



UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

**PROGRAMME: BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION &
EXTENSION YEAR THREE
BACHELOR OF SCIENCE IN AGRONOMY YEAR THREE
BACHELOR OF SCIENCE IN HORTICULTURE YEAR THREE**

COURSE CODE: CP 305

TITLE OF PAPER: CROP PHYSIOLOGY

TIME ALLOWED: TWO (2) HOURS

**INSTRUCTIONS: ANSWER QUESTION 1 AND 2 AND ANY OTHER TWO (2)
QUESTIONS**

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CHIEF INVIGILATOR**

QUESTION 1

Match the term in Column 1 with statement in Column 2 that best describes the term. For example, simply answer/write, 17 = P. (1.5 marks each).

- | | |
|--------------------------------|---|
| 1. C4 species | A Heritable modification in plant structure or function that improves the fitness of the organism |
| 2 Phloem loading | B Deficiency symptoms appear in newer tissues |
| 3. Epinasty | C Redox reactions of electron transport chain and synthesis of adenosine triphosphate |
| 4. Ethylene | D Caused by diurnal changes in production of ethylene |
| 5. Acclimation | E Plants that have a higher carbon dioxide compensation point |
| 6. Magnesium | F Responsible for form and shape of plants, plant parts |
| 7. Log phase | G Generates Calvin Cycle intermediates |
| 8. Oxidative phosphorylation | H Plants that have low light compensation points |
| 10. Nyctinasty | I Causes thigmomorphogenesis |
| 11. Adaptation | J Uphill transport of sucrose from the apoplast into the sieve cells |
| 12. Calcium | K Leaf movements that arise from turgor changes |
| 13. Hexose monophosphate shunt | L Non-heritable adjustment in physiology that occurs over the life of an individual plant |
| 14. Giberellins | M Deficiency symptoms appear on older tissues because of translocation |
| 15. C3 species | N Associated with tillering, stem elongation and leaf expansion in cereals |
| 16. Phloem transport | O Driven by metabolic processes of source and sink tissues |

(24 Marks)

QUESTION 2

Indicate whether the statements below are true (T) or false (F). For example, simply answer/write, (n) = F. (2 marks each).

- (a) Large k values imply that photon irradiance increases rapidly with depth of canopy
- (b) Osmotic adjustment is where osmotic potential of the cytosol becomes unusually negative so that cell turgor can be maintained
- (c) High concentrations of auxin can lead to distortion or retardation
- (d) Stem elongation inhibited by light is an example of photomorphogenesis
- (e) The Krebs or Citric Acid Cycle, takes place in the peroxisome
- (f) Responses to cytokinin include adventitious root formation, delay of senescence, and stimulation of germination
- (g) Length of day, not night, is the operative factor in photoperiodism
- (h) Clipping or grazing stimulates branching owing to removal of apical meristem
- (i) Cyclic photophosphorylation involves Photosystem II
- (j) Ethylene can assist germination, sprouting, and flowering
- (k) Stomata may close in response to low leaf water potential
- (l) The process where the enzyme ribulose biphosphate carboxylase fixes O_2 not CO_2 is referred to as phosphorylation.
- (m) Leaf movements (nyctinasty) are governed by oscillating or rhythmic timing mechanisms in plants.

(26 Marks)

QUESTION 3

- (a) (i) Total amount of photosynthates produced in a crop is decided by two plant factors/ conditions. Briefly describe them. (4 marks)
 - (ii) Describe the four processes involved in assimilate translocation (6 marks)
 - (b) (i) Define plant stress (3 marks)
 - (ii) Describe the effects of stress (6 marks)
 - (iii) Plant performance under stress can be evaluated in terms of three discrete groups of characteristics. Briefly describe them. (6 marks)
- (25 Marks)

QUESTION 4

Describe mechanisms that account for:

- (a) absorption of water by roots (4 marks)
 - (b) uptake of mineral nutrients (4 marks)
 - (c) xylem transport of water (9 marks)
 - (d) movement of assimilates (food) in plants (8 marks)
- (25 Marks)**

QUESTION 5

Describe in as much details as possible reasons that account for differences in crop growth rate amongst crop species: maize, sorghum, cotton, soybean and cassava depicted in the graph below.

(25 Marks)

