

### **SYLLABUS OF SEMESTER III**

#### **CORE COURSE 5 – BIOCHEMISTRY AND MOLECULAR BIOLOGY**

#### **CORE COURSE 6– ECOLOGY**

#### **CC - 5: BIOCHEMISTRY AND MOLECULAR BIOLOGY**

**(Credit: 3)**

##### **Course Code:**

**Course Objective:** To familiarize the students with major biomolecules which are important for the structural organization and functions of the cells.

**Learning Outcome:** Students will be able to understand the basis knowledge and aspects of physical, chemical and biological properties of biomolecules.

##### **Unit I**

Introduction, scope and importance of Biochemistry, Principle of biomolecular organization, configuration and conformation, Water as biological solvent and its physiochemical properties. Ionization of water, pH, acids bases and buffers.

##### **Unit II**

Structure and classification of amino acids, chemical properties of amino acids, Peptides bonds and its properties. N-terminal analysis: Sanger and Edman's reactions, Higher order organization of protein. Enzymes: General properties, Major classes and nomenclature, Mechanism of enzyme action, chemical catalysis, Introduction to enzyme kinetics, factors affecting enzyme activity.

##### **Unit III**

Carbohydrates: Monosaccharides, disaccharides and polysaccharides. Catabolism of carbohydrates and ATP production; Glycolysis and Krebs cycle. Lipids: classification and biological importance, Triglycerides; Phospholipids and Sphingolipids.

##### **Unit IV**

DNA and RNA as genetic material, DNA structure, Conformation of DNA (A, B and Z), Structure of nucleosomes, Mechanism of DNA replication

##### **Unit V**

Transcription; Basic mechanism (prokaryotic model), Transcription initiation complex in eukaryotes, Processing of RNA Pol II transcript, Genetic code, Mechanism of translation.

## REFERENCES:

1. Berg, Tymoczko, Stryer; Biochemistry (7 th ed. 2012, Freeman)
2. Lehninger AL (2012) Principle of Biochemistry (latest edition). New York. Worth.
3. Voet D & Voet JG (2016) Biochemistry (5 th edition). Hoboken NJ J Wiley & Sons.
4. Lodish, H. F. (2019). Molecular cell biology. New York: W.H. Freeman.
5. Krebs, J. E., Lewin, B., Kilpatrick, S. T., & Goldstein, E. S. (2015). Lewin & 39s genes XI.
6. Burlington, MA: Jones & Bartlett Learning.
7. Cooper, G. M., & Hausman, R. E. (2019). The cell: A molecular approach. Washington:
8. ASM; Sunderland.

## **Practical CC-5: BIOCHEMISTRY AND MOLECULAR BIOLOGY LAB (Credit: 1)**

1. To prepare various stock and working solutions.
2. To prepare sodium acetate buffer and validate the Henderson-Hasselbach equation.
3. Titration of amino acids using strong acid and strong base.
4. Isolation and quantification (using UV spectrophotometer) of genomic DNA from bacteria/plant/animal sources.
5. Analysis of genomic DNA using Agarose gel electrophoresis.