

**DISCIPLINE SPECIFIC ELECTIVE**  
**DSE HP 5B1: Nutritional Biochemistry**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Nutritional Biochemistry	4	2	0	2	XII Pass	Appeared in Foundation of Food Science and Nutrition

**Learning Objectives**

- To provide basic concepts of biomolecules, the basic building blocks vital for various life forms
- To focus on key structures, properties and biological functions of biomolecules

**Learning Outcomes**

- Understanding of the biochemical basis of macro- and micro- nutrients
- Developing an insight into structures, functions and biochemical role of carbohydrates, proteins, lipids, vitamins and minerals.

**SYLLABUS OF DSE HP 5B1**

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Unit I: Carbohydrates**

**8 Hours**

This unit lays emphasis on structures, properties and significance of carbohydrates.

- Introduction, definition and classification
- Structures of monosaccharides- glucose, fructose, mannose and galactose
- Structures of disaccharides – maltose, lactose and sucrose
- Structures and biological role polysaccharides– dextrin, starch and glycogen
- Stereoisomerism of monosaccharides (Keto-aldo, D- and L-isomerism, optical isomerism, epimerism and anomerism)
- General chemical properties of monosaccharides (oxidation, reduction, osazone

formation, action of alkali and glycoside bond formation)

#### **UNIT II: Lipids**

**6 Hours**

This unit highlights on definition, classification and biological role of fatty acids and lipids.

- Introduction and structures of fatty acids (saturated and unsaturated)
- Essential and non-essential fatty acids
- Acid value, iodine value, saponification value and hydrogenation
- Definition, classification and functions of lipids (storage lipids-triacylglycerols; Membrane lipids-phospholipids and sphingolipids)

#### **UNIT III: Amino acids and Proteins**

**10 Hours**

This unit gives an overview of amino acids and their role as building blocks of proteins.

The students would acquire knowledge on structure of proteins. The unit would also cover basic concepts of enzymes and their catalytic action.

- Introduction, classification and structures of standard amino acids
- Essential and non-essential amino acids
- Elementary knowledge of structure of proteins
- Introduction to enzymes, active site, co-enzymes, prosthetic groups, apoenzyme and holoenzyme
- Factors affecting enzyme activity: pH, temperature and substrate concentration (Km and Vmax)

#### **UNIT IV: Vitamins and Minerals**

**6 Hours**

This unit covers structures and biochemical functions of vitamins along with biological role and significance of minerals.

- Definition and classification of vitamins
- Structure and biochemical role of fat soluble vitamins-A and D
- Structure and biochemical role of water soluble vitamins- Thiamine, Riboflavin, Niacin, Pyridoxine and Ascorbic acid.
- Biochemical role of inorganic elements – iron, calcium, phosphorous, iodine, selenium and zinc.

#### **PRACTICAL (Credits 2; Hours 60)**

1. Qualitative tests for monosaccharides, disaccharides and polysaccharides.
2. Identification of monosaccharides, disaccharides and polysaccharides in unknown mixtures.
3. Quantitative estimation of glucose, sucrose and lactose by titrimetric method.
4. Qualitative tests for amino acids.
5. Estimation of calcium using EDTA by titration.
6. Estimation of ascorbic acid using 2,6 dichlorophenol indophenol method in the given solution.

#### **Essential Readings:**

- Kennelly, P. J., Botham, K. M., McGuinness, O., Rodwell, V. W., Weil, P.A., 2022, *Harper's Illustrated biochemistry* (32nd ed.). McGraw-Hill Education.

- Nelson, D. L., Cox, M. M., 2017, *Lehninger Principles of Biochemistry* (7th ed.). W H Freeman & Co.
- Satyanarayana, U., Chakrapani U., 2021. *Biochemistry* (6th ed.). Elsevier.
- West, E.S., Todd, W.R., Mason, H.S., Bruggen J.T.V., 2017, *Textbook of Biochemistry* (4th ed.). Oxford & IBH.
- Sundararaj, P., Siddhu, A., 2002, *Qualitative tests and Quantitative Procedures in Biochemistry* (2nd ed.). New Delhi: A. H. Wheeler and Co Ltd.

**Suggested Readings:**

- Voet, D., Voet, J.G., 2012, *Principles of Biochemistry* (4th ed.). Wiley.
- Devlin, T.M. 2010, *Textbook of Biochemistry with Clinical Correlations* (7th ed.). New York, John Wiley-Liss.

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time**