

Sr. no. of paper : 8552

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Roll no.:

Unique paper code : 216503

Name of the paper : BTHT 508 : Plant Physiology

Name of the course : B.Sc. (Hons) Botany Part III

Semester : V

Duration : 03 Hours

Maximum Marks : 75

Instructions for candidates

Attempt any **five** questions in all,

All questions carry equal marks.

Q1. Attempt any three of the following:

(3 x 5 = 15)

1. Explain the Fick's law of diffusion. How does it form the basis for quantitative description of diffusion?
2. Explain why transpiration rate tends to be greatest under condition of low humidity, bright sunlight and moderate winds?

3(a) The radial movement of water through the root involves two possible pathways. Discuss.

3. (b) Estimate the value of ψ_{cell} , ψ_s and ψ_p for a tissue that neither gains nor loses weight when equilibrated with 0.4 molal mannitol solution.

4. (a) What is transpiration? Does it serve any useful function in the plants?

4. (b) Explain whether the following are TRUE or FALSE:

- i. Hydraulic conductance is a measure of resistance to water in xylem.
- ii. "Designed leakage" hypothesis is a kind of safety valve.
- iii. The water content of soil between field capacity and permanent wilting percentage is considered unavailable water.
- iv. Light compensation point is the minimum light intensity at which photosynthesis exceeds respiration.
- v. Stomatal movements follow endogenous rhythm

Q 2. Attempt any three of the following:

(3 x 5 = 15)

1. What is vivipary? How is ABA involved in regulating the vivipary?
2. Describe the cytokinin receptor and signal transduction pathway. How does it relate to cytokinin activity?
3. Name two recently discovered plant growth regulators and their significance.
- 4(a). Ethylene is primarily known for its promotion of fruit ripening and senescence. Comment.

4(b). State whether the following are TRUE or FALSE:

- i. Zeatin was the first cytokinin discovered by F. Skoog and C.O. Miller.
- ii. Calmodulin are regulatory proteins which bind to calcium for their activity.
- iii. DELLA proteins are the class of nuclear proteins that function as repressor of cytokinin signalling.
- iv. Homeobox genes play a fundamental role in plant growth & development.
- v. Auxins stimulate cell enlargement in intact tissue while Gibberellins stimulate cell enlargement in excised tissues.

Q.3 Distinguish between:

(5 x 3 = 15)

- A) Active salt absorption and passive salt absorption
- B) Climacteric and non-climacteric fruits
- C) Hydroponics and Aeroponics
- D) Drought tolerance and Drought avoidance
- E) Carrier proteins and channel proteins

Q.4 (A) Enumerate the survival strategies developed by plants of arid regions. **(5)**

(B) Give brief account of physiological changes associated with fruit ripening **(5)**

(C) List the criteria of essentiality of mineral elements. **(3)**

(D) What are trace elements? **(2)**

Q.5 Answer any three:

(3 x 5 = 15)

(A) Choose the correct alternative amongst the ones provided in the bracket:

- a) The ability of a sink to mobilize photosynthates towards itself is often described as (sink strength/ sink size).

b) A florally (competent / determined) bud will produce flower if it is grafted onto a vegetative plant that is not producing any floral stimulus.

c) The inhibition of flowering in short-day plants by night-break is under control of (phytochrome/cryptochrome).

d) Green light (promotes /reverses) blue-light stimulated stomatal opening.

e) The classical red, far- red photoreversible responses are known as (low fluences responses /very low fluence responses).

(B) Briefly discuss the blue – light mediated plant development response.

(C) What is a photoperiodic cycle? Citing suitable examples, classify the plants according to their photoperiodic responses.

(D) Differentiate between short – distance and long –distance phloem transport.

Q.6. (A) How were phytochromes discovered?

(3 x 5 = 15)

(B) Write short notes: (any two)

(i) Role of aphids in understanding phloem transport.

(ii) Mode of phytochrome action.

(iii) Composition of phloic sap.

(C) Describe the experiments that led to the discovery that ... (attempt any two)

(i) Shoot apical meristem is the site of perception of cold temperature.

(ii) Leaves are the sites of perception of photoperiodic signals.

(iii) Flowering stimulus of a short- day plant and a long – day plant could be similar.

(1000)****