

National University of Lesotho

Faculty of Agriculture

BSc Crop Science

CPS 3501: Introduction to Physiology

Date: August 2023

Supplementary Examinations

Total time 3hrs

Total Marks: 100

Instructions to candidate

- a) Answer **ALL FOUR** Questions.
- b) Each Question Carries **25 Marks**.

-----GOODLUCK!!-----

Question 1 (25)

- a) Write short explanatory notes to show that you understand the concept of plant-water potentials [5]
- b) Explain clearly the concept of **Osmotic Adjustment**. [5]
- c) In the Crop Science Lab, student prepares a sucrose solution in a beaker.

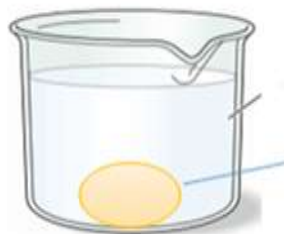
0.15M solution of sucrose



What is the Ψ_w of a 0.15M solution of sucrose at 1 atm at 25°C. [5]

- d) A 3rd year Crop Science student performs an experiment where she/he placed a potato tissue with a pressure potential of 6.2 bars which equilibrizes with -5.5M sucrose at 20°C in an open beaker.

0.15M



-5.5M of sucrose

Potato tissue (- 6.2 bars)

What is the molar concentration of sucrose in the cell? [10]

Question 2 (25)

- a) Please state the diversity of respiratory metabolisms in plants and its biological significance. [12]
- b) Please state the **physiological role of mineral elements** in photosynthesis. [8]
- c) Please explain the driving force of water transport in higher plants and how it is produced. [5]

Question 3 (25)

- a) Briefly describe how the products of light reactions are generated. [6]
- b) Without drawing any diagram, briefly outline how C4 plants assimilate CO₂ [6]
- c) Explain the following statements and fill in where necessary [8]
- i) Photosynthesis unit:
 - ii) Oxygen evolving centre.
 - iii) Short day plant flower in a very short light period.
 - iv) O₂ release during plant photosynthesis come from ().
- c) Explain how **glycolate** is formed by photorespiration [5]

Question 4 (25)

Write a detailed note on the following plant growth regulators: auxin; gibberellins; cytokinins; ABA and ethylene. Include **aspects on site of production, physiological effects in plants, and transport.**