



UNIVERSITY OF ESWATINI

SPECIAL ASSESSMENT EXAMINATION PAPER

PROGRAMME: BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION
BACHELOR OF SCIENCE IN AGRICULTURAL EXTENSION
BACHELOR OF SCIENCE IN AGRONOMY
BACHELOR OF SCIENCE IN HORTICULTURE

COURSE CODE: CPR203 / CPR215

TITLE OF PAPER: CROP PHYSIOLOGY
PLANT PHYSIOLOGY

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ALL QUESTIONS
MARKS ARE SHOWN AGAINST EACH QUESTION

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INVIGILATOR**

QUESTION 1

Identify the correct answer for the following questions/ statements [25 marks]

1. Which of the following statements about Pr and Pfr is FALSE?
 - A. They are photoreceptors.
 - B. They participate in photoconversion reactions.
 - C. Pr is the biologically active form.
 - D. Pr absorbs 660-nanometer light.
 - E. Pfr absorbs 730-nanometer light

2. Which of the following statements about circadian rhythms is FALSE?
 - A. They are endogenous.
 - B. They can be entrained by light-dark cycles.
 - C. They can be entrained by temperature cycles.
 - D. They speed up as the temperature rises.
 - E. They enable the plant to measure changing daylength

3. Which of the following statements about stomates is FALSE?
 - A. Stomatal opening and closing is the function of the guard cells
 - B. When the stomates are open, the internal concentration of K⁺ is low
 - C. Stomatal opening is triggered by light
 - D. Stomatal opening is also tied to a 24 hour cycle (a circadian rhythm)
 - E. All of the above statements about stomates are TRUE

4. Which of the following statements of the Transpiration-Cohesion-Tension model of transpiration is FALSE?
 - A. Evaporation of water from the leaves generates the initial pull of water up the xylem
 - B. Water has low cohesive properties and this reduces friction as it flows up the xylem
 - C. Water adheres to the xylem walls preventing backflow
 - D. All of the above statements of the Transpiration-Cohesion-Tension model of transpiration are TRUE

5. Apoplastic transport of water is possible in all of the following tissues EXCEPT:
 - A. epidermis
 - B. cortex
 - C. endodermis
 - D. pericycle

6. Which of the following elements is incorrectly paired with its function in a plant?
 - A. nitrogen: component of nucleic acids, proteins, coenzymes
 - B. magnesium: component of chlorophyll; activates many enzymes
 - C. phosphorus: component of nucleic acids, phospholipids, ATP, several coenzymes
 - D. potassium: osmosis; operation of stomata

E. sulphur: component of DNA; deficiency is known to result in chromosomal abnormality.

7. While responses to plant hormones are normally slow, which of the following hormones has been shown to be involved in the rapid opening and closing of stomata?

- A. auxin B. cytokinin C. ethylene D. abscisic acid E. gibberellin

8. Both photosynthesis and respiration require

- A Chloroplasts
 B Sunlight
 C Mitochondria
 D Cytochromes

9. In CAM plants, CO₂ required for photosynthesis enters the plant body during

- A Daytime through the lenticels
 B Night when the hydathodes are open
 C Daytime when the stomata are open
 D Night through the stomata which are kept open

10. Which one of the following is wrong in relation to photorespiration:

- A It is a characteristic of C₄ plants
 B It is a characteristic of C₃ plants
 C It occurs in daytime only
 D It occurs in chloroplasts

QUESTION 2

Match the term in Column 1 with statement that best describe it in Column 2. As an example, in your answer book, simply write K=11 [25 marks]

Column 1		Column 2	
A	C ₃ species	1	Leaf movements that arise from turgor changes
B	Magnesium	2	Stimulates production of pectinases and cellulase which helps create many intercellular spaces characteristic of hydrophytes
C	Allometry	3	Plants that have a higher carbon dioxide compensation point
D	Heterotroph	4	Leaves with different shapes
E	Nyctinasty	5	Plants that have low light compensation points
F	Calcium	6	Relation between different rates of growth of plant organs
G	Heterophylly	7	Caused by diurnal changes in production of ethylene
H	C ₄ species	8	Deficiency symptoms appear in newer tissues
I	Epinasty	9	Obtain nutrients from another plant
J	Ethylene	10	Deficiency symptoms appear on older tissues

QUESTION 3

State a phrase or term (s) that correctly completes the statements below [25 marks]

- a) Cell elongation in internodal regions of the green plants takes place due to the following hormone action _____
- b) System for a uniform coding of phenologically similar growth stages of all mono- and dicotyledonous plant species _____
- c) Light response that lead to lateral growth giving shoots and roots of plants recognizable architecture _____
- d) Coiling of garden pea tendrils around any support is an example of _____
- e) When leaf water potentials drop due to water deficits, turgor is insufficient to drive this process _____
- f) The response of different organisms to the environmental rhythms of light and darkness is called _____
- g) The phytohormone, _____, which increases the concentration of potassium in guard cells is also responsible for the induction of _____
- h) Application of water soluble solid fertilizer or liquid fertilizer through an irrigation system _____
- i) Catalyze movement of one type of ion or molecule against its concentration gradient coupled with the movement of a different ion or molecule in the opposite direction _____

QUESTION 4

Indicate whether the statements below are true (T) or false (F). In your answer book, just write T or F. [25 marks]

- a) When shoots are exposed to light, a chemical substance migrates toward the light causing bending.
- b) Responses to cytokinin include adventitious root formation, delay of senescence, and stimulation of germination
- c) Long-day plants are governed by whether the critical night length sets a maximum number of hours of darkness
- d) The hormone produced during adverse environmental conditions is ethylene
- e) Base saturation is a measure of negative surface charge of soils and hence its ability to hold and exchange nutrient cations.
- f) The process where the enzyme ribulose biphosphate carboxylase fixes O_2 not CO_2 is referred to as photorespiration.
- g) Clipping or grazing stimulates branching owing to removal of apical meristem
- h) Length of day, not night, is the operative factor in photoperiodism
- i) Adhesion is the process where water molecules pull each other up the xylem
- j) Stem elongation inhibited by light is an example of photomorphogenesis