



**JYOTI NIVAS COLLEGE AUTONOMOUS BANGALORE – 560 095**  
**DEPARTMENT OF BOTANY**  
**B.Sc. VI SEMESTER BOTANY PAPER VIII SYLLABUS (2021 NEP BATCH)**  
**PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY**

|   |  |
|---|--|
| <b>COURSE TITLE</b>                         | <b>PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY</b> |
| <b>COURSE CODE</b>                          | <b>21VIBO8 (T)</b>                             |
| <b>COURSE CREDITS</b>                       | <b>04</b>                                      |
| <b>TOTAL CONTACT HOURS</b>                  | <b>60</b>                                      |
| <b>DURATION OF ESE</b>                      | <b>2 ½ Hours</b>                               |
| <b>CONTINUOUS INTERNAL ASSESSMENT (CIA)</b> | <b>40 Marks</b>                                |
| <b>END SEMESTER EXAMINATION (ESE)</b>       | <b>60 Marks</b>                                |

| <b>CO NO.</b> | <b>Course outcomes statement</b>  | <b>Knowledge level</b> |
|---------------|---|------------------------|
| 1.            | Understand and describe cellular structures and their functions in plants.                      | K2                     |
| 2.            | Explain the role and mechanisms of enzymes in plant metabolic processes.                        | K3                     |
| 3.            | Analyze the genetic mechanisms underlying plant adaptation to various environmental conditions. | K4                     |
| 4.            | Evaluate the effects of climate change on plant physiology and geographical distribution.       | K3                     |
| 5.            | Understand the principles of tissue differentiation and development in plants.                  | K2                     |

|    |  |    |
|----|--|----|
| 6. | Discuss the significance of nutrient cycling in maintaining ecosystem balance.           | K3 |
| 7. | Analyze the biochemical pathways involved in primary and secondary metabolism in plants. | K4 |

**K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create**

### Mapping of COs with Pos

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| CO1 | ✓   | ✓   |     | ✓   |     |     |     |     |     |      |
| CO2 | ✓   | ✓   |     | ✓   |     |     |     |     |     | ✓    |
| CO3 | ✓   | ✓   |     | ✓   |     |     |     |     |     | ✓    |
| CO4 | ✓   | ✓   |     |     |     |     | ✓   |     |     |      |

Programme Objectives aligned with Graduate Attributes

- PO1: Knowledge
- PO2: Scientific thinking
- PO3: Entrepreneurial skills
- PO4: Analytical skills
- PO5: Communication skills
- PO6: Social commitment
- PO7: Research and Inquiry
- PO8: Conservation of Environment
- PO9: Digital awareness and literacy
- PO10: Academic orientation

## UNIT 1

14 Hrs.

**Enzymes** - Nomenclature, classification, structure and composition. Mechanism of enzyme action – Lock and Key model and induced fit theory. Enzyme kinetics and factors affecting enzyme activity, Industrial application of Enzymes (In brief).

**Nitrogen Metabolism:** Biological nitrogen fixation – symbiotic and asymbiotic, nitrate metabolism. Synthesis of amino acids, Transamination and reductive amination, Nitrogen cycle.

## UNIT 2

15 Hrs.

**Photosynthesis:** Photosynthetic pigments (Chl a, b, Xanthophylls and Carotene) Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation; Photorespiration. Factors affecting photosynthesis.

**Respiration:** Glycolysis, TCA cycle; Oxidative phosphorylation and Anaerobic respiration. Factors affecting respiration.

## UNIT 3

19 Hrs.

Definition and classification of plant growth regulators – Hormones, site of synthesis, and influence on plant growth and development of individual group of hormones - Auxins, Gibberellins, cytokinins, ABA and ethylene

**Synthetic growth regulators** - Classification, their effect on plant growth and development. Practical utility in agriculture and horticulture.

**Sensory Photobiology** - Biological clocks, photoperiodism, function & structure of phytochromes, phototropins and cryptochrome. Brief account of vernalization Senescence - A General account. Plant Movements – Tropisms (Geotropism, Hydrotropism and Phototropism).

## UNIT 4

12 Hrs.

**Carbohydrate metabolism** – Cellulose and starch – structure and function.

**Proteins** - Classification, structure - primary, secondary, tertiary and quaternary. Amino acids – A brief account.

**Vitamins** - Classification, distribution and function.

**Lipids** - Classification, structure and function of fatty acids.

**Secondary plant products:** Distribution of terpenes, phenolics and alkaloids .

## BOTANY PRACTICAL PAPER VIII

|   |  |
|---|--|
| <b>COURSE TITLE</b>                         | <b>PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY</b> |
| <b>COURSE CODE</b>                          | <b>21VIBO8 (P)</b>                             |
| <b>COURSE CREDITS</b>                       | <b>02</b>                                      |
| <b>TOTAL CONTACT HOURS</b>                  | <b>4 hours/week</b>                            |
| <b>DURATION OF ESE</b>                      | <b>03 hours</b>                                |
| <b>CONTINUOUS INTERNAL ASSESSMENT (CIA)</b> | <b>25 Marks</b>                                |
| <b>END SEMESTER EXAMINATION (ESE)</b>       | <b>25 Marks</b>                                |

### Experiments

1. Separation of photosynthetic pigments by paper chromatography and measure their Rf value
2. Estimation of total chlorophyll pigments by Arnon method.
3. Isolate and identify the amino acids from a mixture using paper chromatography.
4. Study of Phototropism, Geotropism and Hydrotropism.
5. Estimation of TAN (Titratable acid Number) from *Bryophllum* leaves/*Aloe vera*.
6. Determination of rate of photosynthesis at different wavelengths of light.
7. Determination of rate of photosynthesis at various concentrations of CO<sub>2</sub>.
8. Determination of RQ of carbohydrates, fats and proteins.
9. Study of Anaerobic respiration using Kuhne's fermentation flask.
10. Effect of phytohormones – Leaf senescence, initiation of axillary bud (potato), seed germination (green gram).  
Visit to Research Institute/Scientific laboratory.