

AMLT01 BIOCHEMISTRY OF PROTEINS

UNIT-1 FUNDAMENTALS OF BIOCHEMISTRY

- 1.1 The molecular logic of life,
- 1.2 Strong and weak interactions,
- 1.3 Introductory concept of cell,
- 1.4 Bio-molecules and water.

UNIT-2 CHEMISTRY OF BIO-MOLECULES

- 2.1 Chemical composition and bonding,
- 2.2 3-D structure- configuration and conformation, chemical reactivity, macromolecules and their monomeric subunits, prebiotic evaluation.
- 2.3 Water: Electronic structure, weak interactions in aqueous system,
- 2.4 Ionization of water – weak acid – weak bases, Buffering against pH changes.

UNIT-3 AMINO ACIDS, PEPTIDES AND PROTEINS

- 3.1 Chemistry, classification, determination of amino acids,
- 3.2 Qualitative test and quantitative determination,
- 3.3 Structure of various amino acids, formation of polypeptides,
- 3.4 Purification and separation of proteins, covalent structure of proteins.

UNIT-4 THREE DIMENSIONAL STRUCTURE OF PROTEINS

- 4.1 Fundamentals of protein structure,
- 4.2 Amino acid sequencing of protein,
- 4.3 Hierarchy in protein structure, primary, secondary, super secondary, tertiary,
- 4.4 Quaternary and domain structure of protein, protein folding and denaturation.

UNIT-5 TYPES OF PROTEINS

- 5.1 Functional role of various proteins,
- 5.2 Structure of fibrous and globular proteins of connective tissues like keratin, reticulin and elastin;
- 5.3 Albumin, globulin, mucine etc.

UNIT-6 BIOSYNTHESIS OF PROTEIN

- 6.1 Central dogma,
- 6.2 Structure of DNA, RNA, DNA replication,
- 6.3 Transcription and translation (elementary introduction only).

UNIT-7 MOLECULAR BIOLOGY OF COLLAGEN

- 7.1 Introduction of collagen, proteoglycan network,
- 7.2 Level of orders in collagen, primary, secondary, tertiary and quaternary structure of collagen, genes of collagen, collagen biosynthesis,

7.3 Physiological disorders for inappropriate biosynthesis, reactivity of collagen, cursory look on the interaction of collagen network with leather auxiliary.

UNIT-8 ORIGIN OF CUTANEOUS STRUCTURE

- 8.1 Origin of epidermal cells,
- 8.2 Cutaneous appendages,
- 8.3 Epithelial – mesenchyme interaction.

UNIT-9 PHYSICAL CHEMISTRY

- 9.1 Polarity of amino acids and ionization of proteins, electrophoresis, hydration,
- 9.2 Solubility of proteins, dielectric properties, intermolecular forces of proteins, crosslinks in collagen and elastin
- 9.3 Isoelectric point of collagen and its manipulation in various stages of leather manufacture,
- 9.4 Acid and base binding capacity of collagen, reversible and irreversible acid and base binding,
- 9.5 Effects of anions, swelling (osmotic and lyotropic) and phase transition of collagen,
- 9.6 Helix-coil transition, denaturation and melting of collagen,
- 9.7 Glass transition of collagen, denaturation and optical birefringence of collagen.

Reference Books:

1. Nelson, D.L. and Cox, M.M. (2000), Lehninger principles of biochemistry, 3rd Edn. Worth Publishers, N.Y.
2. Gilbert, F.G. (1997) Development Biology, 5th Edn. Sinauer Associates, Massachusetts.
3. Kleinsmith, L.J. and Kish, V.M. (1998), Principles of cell biology, Harpar & Row publishers, N.Y.
4. Gustavson, K.H. (1956), the chemistry and reactivity of collagen, Academic press, N.Y.
5. Hames, B.D., Hooper, N.M. and Houghton, J.D. (1999), Instant notes on Biochemistry, Viva Books Pvt. Ltd. N.D.