

DISCIPLINE SPECIFIC CORE (LS-BOT-DSC-05)
Plant Physiology and Metabolism

Guidelines

Unit 1: Plant-water relations

03 hours

Water potential and its components, pathway of water movement, ascent of sap (include root pressure and guttation), transpiration and its significance, stomatal movements – only ion theory.

Unit 2: Mineral nutrition

03 hours

Classification of mineral elements: Essential elements (macro- and micronutrients) and beneficial elements, General role of essential elements, transport of ions across membrane, active and passive transport (brief account of carriers, channels and pumps).

Unit 3: Translocation in phloem

02 hours

Composition of phloem sap, girdling experiments, Pressure Flow Model, phloem loading and unloading.

Unit 4: Plant growth regulators

04 hours

Physiological roles and bioassays of auxins, gibberellins, cytokinins, ethylene and ABA.

Unit 5: Plant response to light and temperature

02 hours

Photoperiodism - discovery (SDP, LDP, day neutral plants), concept of florigen; phytochrome (discovery and physiological role), vernalization.

Unit 6: Enzymes

02 hours

Classification, Structure and properties, mechanism of enzyme catalysis and enzyme inhibition.

Unit 7: Carbon metabolism

06 hours

Photosynthetic pigments (chlorophyll a and chlorophyll b, xanthophyll, carotene); photosystem I and II, Light reactions (electron transport and photophosphorylation), Dark reactions: C3 pathway; C4 and CAM pathways (no chemical structures); photorespiration. Metabolite pool and exchange of metabolites, synthesis and degradation of sucrose and starch.

Unit 8: Respiration

02 hours

Basic differences in animal and plant respiration, Cyanide resistant respiration.

Unit 9: Nitrogen metabolism

04 hours

Nitrate assimilation (NR and NiR), biological nitrogen fixation in legumes (nodulation and role of dinitrogenase) Ammonia assimilation: GS-GOGAT, reductive amination and transamination.

Unit 10: Stress physiology in plants

02 hours

ROS, RNS and anti-oxidative defence strategies.

B.Sc. Life Sciences Semester V
Guidelines for Practical Examination of
Discipline Specific Core Course -5: Plant Physiology and Metabolism

Time: 5 hours
40+20+20 = 80

Max. marks:

Q1. Perform the experiment 'A' allotted by draw of lot. (20 marks)

Requirements	–	3 marks
Principle	-	3 marks
Procedure	-	3 marks
Observations	-	3 marks
Calculation / graph and Results	-	3 marks
Discussion	-	3 marks
Precautions	-	2 marks

List of experiments:

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. To study the effect of the environmental factor light on transpiration by excised twig.
3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.
4. To study the activity of catalase and study the effect of pH on the activity of enzyme.
5. To Study Hill's reaction.
6. To study the effect of light intensity on O₂ evolution in photosynthesis.
7. Comparison of the rate of respiration in any two parts of a plant.
8. To separate photosynthetic pigments by paper chromatography.

Q2. Setup - B and Setup - C (any two from the list of demonstration experiments: at least 4 questions to be asked). (10 +10 marks)

List of demonstration setup:

1. Effect of GA on Bolting / Effect of auxins on rooting.
2. To demonstrate the delay of senescence by cytokinins / effect of ethylene on fruit ripening.
3. To study the phenomenon of seed germination (effect of light and darkness).
4. To demonstrate Respiratory Quotient (RQ).

Q3. Viva Voce: (20 marks: 10 per examiner)

Q4. Continuous Evaluation: (20 marks)
Test: 10 Marks
Records: 10 Marks

Suggestions

Theory

NO Change

Practicals

Listing of practicals not in order, needs to be corrected.