ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VII SEMESTER **BIOTECHNOLOGY** TIME: 3 Hrs/Week

BTH 7701 (3) **STRUCTURE AND FUNCTIONS OF BIOMOLECULES**

W.e.f 20AH batch **(Core course)** Max. Marks: 100

SYLLABUS

OBJECTIVES: To enable the students to –

- Know the organization of carbohydrates and their biochemical roles.
- Compare the interaction of amino acids among themselves for the detection of pathways.
- Realize the structure of various forms of lipids and their significance in biology.
- Get the knowledge on structure and functions of nucleic acids.

I. Learning outcomes:

1. Understand the classification of carbohydrates and their biochemical functions.
2. Correlate the reactions of amino acids that are basis for identification tests and biochemical pathways.
3. Know the structure of different classes of lipids and their roles in biological systems.
4. Comprehend the structure and functions of nucleic acids

UNIT-I: Chemistry of carbohydrates

1. Definition and classification of carbohydrates.
2. Outlines of structures and properties of important mono- (Glucose & Fructose), di- (Lactose, Sucrose, Maltose) and polysaccharides (Starch, Glycogen, Cellulose, Chitin).
3. Physical and Chemical reactions of carbohydrates.
4. Analysis of carbohydrates- Qualitative and Quantitative.

UNIT – II: Chemistry of amino acids and proteins

1. Classification of amino acids, Structures of amino acids, Chemical reactions of amino acids.Determination of amino acid sequences (N and C terminus).
2. Peptide bond - Nature of peptide bond, pi/φ rotation.
3. Proteins and their classification, properties of proteins.
4. Structural organization of proteins - Outline structures and biological functions. Determination of primary structure. Secondary structure predictions, helices and beta-sheets.Tertiary/quaternary structure of proteins (myoglobin/ hemoglobin model).Ramachandran plot.
5. Protein folding and significance.

UNIT – III: Chemistry of lipids

1. Classification of lipids, Properties of lipids.
2. Outline structures of saturated and unsaturated fatty acids, fats and waxes, phospholipids, glycolipids, cholesterol, prostaglandins, leukotrienes.
3. Lipids as signaling molecules.

UNIT – IV: Chemistry of nucleic acids

1. Structure of purines and pyrimidines, modified bases nucleosides and nucleotides; Properties of nitrogen bases and nucleotides.
2. Structure, variation and properties of DNA and RNA.
3. DNA denaturation and renaturation kinetics.
4. Determination of DNA complexity, Hyperchromacity, Tm, cot curves and their significance.

UNIT V: Heterocyclic molecules and vitamins

1. Structure and functions ofheterocyclic molecules.
2. Porphyrins and vitamins.

REFERENCES

1. Lehninger, A. L. (2012). Principles of Biochemistry (6thed.). New York, NY: Worth.

2. Rodwell, V., Bender, D., Botham, K. M., Kennelly, P. J., & Weil, P. A. (2015). Harpers illustrated Biochemistry (30thed.). McGraw Hill Professional.

3. Stryer, L. (2015). Biochemistry. (8thed.) New York: Freeman.

4. Voet, D., &Voet, J. G. (2016). Biochemistry (5thed.). Hoboken, NJ: J. Wiley & Sons.

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