

# CBO 406 BIOPHYSICS, INSTRUMENTATION AND BIOCHEMISTRY

## Unit-I Biophysics

1. pH and Buffers.
2. Free radicals, charge transfer complex (CTC) and Redox potentials.
3. Laws of Thermodynamics.
4. Radiations and Isotopes and their role/application in plant science.

### References:

- (1) Biophysics by Vasantha Pattabhi and N. Gautham, Narosa Pub.
- (2) Introduction to Biophysics by Pranabkumar Banerjee, S.Chand.

## Unit-II Instrumentation

1. Principles and application of light, phase contrast, fluorescence, scanning and transmission electron microscopy.
2. Photometry, colorimetry and spectrophotometry, their application.
3. Principles and application of gel-filtration, ion exchange and affinity chromatography. Paper chromatography, thin layer and gas chromatography, HPLC.
4. Electrophoresis: PAGE, Agarose gel electro-phoresis and electro-focusing, Ultra-centrifugation: Principles and types.

### Reference:

Research Methodology for biological sciences, N Gurumani, MJP Publishers, Chennai, 2007

## Unit-III Biochemistry-I

1. Behaviour of biological compounds: Dissociation, Solubility, Isomerism, Adsorption and Chemical bonds.
2. Carbohydrates: Occurrence, classification, structure and function of Monosaccharides (Triose, Pentose and Hexose), Disaccharides (Maltose, Lactose and Sucrose) and Polysaccharides (Starch and Cellulose).
3. Lipids: Occurrence, classification, structure and function of Simple lipids (Triglycerides and Waxes) and Complex lipids (Phospholipids) and Role of Polyunsaturated fatty acids.
4. Amino acids: Structure, properties and classification of amino acids. Amino acid metabolism, non-oxidative de-amination. Biosynthesis and breakdown of amino acids.

## Unit-IV Biochemistry-II

1. Proteins: Classification of proteins, Biological functions, Conformation of proteins (primary, secondary, tertiary and quaternary), Ramachandran plot, Lectins (Glycoproteins) and their importance.
2. Enzymes: Definition, nomenclature and classification of Enzymes, Apo-enzymes, coenzymes, cofactors and prosthetic groups, properties of Enzymes, Mechanism of enzyme action, Kinetics of an enzyme-catalyzed reaction, Various kinds of Inhibition, Factors affecting the enzyme action.
3. Vitamins: Occurrence, classification, structure and function of various vitamins and their deficiency diseases.
4. Nucleic acids: Introduction, components, structure of DNA and various RNAs.

### Main Reference(s):

Deb A C (2008) *Fundamentals of Biochemistry*, New Central Book (P) Ltd., Kolkata (9<sup>th</sup> Edition Revised).  
Jain J L, Jain Sanjaya and Jain Nitin (2005) *Fundamentals of Biochemistry*, S Chand & Co. Ltd., New Delhi (6<sup>th</sup> Revised Edition).

### References

- Lehninger A C ( ), *Biochemistry*  
Jain J.L., *Fundamentals in Biochemistry*,  
Deb A C (2008), *Fundamentals of Biochemistry* (9<sup>th</sup> edition),  
Satanarayana U (1999), *Biochemistry* ( edition),  
Rama Rao A V S S ( ) *Text Book of Biochemistry* (5<sup>th</sup> edition),  
Verma S K and Verma Mohit ( ), *Plant Physiology, Biochemistry and Biotechnology* ( ),