



**B.Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY**

**ALLIED - II BASIC BIOCHEMISTRY - I & II**

B.Sc. va (For the candidates admitted from the academic year 2008-2009)

**Semester III & IV**

## Paper 4c Allied - II (Semester III)

### ALLIED - II BASIC BIOCHEMISTRY - I

B.Sc. va (For the candidates admitted from the academic year 2008-2009)

#### Allied Theory

##### UNIT I

###### Carbohydrates

Monosaccharides, Dissacharides and Polysaccharides - Classification, structure and biological significance of Carbohydrates.

Structural Polysaccharides - cellulose and chitin, Storage polysaccharides- starch and glycogen. Glycoproteins and Lipopolysaccharides.

**Key words:** Reducing sugar & Non-reducing sugar, Glycosidic bond, Epimer, Lectin, Enantiomer, Peptidoglycan.

##### UNIT II

###### Amino acids

Amino acids - Classification, structure and properties. Essential and non-essential aminoacids.

##### UNIT III

###### Proteins

Proteins - Classification and general characteristics. Primary Structure, Secondary Structure, Tertiary structure and Quaternary structure.

**Key words:**  $\alpha$ -helix,  $\beta$ -sheet, Motifs, Zwitterion, Isoelectric point, Lipoproteins.

##### UNIT IV

###### Lipids and Vitamins

Definition and classification of Lipid. -. Biological function of lipids.

Vitamins-Classification, occurrence, deficiency symptoms, biochemical functions of fat soluble (A, D, E & K) and water soluble vitamins (B & C).

**Key words:** Fatty acids, Triacylglycerols, phospholipids, glycolipids, steroids, Cyanocobalamine, Phylloquinone, Tocopherol.

##### UNIT V

###### Nucleic Acids

Structure of Nucleosides and Nucleotides. Single stranded nucleic acids and Double helix. Properties of Nucleic acid - carrier of genetic information. RNA - Structure and biological role.

**Key words :** Histone, Histone octomer, Purines, Pyrimidines, mRNA, tRNA.

## **UNIT VI**

### **Secondary Metabolites**

Classification and importance of secondary metabolites: alkaloids, terpenoids, phenolics and flavonoids.

**Key words:** Anticancer agents - Vincristin, Vinblastin, Taxol, Schikmic acid pathway.

**Paper 5c Allied - II (Semester IV)**  
**ALLIED - II BASIC BIOCHEMISTRY - II**

B.Sc. va (For the candidates admitted from the academic year 2008-2009)

**Allied Theory**

**UNIT I**

**pH and Buffers**

Definition, pH scale, pH measurements, pH maintenance, acids, bases and buffers.

**UNIT II**

**Analytical techniques**

Principles and applications of spectrophotometer, and electrophoresis.

**Key words:** pH indicator, Henderson equation, Beer-Lambert's law, Optical density, SDS- Sodium Dodecyl Sulphate.

**UNIT III**

**Bioenergetics**

Thermodynamics-Definition, laws of thermodynamics, Exo thermic and endothermic reactions. High energy compounds.

**Key words:** Enthalpy, Entropy, Gibbs free energy, ATP, GTP, UTP.

**UNIT IV**

**Enzymes**

Definition, classification, Michaelis - Menten equation. Lock and Key model, Induced fit hypothesis. Factors affecting enzyme activity.. Biological function of enzymes.

**Key words:** Active site, Isoenzymes, Allosteric enzymes, Coenzymes, Activation energy, Competitive inhibition, Non-competitive inhibition.

**UNIT V**

**Metabolism I**

Photosynthesis: Light reactions - Hill reaction, cyclic and non-cyclic photophosphorylation, Dark reactions - Calvin cycle. Storage reserves of seed and biochemistry of seed germination.

**Key words:** RUBISCO, Thylakoid membrane, Chlorophylls, Carotenoid, Xanthophyll, ATP synthase (CF<sub>1</sub> - CF<sub>0</sub> complex), peroxisomes, α-amylase.

## UNIT VI

### Metabolism II

Carbohydrate: Glycolysis, Krebs cycle. Electron transport chain and Oxidative phosphorylation

Protein: Deamination, transamination and decarboxylation of amino acids.

Lipid: β-oxidation.

**Key words:** Acetyl Co A carboxylase, Cytochrome, Transaldolase, Transketolase, Rate limiting enzyme, ETC Uncouplers.

### Suggested Reading

CONN, E.E., P.K. STUMPF, G. BRUENING AND R.H.DOI. 1987. Outlines of Biochemistry. John Wiley and Sons, New York.

JAIN, J.L., S. JAIN AND N. JAIN. 2005. Fundamentals of Biochemistry. S. Chand & Company Ltd., New Delhi.

MAHDADEVAN, A. AND R. SRIDHAR. 1996. Methods in Physiological Plant Pathology, Fourth Edition, Sivakami Publications, Chennai - 600 020.

NELSON, D.L. and M. M. COX. 2005. Lehninger Principles of Biochemistry, Fourth Edition, W.H. Freeman and Company, New York.

SATYANARAYANA, U.2006. Essentials of Biochemistry. Books and Allied Private Limited, Kolkata.

STRYER, L. 1999. Biochemistry. Fourth Edition, W.H. Freeman and Company, New York.

VOET D. AND G.T. VOET. 1994. Biochemistry, Second Edition, John Wile and Sons, New York.

**Paper 6c COMBINED PRACTICAL (SEM III & IV)**  
**BASIC BIOCHEMISTRY I & II PRACTICALS**

**Allied Practical**

**ALLIED - II BASIC BIOCHEMISTRY - I (Semester - III)**

1. Qualitative analysis of carbohydrates - Glucose, fructose, sucrose, and starch.
2. Qualitative analysis of amino acids - Tyrosine, tryptophan, methionine, and proline.
3. Estimation of glucose- Benedict's method.
4. Estimation of ascorbic acid.
5. Estimation of acid number of oil.
6. Estimation of glycine by Sorenson's formal titration.
7. Estimation of protein by Lowry / Bradford method.
8. Separation of amino acids by ascending paper chromatography.

**Allied - II BASIC BIOCHEMISTRY - II (Semester - IV)**

1. Calculations and preparation of Molar, Molal and Normal solutions.
2. Buffer preparation and pH analysis.
3. Determination of pH of lemon juice and detergent powder.
4. Demonstration of Principle and working of Colorimeter and Spectrophotometer.
5. Separation of sugars using TLC
6. Separation of secondary metabolites / pigments by Thin Layer Chromatography method.
7. Determination of activity of enzyme amylase and peroxidase.
8. Demonstration of seed viability by TTC method.