninger
2. Laboratory Techniques in Biochemistry and Molecular Biology, Work and Work
3. A Biologist's guide to Principles and Techniques of Practical Biochemistry, Wilson & Goulding
4. The Nature of Enzymology by R.L. Foster
5. The Enzymes vol I and II by Boyer
6. Enzyme Assays: A Practical Approach by Eisenthal and Danson

19/09/2025