

Biomolecules

Unit - I : Biophysical Concepts

12 hours

Water as a biological solvent and its role in biological processes. Biological relevance of pH. Henderson-Hasselbalch equation. Importance of buffers in biological systems. Donnan membrane equilibrium.

Unit - II : Carbohydrates

12 hours

Carbohydrates: Classification, monosaccharides, D and L designation, open chain and cyclic structures, epimers and anomers, mutarotation, reactions of carbohydrates (due to functional groups - hydroxyl, aldehyde and ketone). Structure and biological importance of disaccharides (sucrose, lactose, maltose), structural polysaccharides (cellulose, chitin, pectin) and storage polysaccharides (starch, inulin, glycogen), Bacterial cell wall polysaccharides blood group substances.

Unit - III Lipids

12 hours

Lipids: Classification, saturated and unsaturated fatty acids, structure and properties of fats and oils (acid, saponification and iodine values, rancidity). General structure and functions of phospholipids, sphingolipids and cholesterol. Prostaglandins- structure and biological role of PGD₂, PGE₂ and PGF₂.

Biomembranes: Membrane composition and organization - Fluid mosaic model.

Unit-IV : Amino Acids and Peptides

12 hours

Amino Acids: Classification, structure, chemical reactions of amino acids due to carbonyl and amino groups. Titration curve of glycine and pK values. Essential and non-essential amino acids, non-protein amino acids. Peptide bond - nature and conformation. Naturally occurring peptides - glutathione.

Unit-V : Proteins

12 hours

Proteins: Classification based on solubility, shape and function. Determination of amino acid composition of proteins. General properties of proteins, denaturation and renaturation of proteins. Structural organization of proteins- primary, secondary, tertiary and quaternary structures (Eg Hemoglobin and Myoglobin), forces stabilizing the structure of protein.

Revised





B.Sc. BIOCHEMISTRY SEMESTER-II SYLLABUS
(w.e.f. 2017-2018)

Module-II: Nucleic acids and Biochemical Techniques

Unit-I : Nucleic Acids

12 hours

Nature of nucleic acids. Structure of purines and pyrimidines, nucleosides, nucleotides. Stability and formation of phosphodiester linkages. Structure of Nucleic acids- Watson-Crick DNA double helix structure, introduction to circular DNA, super coiling, denaturation of nucleic acids- hyperchromic effect, T_m -values and their significance. Reassociation kinetics, cot-curves and their significance. Types of RNA and DNA.

Unit-II: Porphyrins

9 hours

Structure of porphyrins; Protoporphyrin, porphobilinogen. Properties -identification of Porphyrins. Structure of metalloporphyrins – Heme, cytochromes and chlorophylls.

Unit-III: Biochemical Techniques I

15 hours

Principle and applications of centrifugation techniques- differential, density gradient.

Ultracentrifugation-preparative and analytical.

Principle and applications of chromatographic techniques- paper, thin layer, gel filtration, ion- exchange and affinity chromatography.

Electrophoresis- principles and applications of paper, SDS PAGE

Unit-IV: Biochemical Techniques II

12 hours

Colorimetry and Spectrophotometry- Laws of light absorption- Beer-Lambert law. UV and visible absorption spectra, molar extinction coefficient, biochemical applications of spectrophotometer.

Tracer techniques; use of radioactive isotopes in biology.

Unit- V : Techniques employed in metabolic studies 12 hours

Broad outlines of Intermediary metabolism, methods of investigation, intermediary metabolism in vivo studies such as Respiratory exchange, Removal of organs and perfusion studies, in vitro studies such as tissue slice techniques; isotope tracer studies, use of inhibitors and antimetabolites.

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Semester I

List of practicals

PRACTICAL - I:

Qualitative Analysis:

Max. Marks: 50

Introduction to Good Laboratory Practice (G.L.P). Principles of Laboratory Hygiene and Safety.

List of experiments:

1. Preparation of buffers (acidic, neutral and alkaline) and determination of pH.
2. Qualitative identification of carbohydrates- glucose, fructose, ribose/xylose, maltose, sucrose, lactose, starch/glycogen.
3. Qualitative identification of amino acids - histidine, tyrosine, tryptophan, cysteine, arginine.
4. Qualitative identification of lipids- solubility, saponification. Lieberman-Burchard test.
5. Preparation of Osazones and their identification.
6. Absorption maxima of coloured substances- *p*-Nitrophenol, Methyl orange.

List of practicals

Semester II

PRACTICAL - II

Max. Marks: 50

1. Isolation of egg albumin from egg white.
2. Isolation of cholesterol from egg yolk.
3. Isolation of starch from potatoes.
4. Isolation of casein from milk.
5. Separation of amino acids by paper chromatography.
6. Separation of serum proteins by paper electrophoresis.
7. Separation of plant pigments by T.L.C.

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List of practicals

Semester III

PRACTICAL - III

Max. Marks: 50

1. Assay of amylase
2. Assay of urease
3. Assay of catalase.
4. Assay of phosphatase
5. Determination of optimum temperature for amylase.
6. Determination of optimum pH for phosphatase.

List of practicals

Semester IV

PRACTICAL - IV

Max. Marks: 50

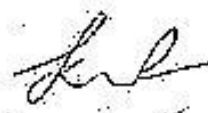
1. Estimation of amino acid by Ninhydrin method.
2. Estimation of protein by Biuret method.
3. Estimation of protein by Lowry method.
4. Estimation of glucose by DNS method.
5. Estimation of glucose by Benedict's titrimetric method.

Sub
Revised
2024

List of Recommended Books for Biochemistry

General Biochemistry

1. Lehninger's Principles of Biochemistry . Nelson.D.L. and Cox.M.M., Freeman & Co.
 2. Biochemistry . Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
 3. Biochemistry . Voet.D and Voet., J.G., John Wiley & Sons .
 4. Textbook of Biochemistry . West.E.S., Todd.W.R., Mason,H.S. and Bruggen, J.T.V., Oxford & IBH Publishers.
 5. Principles of Biochemistry: General Aspects-Smith, E. L., Hill, R.L. Lehman, I. R. Lefkowitz, R.J. Handler, P., and White, A. McGraw-Hill
 6. Outlines of Biochemistry . Conn.E.E., Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons .
 7. Harper.s Illustrated Biochemistry . Murray, R.K., Granner.D.K. & Rodwell,V.W., McGraw-Hill
 8. Biochemistry-Lippincott.s Illustrated Reviews. Champe. P.C. and Harvey. R. A. Lippincott
 9. Fundamentals of Biochemistry .Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
 10. Biochemistry . Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.
 11. Biochemistry . Rama Rao. A and Ratna Kumari. D, Kalyani Publishers.
 12. Biochemistry- The Molecular Basis of Life . McKee. T and McKee, J. R. McGraw-Hill.
 13. Biophysical Chemistry by C.R. Cantor and P.R. Schimmel
 14. Physical Biochemistry by K.E.van Holde, C. Johnson and P. S. Ho
 15. Biophysical Chemistry by Upadhyay
 16. Biophysical Chemistry by Gurtu
- Enzymology :**
1. Fundamentals of Enzymology – Price.N.C. and Stevens.L., Oxford University Press.
 2. Understanding Enzymes – Palmer.T., Ellis Harwood.
 3. Enzymes – Biochemistry, Biotechnology, Clinical Chemistry – Palmer.T., Affiliated East-West


Renuka
