



GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND P.G COURSES(A)

DEPARTMENT OF BIOCHEMISTRY

B.Sc. – Honours in BIOCHEMISTRY - MINOR

(w.e.f. 2023-24 AY onwards)

Semester -II

Course: 3 -Biomolecules

(Admitted Batch 2023-2024)

Credits- 3

45 hrs (3periods/week)

Course objectives

1. To understand chemical foundation of biological systems
2. To identify and classify the carbohydrates, proteins, lipids and Nucleic acids.
3. To know the structure and functions of the carbohydrates, proteins, lipids and Nucleic acids.

CO 1: Unit - I: Biophysical Concepts

6 hrs

Fundamentals of Biochemistry: History, scope and avenues of Biochemistry. Water as a biological solvent. Measurement of PH, Buffers, Biological relevance of Buffers. Outlines of surface tension, adsorption and osmosis and their biological relevance.

CO2: Unit - II: Carbohydrates

10 hrs

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. Amino sugars, Glycosides. Structure and biological importance of disaccharides (sucrose, lactose, maltose, isomaltose, trehalose), trisaccharides (raffinose, melezitose), structural polysaccharides (cellulose, chitin, pectin) and storage polysaccharides (starch, inulin, glycogen). Glycosaminoglycans.

CO3: Unit – III: Lipids

8 hrs

Lipids: Classification, saturated and unsaturated fatty acids, structure and properties of fats and oils (acid, saponification and iodine values, rancidity). General properties and structures of phospholipids. Prostaglandins- structure, types and biological role. Lipoproteins- types and functions,

CO4: Unit-IV: Amino Acids and Proteins

12 hrs

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

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).

CO5: Unit-V: Nucleic acids and porphyrins

9 hrs

Types of RNA and DNA. Structure of purines and pyrimidines, nucleosides, nucleotides. Stability and formation of phosphodiester linkages. Effect of acids, alkali and nucleases on DNA and RNA. Structure of Nucleic acids- Watson-Crick DNA double helix structure, denaturation and renaturation kinetics of nucleic acids-, *T_m*-values and their significance, cot curves and their significance. Structure of porphyrins: Identification of Porphyrins, Protoporphyrin, porphobilinogen properties, Structure of metalloporphyrins–Heme, cytochromes and chlorophylls.

<p><u>COURSE OUTCOMES:</u></p>
<p>CO1: Students gain the knowledge about chemical foundation of life</p>
<p>CO2: Students able to identify different types of carbohydrates found in nature, able to discriminate between them and understand their significance in biological systems</p>
<p>CO3: Students gain the knowledge of types and structures of lipids which enables them to understand the importance of lipids in maintenance of health</p>
<p>CO4: Students describe structure, physical and chemical properties of aminoacids and get the knowledge of the diversified nature and function of proteins</p>
<p>CO5: Students can apply mathematical knowledge and understand the structure and functions of DNA and also able to identify various types of porphyrins present in the nature</p>

SUGGESTED BOOKS:

1. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
2. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.
3. Biochemistry – Rama Rao. A and Ratna Kumari. D, Kalyani Publishers.

Reference books:

1. Textbook of Biochemistry -West E.S., Todd. W.R, Mason .H.S and. Bruggen, J.T.V.- Oxford & IBH Publishers. 4th Edition.
2. Nelson.D.L. and Cox.M..M- Lehninger's Principles of Biochemistry- Freeman & Co.7th Edition



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Semester -II

Course: 3 -Biomolecules- Practical syllabus

(Admitted Batch 2023-2024)

CREDITS: 2

MAX: 50M

- 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, acrolein test, Salkowski test, Lieberman-Burchard test.
- 5.Preparation of Osazones and their identification
6. Estimation of proteins in biological samples by using – Biuret method, Lowry Method and Bradford method
- 7.Estimation of amino Acids in Biological samples by using Ninhydrin method.

COURSE OUTCOMES:

CO1 : 1 & 2	students able to prepare buffers and apply the knowledge to calculate the pH values of charged biomolecules.
CO2 : 3,4 & 5:	Students identify various carbohydrates, aminoacids and lipids present in the nature by performing qualitative analysis
CO 6 &7 :	students will able

Recommended books:

1. Experimental Biochemistry: *A Student companion*- Sashidhar Rao, B and Deshpande, V. IK International (P) Ltd. Pub.
2. Modern Experimental Biochemistry- Boyer. R. Pearson Education
3. Biochemical Methods –Sadasivam, S and Manickyam, A.- New Age International publishers