UNIVERSITY OF SWAZILAND

MAIN 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 QUESTION 2, AND ANY OTHER TWO (2) QUESTIONS

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QUESTION 1

Match the terms on the left column (represented by a letter) with the correct definition/ description of the term on the right column (represented by a number). As an example, in your Answer Book, write K = 11

A.	Tryptophan	1.	set of enzyme-mediated reactions in which light energy from the sun is converted into the chemical bond energy found in glucose and ATP
B.	Amyloplasts	2.	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
C.	Nastic movements	3.	plant not tolerant of high salt concentrations in the soil
D.	Leaf area ratio	4.	light receiving pigment in the leaves that controls photoperiod
E.	Glycophyte	5.	ratio of leaf area to the ground area occupied by the crop, or the leaf area per unit area of land
F.	Translocation	6.	primary precursor for auxin biosynthesis
G.	Leaf area index	7.	gravity receptors in plant cells
H.	Photosynthesis	8.	response to environmental stimuli that are independent of the direction of the stimulus
I.	Antiporters	9.	process of sugar movement from source to sink
J.	Phytochrome	10.	ratio between the total leaf area (or photosynthesizing tissue) to the total respiring plant tissues (or total plant biomass)

(25 Marks)

QUESTION 2

Indicate the correct answer for the following statements. As an example, in your Answer Book, write 11 = B

1. Select the correct events leading to the opening of the stomata

   a. Decline in guard cell solutes
   b. Lowering of osmotic potential of guard cells
   c. Rise in potassium levels in guard cells
   d. Movement of water from neighbouring cells into guard cells
   e. Guard cells becoming flaccid

   Answer:
   A a, c and d only
   B b, c and d only
   C a and e only
   D b, d and e only

2. Which one of the following pairs, is not correctly matched?
   A IAA – Cell wall elongation
   B Abscisic acid – Stomatal closure
   C Gibberellic acid – Leaf fall
   D Cytokinin – Cell division

3. The minerals involved in water-splitting reaction during photosynthesis are
   A Magnesium and Chlorine
   B Potassium and Manganese
   C Manganese and Chlorine
   D Molybdenum and Manganese

4. In which of the following plants, there will be no transpiration?
   A Plants growing in hilly regions
   B Aquatic, submerged plants
   C Plants living in deserts
   D Aquatic plants with floating leaves

5. The translocation of organic solutes in sieve tube members is supported by
   A P-proteins
   B Root pressure and transpiration pull
   C Cytoplasmic streaming
   D Mass flow involving a carrier and ATP

6. Water will be absorbed by root hair when
   A concentration of salts in the soil is high
   B concentration of solutes in the cell sap is high
   C plant is rapidly respiring
   D they are separated from soil by a permeable membrane

7. Differentiation of shoot is controlled by:
   A High auxin : cytokinin ratio
   B High cytokinin : auxin ratio
   C High gibberellin : auxin ratio
   D High gibberellin : cytokinin ratio

8. Movement of leaves of sensitive plant, *Mimosa pudica* are due to
   A Thermonasty
   B Seismonasty
   C Hydrotropism
   D Chemonasty.

9. Carbohydrates are commonly found as starch in plant storage organs. Which of the following five properties of starch (a to e) make it useful as a storage material?
   (a) Easily translocated
   (b) Chemically non-reactive

(c) Easily digested by animals
(d) Osmotically inactive
(e) Synthesized during photosynthesis

The useful properties are:
A (a) and (e)
B (b) and (c)
C (b) and (d)
D (a), (c) and (e)

10. In sugarcane plant, CO_2 is fixed in malic acid, in which the enzyme that fixes CO_2 is:
A Ribulose phosphate kinase
B Phosphoenolpyruvic acid carboxylase
C Ribulose biphosphate carboxylase
D Fructose phosphatase

(25 Marks)

QUESTION 3

a) What is net photosynthesis? (5 Marks)
b) Compared to C3 plants, describe the disadvantage(s) of C4 plants (5 Marks)
c) List and describe the products of respiration (15 Marks)

(Total 25 Marks)

QUESTION 4

Briefly explain the following phenomena/ observations

a) Transpiration is least in high atmospheric humidity
b) Phytochrome is involved in photoperiodism
c) Gibberellins promotes seed germination
d) Photorespiration is favoured by a high O_2/CO_2 ratio
e) Movement of ions against the concentration gradient

(25 Marks)

QUESTION 5

Explain the following terms

a) Extinction coefficient
b) Photophosphorylation
c) Glycolysis
d) Translocation gradient
e) Plagiotropism

(25 Marks)