

**P530/2**  
**BIOLOGY**  
**(Theory)**  
**Paper 2**  
**Aug./Sept. 2022**  
 **$2\frac{1}{2}$  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

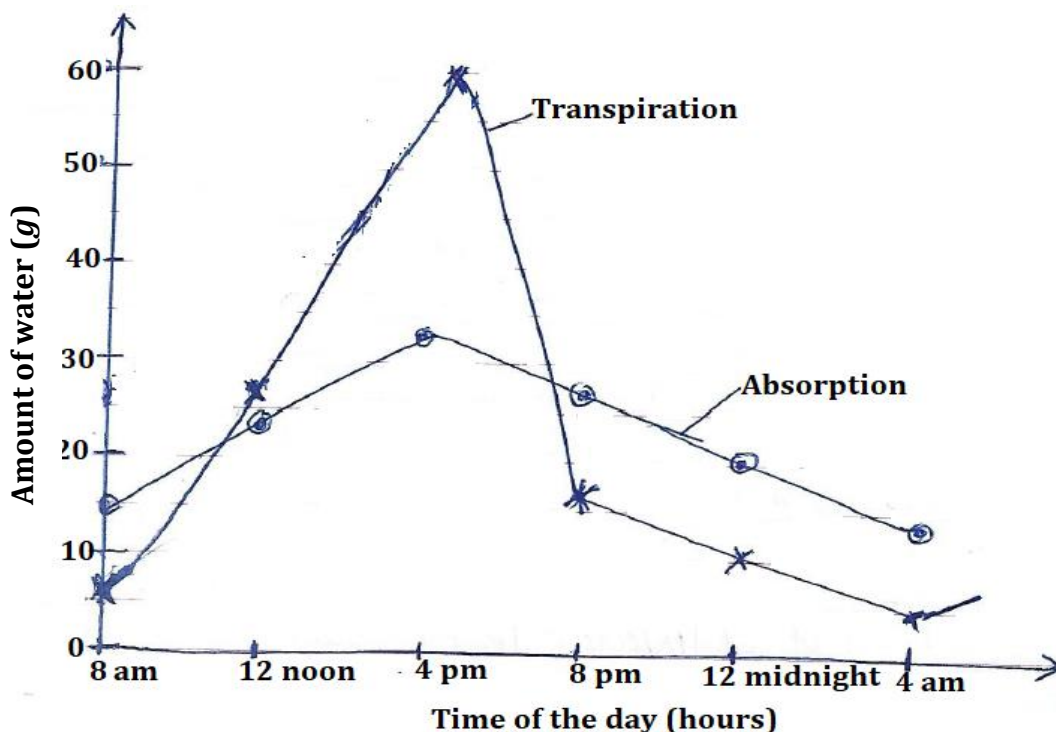
1. In an experiment carried out to measure the uptake of water, potassium ions and oxygen by the different zones of the roots of a dicotyledonous plant, the root of an intact plant was immersed in a very dilute solution of potassium nitrate. Measurements for the absorption of the substances were made when the plant was transpiring at a high rate.

The results of the experiment are shown in the table 1 below.

| Zones of the root of an intact plant | Amount of substances absorbed in each root zone (arbitrary units) |                |        |
|--------------------------------------|---|----------------|--------|
|                                      | Water   | Potassium ions | Oxygen |
| Outer zone of the root               | 18  | 05             | 07     |
| Middle zone of the root              | 30  | 15             | 03     |
| Inner zone of the root               | 26  | 12             | 02     |

In another experiment, the relationship between the amount of water absorbed and lost through transpiration in the plant used in experiment above were made and the results obtained are represented in the graph 1 shown below.

Graph 1



- (a)
- (i) What is meant when the process of uptake is said to be active and passive? (04 marks)
  - (ii) Explain why the amount of water and oxygen absorbed are different in each of the three zones of the root of the plant. (12 marks)
  - (iii) Explain why it is suggested that absorption of potassium ions into each zone of the root was an active process. (04 marks)
- (b)
- (i) Describe the relationship between water uptake and transpiration over time of the day indicated in the graph 1 above. (08 marks)
  - (ii) Give two factors varying with time of the day and explain how each influences the absorption and transpiration rates of the plant species used in the experiment. (08 marks)
- (c) Explain the physiological response that would occur in the plant when water availability in the soil decreases during long drought so that the plant conserves the little water absorbed. (04 marks)

## SECTION B (60 MARKS)

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

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

2.

(a) Distinguish between;

(i) Innate immunity and acquired immunity. (02 marks)

(ii) Primary and secondary immune responses. (02 marks)

(b) Explain how the human body may acquire the immunity against the viral disease infection. (12 marks)

(c) Discuss the advantages which an individual surviving after being infected by the viral pathogens have over the one protected against the same disease by vaccination. (04 marks)

3.

(a) Suggest the explanation for the;

(i) lack of an elaborate transport system for transport of the respiratory gases in plants. (08 marks)

(ii) importance of respiratory pigments in the mammalian transport system. (06 marks)

(b) State the advantages of restricting the respiratory pigments in the red blood cells of mammalian blood. (06 marks)

4.

(a) Explain the benefits of the following processes in flowering plants.

(i) Transpiration (04 marks)

(ii) Osmosis (04 marks)

(b) How are the plant structures for uptake and transport of water and dissolved salts suited to their functions? (12 marks)

5.

(a) Describe the structure and distribution of the stomata in terrestrial plants. (08 marks)

(b) Describe the mechanism of stomatal movement influenced by time of the day. (08 marks)

(c) Explain the environmental factors that influence the stomatal movements. (04 marks)

6.

(a) Describe how the structure of the heart muscle is suited to its function. (08 marks)

(b) Explain how the heartbeat is regulated according to the demands of the mammalian body. (08 marks)

(c) Give the situations that may lead to increased rate of heart beat. (04 marks) **END**