

Uva Wellassa University, Sri Lanka
 B.Tech. Degree Programme - 2006/07
 End Semester Examination- Semester 1
 January -2008



BIO 202-1 Fundamentals of physiology

Answer both Part A and Part B

Time: One (01) Hour

Part A: Answer two questions only

1. (a) Explain briefly the glycolysis process.

(3marks)

(b) Illustrate by a schematic diagram the process of CO₂ fixation in a C₄ plant (omit structural formulae)

(10marks)

(c) The acid content in 2 grams of leaf tissue in a CAM plant kept continuously in the dark for 12 hours and 24 hours was estimated by titrating the tissue extract with 0.01M NaOH. The volumes of NaOH used up are as follows.

12 hrs of darkness - 30ml

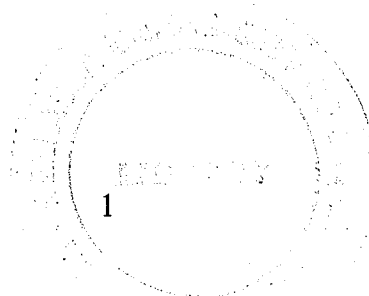
24 hrs of darkness - 18ml

Give an explanation for the difference in NaOH volumes obtained. (Assume the leaves used for the extraction were at the same stage of maturity.)

(7marks)

(d) How does CAM metabolism enable plants to maximize their water use efficiency?

(5marks)



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2. (a) What are the three pathways that water moves through a plant root and explain briefly about the pathways? (7marks)

(b) A group of biology students wanted to design an experiment to determine the water potential of a plant cell in different situations. First they took a *Rhoeo* cell (solute potential is known $\psi_s = -0.648\text{Mpa}$) and put it in to a hypertonic solution. At the incipient plasmolysis stage, the cell was taken out and put in pure water. After the equilibrium, the cell was removed from that solution and put again in 0.4mol dm^{-3} sucrose solution.

i. What is the water potential (ψ_w) of the cell before putting it in to pure water?

ii. Calculate ψ_p (pressure potential =P1) of the cell at the equilibrium with pure water.

iii. At the equilibrium what is the ψ_p (pressure potential=P2) of the cell when the cell is in sucrose solution?

iv. What can you say about P1 and P2? and why?

$$\Psi_s = -iRT \quad (i=1, R=8.314 \text{ cm}^3 \cdot \text{MPa} \cdot \text{K}^{-1} \cdot \text{mol}^{-1}, \text{ room temperature} = 25^\circ\text{C})$$

State your assumptions clearly.

(18marks)

3. Discuss about the following topics

(a) K^+ / H^+ hypothesis for stomatal opening

(10marks)

(b) Non cyclic electron transport chain

(15marks)