

THE OPEN UNIVERSITY OF SRI LANKA
B.Sc./B.Ed. DEGREE PROGRAMME
BOTANY – LEVEL 04
FINAL EXAMINATION – 2007/2008
BTU 2201/BTE 4201 – PLANT PHYSIOLOGY (PAPER I)
DURATION : TWO AND A HALF (2 ½) HOURS



241

DATE : 30.06.2008

TIME: 10.00 a.m. – 12.30 p.m.

ANSWER ANY FOUR(04) OF THE FOLLOWING QUESTIONS.

01. a) What are the components that determine the water potential of plant cells? How would you express the relationship between these components?
- b) Explain what you would expect to happen if a plant cell with an osmotic potential of -1000 kPa and pressure potential of 200 kPa is placed in the following.
- i) a solution of osmotic potential of -800 kPa
 - ii) a solution of water potential of -800 kPa
 - iii) a solution of osmotic potential of -1000 kPa
 - iv) pure water.
- c) Distinguish between
- i) isotonic solution and hypotonic solution.
 - ii) concave plasmolysis and convex plasmolysis.
 - iii) diffusion and osmosis.
02. a) Name the processes by which water/water vapour is lost from plants. Explain how each process takes place.
- b) Discuss the role of stomata in transpiration
- c) What is the significance of transpiration?
- d) What are anti-transpirants? Briefly explain how they work.

03. a) How do you differentiate between pathological symptoms from nutritional deficiencies?
- b) Describe the symptoms seen in a plant when it is deficient in
- i. magnesium
 - ii. nitrogen
 - iii. phosphorus
- c) Discuss the role of the above elements in plants.
04. a) Explain the nature and the structure of the plant tissue which is involved in translocation of organic food material.
- b) Briefly describe the experiments performed to demonstrate that the translocation of assimilates takes place in the phloem.
- c) State the composition of the phloem sap.
05. Explain the following.
- a) "Soil-less culture of plants (hydroponic culture) have several advantages over soil-based culture"
 - b) "Unique properties of water make water suited for the role it plays in plants."
06. Write briefly on any two of the following.
- a) Fluid mosaic model of biological membranes.
 - b) Mechanism of phloem translocation.
 - c) Effect of environmental factors on transpiration.

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DURATION : TWO AND A HALF (2 ½) HOURS



DATE : 30.06.2006

TIME: 1.30 p.m. – 4.00 p.m.

ANSWER ANY FOUR (04) OF THE FOLLOWING QUESTIONS.

01. a) What is photorespiration?
b) How does the leaf anatomy and the CO₂ fixation process in C₄ plants reduce photorespiration?
c) What is the significance of crassulacean Acid Metabolism (CAM) to plants which possess this mechanism?
02. a) Briefly explain the suitability of Adenosine Tri-phosphate (ATP) as an energy storing intermediate.
b) Give a simple account of glycolysis and state why ATP is utilized during the first steps of glycolysis.
d) Outline the principal stages of anaerobic respiration.
03. a) What are plant hormones?
b) Briefly describe how plant hormones influence each of the following processes.
i. Abscission of leaves and fruits.
ii. Germination of cereal grains
iii. Epinasty
iv. Phototropic responses of plants.

04. a) What is photoperiodism?
- b) Briefly explain the role of the hypothetical hormones "florigen" and "vernalin" in the regulation of flowering.
- c) A short-day plant has a critical night length of 15 hours for flowering. Giving reasons, state whether this plant would flower or not when exposed to the following conditions.
- i. 16 hours of darkness
 - ii. 15 hours of darkness but given a flash of red light during this period.
 - iii. 15 hours of darkness but given a flash of red light followed by a flash of far-red light during this period.
 - iv. 10 hours of light.
05. Explain the following:
- a) "Continuous pruning maintains a plant as a bush"
 - b) "A quick response of plants to water stress is closure of stomata".
 - c) "When plants are placed horizontally, shoots bend upwards and roots bend downwards".
06. Write short notes on any two(02) of the following.
- a) External (Environmental) factors affecting growth of plants.
 - b) Photosynthetic pigments.
 - c) Non-symbiotic nitrogen fixation.