

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER 2010/2011

- COURSE CODE : B402
- TITLE OF PAPER : PLANT PHYSIOLOGY
- TIME ALLOWED : THREE (3) HOURS
- INSTRUCTIONS :
1. ANSWER ANY FOUR (4) QUESTIONS
  2. EACH QUESTION CARRIES 25 MARKS.
  3. ILLUSTRATE YOUR ANSWERS WITH LARGE AND CLEARLY LABELLED DIAGRAMS WHERE APPROPRIATE

SPECIAL REQUIREMENTS :

CANDIDATES MAY BRING THEIR CALCULATORS. GRAPH PAPER MAY BE PROVIDED ON REQUEST.

THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR(S).

QUESTION 1.

With reference to at least one factor, explain how environmental cues can regulate plant biomass development.

[25 Marks]

QUESTION 2.

[a]. Discuss the role of mesophyll and bundle sheath cells in C4 Photosynthesis.

[10 Marks]

[b]. Give an account of Photosynthesis in Crassulacean Acid Metabolism (CAM) plants.

[15 Marks]

QUESTION 3.

Discuss the possible mechanisms that higher plants may utilize for water stress resistance.

[25 Marks]

QUESTION 4.

Explain how Potassium may be involved in transport processes in root tissues and leaf tissues of plants.

[25 Marks]

QUESTION 5.

How might phytohormones be involved in the following phenological processes:-

[a]. Flower and fruit development.

[12 Marks]

[b]. Leaf development and shedding.

[13 Marks]

QUESTION 6.

[a]. Explain what is meant by “essential mineral nutrients” in the context of plant life.

[10 Marks]

[b]. Consider Table 1 below. Calculate Nernst potentials and determine the direction of the passive driving force for the ions noted with reference to mineral element uptake in typical plant cells.

Table 1. Solute transfer in plant cells.

ION	$C_O$ (mM)	$C_I$ (mM)	$E_M$ (mV)
$Na^+$	1.01	15	-140
$K^+$	0.09	130	-140
$Cl^-$	1.50	70	-140
<i>NB</i>			
$C_O$ = Concentration Outside the Cells		$R = 1.98/\text{mol-deg.}$	
$C_I$ = Concentration Inside the Cells		$T = 298^\circ\text{K}$	
$E_M$ = Membrane Potential		$F = 23060 \text{ Cal/Volt}$	

[15 Marks]

[TOTAL MARKS: 100]