P530/2
BIOLOGY
(Theory)
Paper 2
Apri./May. 2023
$2\frac{1}{2}$ HOURS

Uganda Advanced Certificate of Education

BIOLOGY

Paper 2

2 hours 30 minutes

INSTRUCTIONS

- This paper consists of two sections A and B
- Attempt question 1 in section A and any three (3) from section B
- Any additional (s) will not be marked.
- You are advised to read the questions carefully, organize your answers and present them precisely and logically. Illustrate your answers with clear labeled diagrams where necessary.

SECTION A (40 MARKS)

*Question **1** is **compulsory***

1. In an experiment on one of the passive processes of movement of substances in and out of cells, five cubes of an Irish potato tuber measured to the same dimension were placed in different solutions of sucrose of varying concentration for 20 minutes.
   The ratio of initial volume to final volume of each cube was obtained after 20 minutes as shown in the following table.

Concentration of sucrose (moles per litre)x10^{-1}	Ratio of initial volume to final volume
1	0.90
2	0.95
3	1.02
4	1.10
5	1.21

(a)
(i) Present the above resents graphically. (10 marks)
(ii) Describe the graph. (03 marks)

(iii) Give an account for the ratios obtained in each of the following cases.

Ratios below 1.10 (04 marks)

Ratios above 1.10 (03 marks)

(b)
(i) Using the graph, state the concentration of sucrose which produced no change in volume of cube. (01 mark)
(ii) Give the physiological role of the passive process which was investigated upon. (03 marks)
(iii) Name one other passive process involved in movement of materials in and out of cells. (01 marks)
(c) Name the structures responsible for production of respiratory energy for active movement of substances in the following groups of organisms.
(i) Prokaryotes. (01 mark)
(ii) Eukaryotes. (01 mark)
(d) State the importance of active transport in bodies of plants and animals. (06 marks)

SECTION B (60 MARKS)

*Answer any **three** questions from this section.*

*Any additional question(s) answered will **not** be marked.*

2.

(a) Using a well labelled diagram, describe the fluid mosaic model. (12 marks)

(b) How does the model differ from the Davson-Danielli's model? (05 marks)

(c) State any three factors that affect membrane fluidity. (03 marks)

3.

(a) Distinguish between the following;

(i) Water potential and osmotic potential (04 marks)

(ii) Solute potential and pressure potential (04 marks)

(b) Plant cells have a solute concentration which is generally higher than that of their surroundings. Describe what happens to a plant cell that has been placed in solutions with varying concentration from that of the cell sap. (10 marks)

(c) State any 2 practical applications of osmosis. (02 marks)

4.

(a) Draw and label a bacterial cell. ($06\frac{1}{2}$ marks)

(b) Describe the importance of bacteria in nature. ($13\frac{1}{2}$ marks)

5.

(a) Why is water a suitable habitat for living organisms? (08 marks)

(b) With examples, explain how organisms benefit from dehydration. (08 marks)

(c) Explain the biological significance of water being a universal solvent. (04 marks)

6.

(a) Explain the advantages of multicellularity over unicellularity. (08 marks)

(b) Describe the characteristics of meristematic tissues. (04 marks)

(c) Explain the importance of the different epidermal modifications in plants. (08 marks)

END