

B.Sc.III (SEM V)
5S – BOTANY
PLANT PHYSIOLOGY AND ECOLOGY

Unit - I: Plant Water Relations

- 1.1 Importance of water to plant life. Imbibition , Diffusion, Osmosis, Plasmolysis.
- 1.2 Active and passive Absorption of water.
- 1.3 Ascent of sap - Root Pressure and Transpiration Pull Theory.
- 1.4 Transpiration - Types of transpiration, Stomatal movements, Mechanism of transpiration (Starch) sugar hypothesis), Significance. Antitranspirant, Guttation.
- 1.5 Mineral uptake - Active uptake - Carrier Concept, Passive up take - Ion Exchange.

Unit - II: Metabolism-

- 2.1 Photosynthesis - Introduction, Role of Light, Photosynthetic Apparatus and Pigments, Two Pigment Systems, Photophosphorylation, C₃ and C₄ cycle, CAM Pathway.
- 2.2 Respiration - Introduction, Mitochondria as a Respiratory centre, Types of Respiration - Aerobic and Anaerobic, Mechanism of aerobic respiration- Glycolysis, Krebs cycle, Electron transport system and Chemiosmotic ATP generation, Respiratory Quotient.

Unit - III: Metabolism and growth

- 3.1 Nitrogen Metabolism- Sources of nitrogen, Symbiotic nitrogen fixation, Role of Nitrate reductase.
- 3.2 Growth - Phases of growth, Growth curve, Physiological role of growth hormones (Auxins, Gibberellins, Cytokinins, Absciscic acid, and Ethylene).
- 3.3 Physiology of Senescence and Abscission.

Unit – IV: Plant responses

4.1 Photoperiodism - Concept of Florigen, Role of Phytochrome,

4.2 Vernalization- Concept and Significance.

4.3 Plant movement- Tropic (Phototropic and Geotropic) and Nastic (Epinasty, Hyponasty and Seismonasty)

4.4 Stress physiology- Concept, Types of stress, Water and Salinity stress.

Unit – V: Ecology and Environment:

5.1 Concept of environment, Concept and scope of ecology.

5.2 Ecological factors- Climatic- Light, Temperature and Water.

5.3 Atmosphere and its composition.

5.4 Edaphic factor- Process of soil formation, soil profile, soil biota and their role.

5.5 Ecological Adaptations - Morphological and Anatomical adaptation in Hydrophytes, and Xerophytes.

Unit – VI: Ecosystem:

6.1 Population Ecology- Natality and Mortality, Community characteristics – Frequency, Density and Abundance

6.2 Ecological Succession - Hydrosere and Xerosere

6.3 Ecosystem – Definition, Structure and Function, Food chain, Food web, Energy flow model (Single channel model)

6.4 Types of Ecosystem- Pond ecosystem, Desert ecosystem.

LABORATORY EXERCISE :

Plant Physiology: Major experiment (Any Seven)

1. To study the effect of temperature and organic solvent on permeability of plasma membrane.
2. To study osmotic pressure of cell sap by plasmolytic method.
3. To determine water potential of plant tissue.
4. To determine the path of water (ascent of sap)
5. To determine the rate of transpiration by Ganongs photometer.
6. To determine rate of photosynthesis under varying quality of light and CO₂ concentration.
7. To study the rate of photosynthesis in terrestrial plants with the help of Ganongs Photosynthometer.
8. Separation of chloroplast pigments by paper chromatography/ solvent extraction method.
9. Separation of amino acids by paper chromatography method.
10. To determine R.Q. using different substrates.
11. To determine the rate of respiration by Ganongs respirometer.
12. To study antagonism of salts.
13. To study phenomenon of adsorption.
14. To study effect of IAA and Gibberellins on seed germination.
15. Test for secondary metabolites- Alkaloid, Phenolics, Tannin, Flavonoids and Lignin
16. To study Endo and Exo-osmosis by egg membrane osmoscope

Plant Physiology: Minor experiment- (Any Three)

1. To demonstrate fermentation.
2. To demonstrate exo and endosmosis

3. To demonstrate transpiration by Bell jar.
4. To demonstrate light is necessary for photosynthesis
5. To demonstrate anaerobic respiration in germinating seeds.
6. To demonstrate the evolution of CO₂ in respiration.
7. To demonstrate the phenomenon of nastic movement with help of *Mimosa pudica* / or *Biophytum sensitivum*.

Ecology: Major experiment (Any Three)

- Study of morphological and anatomical adaptations in hydrophytes – Hydrilla, Eichhornia, Typha, Vallisneria and Nymphaea (any two)
- Study of morphological and anatomical adaptations in xerophytes - Asparagus, Nerium, Casuarina, Euphorbia, Cycas, Opuntia (any two)
- Study of community characteristics by quadrat method.
- Determination of water holding capacity of different soils.
- To determine the texture of different soils by sieve method.

Ecology: Minor experiment (Any Two)

1. To determine the porosity of soil.
2. To determine the transparency and temperature of water bodies.
3. Estimation of salinity of different water samples
4. Determination of pH of different soils and water samples by pH papers/ pH meter.
5. Study of meteorological instruments -Rain gauge, Hygrometer, Barometer

PRACTICAL EXAMINATION Time: 4 Hours Marks: 50

Q. 1 - Physiology- major experiment-. 15

Q. 2 - Comment one Minor Physiology experiment- 5

Q. 3 - Ecology major experiment. 10

Q. 4 - Ecology minor experiment. 5

Q. 5 - Viva – voce 5

Q.6 - Class record. 5

Q. 7 - Co-curricular Activity Report 5

Co-curricular Activity Report”

Which mean the report on the activity Such as Study Tour, Industrial visit to Research Institute, Excursion Tour to be submitted by the students at the time of practical Examination.