

## ENVIRONMENTAL SCIENCE

Course Code : BCH 101

Course Title : General Biochemistry

Credit Hours : 3 (2+1) Full Marks: 50 Theory: 25 Practical: 25

### OBJECTIVES

Upon the completion of this course, the students will be able to understand the structure and functions of sugars, lipids, proteins, nucleic acids and metabolism of biomolecules

### I. SYLLABUS

Introduction, concepts, importance, pH, buffer major biomolecules classification and functions, structures, Central metabolic pathways, Biosynthesis and degradation of biomolecules

### II. COURSE OUTLINE

#### A. Lecture

S.N.	Topic	No. of Lecture
<b>1</b>	<b>Introduction</b>	
1.1	Concepts, scope, and importance of biochemistry	1
1.2	Structure of water, its properties, and importance as a biological solvent	1
1.3	pH: Henderson_Hassalbalch equations and its application; Buffer: definition, biological buffer with special reference to phosphate buffer	1
<b>2</b>	<b>Classification and function of major biomolecules</b>	
2.1	Definitions, classification and functions of carbohydrates	1
2.2	Definition, functions and classification of standard amino acids	1
2.3	Definition, function and classification of lipids and proteins	1
<b>3</b>	<b>Structure of Carbohydrates</b>	
3.1	Structure of glucose, fructose, sucrose and lactose	1
3.2	Structure of Cellulose, hemicellulose, pectin, chitin, Glycogen and starch	1
<b>4</b>	<b>Structure of amino acids and proteins</b>	
4.1	Structure of standard amino acids	1
4.2	Structure of Proteins	1
<b>5</b>	<b>Structure of Lipids</b>	
5.1	Structure of common fatty acids that occur in lipids	1
5.2	Structure of Acyl glycerol	1
5.3	Structure of phospholipid, glycolipids and sphingolipids,	1
5.4	Structure of soluble vitamins, essential oils and terpenoids	1

<b>6</b>	<b>Structure and functions of nucleic acid</b>	
6.1	Structure and function of nucleotides and DNA	1
6.2	Structure and function of different RNAs	1
<b>7</b>	<b>Enzymes</b>	
7.1	Introduction, nomenclature, classification, and function of enzymes	1
7.2	Properties of enzymes, mechanism of enzyme action	1
7.3	Co-enzymes and enzyme inhibition	1
<b>8</b>	<b>Central metabolic pathways</b>	
8.1	Calvin-Benson cycle	1
8.2	Glycolysis	1
8.3	Kreb's cycle, ETS	1
<b>9</b>	<b>Biosynthesis of biomolecules</b>	
9.1	Biosynthesis of sucrose and starch	1
9.2	Biosynthesis of fatty acids and triacylglycerols	1
9.3	Biosynthesis of fatty acids and amino acids	1
9.4	Biosynthesis of proteins	1
<b>10</b>	<b>Degradation of biomolecules</b>	
10.1	Degradation of sucrose and starch	1
10.2	Degradation of glycogen, triacyl-glycerols and proteins	1
10.3	Degradation of amino acids and fatty acids (Beta- Oxidation pathway)	1
<b>Total</b>		<b>30</b>

#### B. Practical

S.No.	Topic	No. of Practical
1	Preparation of standard solution	1
2	Preparation of buffers solution	1
3	Preparation of colloidal solution	1
4	Qualitative tests on carbohydrates	1
5	Qualitative tests on lipids	1
6	Qualitative tests on amino acids and proteins	1
7	Quantitative estimation of reducing sugars	1
8	Quantitative estimation of amino acids	1
9	Quantitative estimation of proteins	1
10	Enzymatic action of potato oxidase or urease or catalase	1
11	Demonstration of Differential centrifugation	1
12	Demonstration of Polyacrylamide gel electrophoresis	1
13	Demonstration of Paper chromatography	1
14	Demonstration of Thin-layer chromatography	1
15	Demonstration of Spectrophotometry or colorimetry	1
<b>Total</b>		<b>15</b>

#### REFERENCES

- Lehninger, A. L. 1975. Principle of Biochemistry. Kalyani Publishers New Delhi, India.
- Well, J. H. 1990 General Biochemistry. Wiley Eastern Ltd. New Delhi.
- Conn, E. E., P. K. Stumpf. G. Brueing and H. D. Roy. 1987 Outlines of Biochemistry. John Wiley & Sons, New York.