ST. JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

# I SEMESTER **SKILL ENHANCEMENT** Time: 3hrs/week

AGBT 101(2) **PLANT BIOCHEMISTRY & BIOTECHNOLOGY**  Marks:50

## w.e.f AK 2023-2024 (Admitted batch) PRACTICAL SYLLABUS

**OBJECTIVES:**

* To identify importance of biochemistry in plant sciences
* To explain about application of biotechnology
* To identify the various classifications and structures of biochemical elements

**Course Outcomes**

At the end of the course, students will be able to

**CO1:** To discuss about the classifications and functions of carbohydrates.

**CO2**: To know about the nucleic acids and types of nucleocides DNA nd RNA.

**CO3**: To know about the applications of plant tissue culture and its applications.

**CO4**: To discuss Tricarboxylic Acid (TCA) cycle

**UNIT – I: (4Hrs.)**

1. Introduction – Historical aspects of Biochemistry– Scope, impact and importance

of Biochemistry in plant sciences -Properties of water – PH – Buffers.

2. Carbohydrates– Classification - Structures – Monosacharides – Structural aspects – mutarotation - Reducing and oxidizing properties.

3. Oligosaccharides and polysaccharides-Functions of carbohydrates

4. Lipids – Fatty acids – Structures and properties – Functions of lipids-Lipids - Classification – 5. Amino acids – Structures - Classification – Zwitterions – Titration -Peptides –

**UNIT – II: (4Hrs.)**

1.  Proteins –Importance - Classification - Properties of proteins –Isoelectric PH –

Denaturation - Protein sequencing – Edman degradation method

2. Proteins – Structural organization – Primary, secondary, tertiary and quaternary

structures and forces involved in stabilizing proteins

3. Enzymes – Characteristics of enzymes – Chemical nature, speed, specificity, active site - activation energy .

4. Classification of enzymes

5.Factors affecting enzyme activity – Enzyme Inhibition – MM & LB plots

**UNIT – III:**

1. Nucleic acids – Functions – Structures of nitrogen bases – Nucleosides –

Nucleotides in RNA and DNA **(4Hrs.)**

2. Various types of DNA and RNA – Secondary structure of B-DNA and t-RNA.

3. Metabolism – Anabolism and Catabolism – Stages of respiration – Overall

metabolic view of carbohydrates, proteins and lipids.

4.Paper electrophoresis for separation of plant pigments

5. Paper model of protein – protein estimation by Lowry method

6. Extraction of DNA from onion – test for DNA

7.Column chromatography of RNA hydrolysate

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**UNIT – IV: (4Hrs.)**

1. Biotechnology – Major – Concepts and importance – Applications of plant

biotechnology.

2. Requirements for plant tissue culture laboratory

3. Techniques in plant tissue culture

4. Media components and preparations

5. Sterilization techniques and inoculation of various explants

6. Aseptic manipulation of various explants

7. Micropropagation of important crops

8. Anther culture – callus induction and plant regeneration

**UNIT – V: (4Hrs.)**

1. Embryo and endosperm culture – callus induction and plant regeneration

2. Hardening / acclimatization of regenerated plants

3. Somatic embryogenesis and synthetic seed production

4. Isolation and culturing of protoplast

5. Plant genomic DNA isolation

6. Gel-electrophoresis technique / southern blotting

7. Direct gene transfer technique

8. Indirect gene transfer technique

9. Confirmation of genetic transformation

**References Text Books:**

1. David L. Nelson, Michael M.Cox; W.H. Freeman.Lehninger Principles of

Biochemistry, 6th Edition

2. Biochemistry, Dr.U.Satyanarayana, Dr.U. Chakrapani, Books and Allied(P) Ltd, Kolkata

3. Biochemistry, S.N.Gupta, Rastogi Publications, First Edition, 2011

4. Introduction to Plant Biotechnology by HS Chawla (3rd Edition), Oxford & IBH

Publishing Co. Pvt Ltd., New Delhi.

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