

**National University of Lesotho**

**Faculty of Agriculture**

**BSc Crop Science**

**CPS 3501: Introduction to Physiology**

**Date: January 2024**

**Final examination**

**Total time 3hrs**

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**Total Marks: 100**

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**Instructions to candidate**

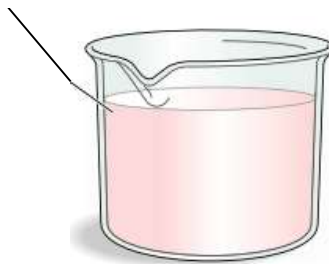
- a) Answer **ALL FOUR** Questions.
- b) Each Question Carries **25 Marks**.

**-----GOODLUCK!!-----**

**Question 1 (25)**

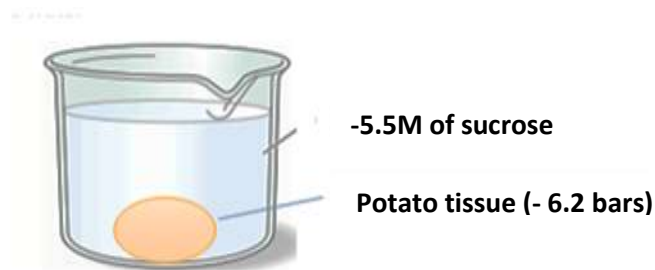
- a) Write short explanatory notes to show that you understand the concept of plant-water potentials [5]
- b) Clearly explain the concept of **Osmotic Adjustment**. [5]
- c) In the Crop Science Lab, student prepares a sucrose solution in a beaker.

**0.15M solution of sucrose**



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

- d) A 3<sup>rd</sup> 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.



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 CO<sub>2</sub> [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) O<sub>2</sub> release during plant photosynthesis comes 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.**