

National Exams May 2003

98-Agric-A1, Applied Plant Physiology

3 hours duration

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of the assumptions made.
2. Candidates may use one of two calculators, the Casio or Sharp approved models. This is a Closed Book exam.
3. Any five questions constitute a complete paper. Only the first five questions as they appear in your answer book will be marked.
4. All questions are of equal value.

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1. a) The water potential of a sample of leaf tissue at 25° C is -1.5 MPa, with a pressure potential within the cell of +0.5 MPa. What is the molality of the solution within the cytoplasm of the cell, assuming that all of the solute is divalent? (Gas constant = 0.0083 L MPa / mole / °K; $T_{\text{absolute}} = -273^{\circ} \text{C}$)

b) Describe how photosynthate is believed to move from source to sink leaves.
2. Describe how light energy is used to form oxygen and NADPH in chloroplasts.
3. Describe how ATP is synthesized in oxidative and photosynthetic phosphorylation.
4. Describe how plants adapt to short and long term hypoxic stress.
5. Discuss the various types of seed dormancy and the methods used to overcome them.
6. How are fatty acids metabolized to generate sugars for growth during germination in oil-containing seeds?
7. Briefly describe the following terms:
endosperm, testa, apical meristem, turgor pressure, thylakoid membrane, vivipary, apoplast, guard cell, vacuole, light quantum.