

## DEPARTMENT OF BIOCHEMISTRY

**BICM 101\***

**Credits 3(2 + 1)**

### **PRINCIPLES OF BIOCHEMISTRY AND BIOTECHNOLOGY**

#### **Theory**

Biochemistry - Introduction and importance Bio-molecules - Structure and Properties - Amino acids, peptides and proteins. Enzymes, lipids, Carbohydrates, *Nucleotides* and Nucleic acids. Metabolic energy and its generation - Metabolism - Basic concepts, Glycolysis, Citric acid Cycle, Pentose phosphate pathway, oxidative phosphorylation, Fatty acid oxidation. General reactions of amino acid degradation. Photosynthesis. Biosynthesis - carbohydrates, Lipids, Proteins and Nucleic acids. Metabolic regulation.

Biotechnology - ancient and Modern Biotechnology, Scope and importance in crop. Improvement, Plant cell, tissue and organ' culture, Basic principles of Recombinant DNA. Technology, Transgenic plants (GMO's) - challenges, achievements and applications, Social aspects of Biotechnology.

#### **Practicals**

1. Amino acid model, R.S. Configuration, Ninhydrin test
2. Paper electrophoresis, Xanthoproteic test, Millon's test, Glyoxylate test
3. Identification of protein components, Biruret test, secondary structure of proteins (a) helix & (b) pleated sheet (Models). Protein denaturation - heat, pH, precipitation of proteins with heavy metals, immune reaction
4. Enzyme kinetics, data-plotting the graphs, competitive inhibition, enzyme immobilization
5. Extraction of nucleic acids, column chromatography of RNA hydrolysate
6. Models of sugars, sucrose & starch (atomic & Paper)
7. Quantitative determination of sugars after removal of interfering substances
8. Paper chromatography for the separation of sugars, scheme for the identification of unknown carbohydrate
9. Fatty acid model, characterization of lipids by T.L.C.
10. Enzyme induction
11. Requirements for plant tissue culture laboratory
12. Techniques in plant tissue culture

13. Media composition and preparation
14. Media components and preparation
15. Agro bacterium mediated gene transfer

## References

1. Outlines of Biochemistry Conn EE & Eric E, 5e, 1987, John Wiley and Sons Incorporated, New Delhi.
2. Principles of Biochemistry Albert Lehninger, 313, 2003. CBS Publisher and Distributors, New Delhi
3. Biochemistry Voet D & Voet J G John 2003. Wiley and Sons Incorporated
4. Practical Biochemistry Rameshwar A 1995. Kalyani Publishers, Ludhiana
5. An introduction to practical Biochemistry Plummer D T 1988. Tata McGraw Hill Publishing Company Limited, Bombay
6. Biochemical methods for agricultural sciences Sadasivam S & Manikam A 1988. Wiley Eastern Limited, New Delhi
7. Introduction to Biotechnology Singh R P 1990. Central Book Depot, Allahabad
8. Introduction to Biotechnology Belgraxc K S and Pandey A K 1992 CBS Publishers, New Delhi
9. Elements of Biotechnology Gupta P K 1984. Rastogi Publishers, Meerut
10. Plant biotechnology Sing B D 1988. Kalyani Publishers, Ludhiana

***\* Offered jointly by the Dept. of Bio-Chemistry and Genetics & Plant Breeding.***