THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

033/2C **BIOLOGY 2C**

(ACTUAL PRACTICAL 2C)

Time : 3 Hours **ANSWERS** **Year : 2021**

Instructions

1. This paper consists of **two (2)** questions. Answer all questions.
2. Each question carries **twenty five (25)** marks.
3. Communication devices and any unauthorised materials are **not** allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet(s).

1. You are provided with stirring rod, delivery tube, test tube, Irish potato, scalpel, measuring cylinder and solutions in the beakers labeled by letters N_1, N_2, N_3, and N_4. Follow the procedures as directed in (i)–(vii) to demonstrate the process of capillarity and osmosis experiments, and answer the questions that follow:

(a) What was your observation after 5 minutes when a delivering tube and stirring rod were deepened into solutions N_1 and N_2 in procedure (i)?
The solution rose inside the delivery tube and stirring rod.

(b) Account for observation made in procedure (i).
The solution rose due to capillary action, where water molecules were attracted to the inner surface of the tube and pulled upward against gravity.

(c) Which of the beakers N_1 and N_2 acted as a control of the capillarity experiment? Give reason to support your answer.
Beaker N_2 acted as the control because it showed no rise in solution, proving that the rise observed in N_1 was caused by capillarity.

(d) Which tissue found in plants can perform the same function as represented by delivery tube in this experiment?
The xylem tissue in plants performs the same function.

(e) How does the function of capillarity investigated in this experiment important for the survival of the plants?
Capillarity enables plants to transport water and dissolved minerals from the roots to the upper parts, ensuring survival even in tall plants.

(f) (i) What was the texture of each bar after removing them from the solution N_3?
The boiled bar was soft and flexible. The unboiled bar was firm and turgid.

(ii) Briefly explain the cause of each texture observation in (f)(i).
The boiled bar was soft because its cell membranes and proteins were denatured by heat, preventing osmosis. The unboiled bar was firm because water entered the cells by osmosis, making them turgid.

(g) (i) What was the texture of each bar after removing them from the solution N_4?
The boiled bar remained soft. The unboiled bar became flaccid and shrunken.

(ii) Briefly explain the cause of each texture observed in (g)(i).
The boiled bar remained soft because its membranes were already destroyed and osmosis could not occur.
The unboiled bar became flaccid because water left its cells by osmosis into the concentrated solution.

(h) Which of the bars in solutions N_3 and N_4 acted as a control of osmosis experiment? Give reason to support your answer.
The boiled bars acted as the control because boiling destroyed their membranes, preventing osmosis and showing that osmosis depends on living membranes.

(i) Which of the solutions N_3 and N_4 had the following:
(i) Higher concentration of water molecules? Solution N_3.
(ii) Higher concentration of solute molecules? Solution N_4.

2. You are provided with specimens A, B, C and D, study them carefully and answer the following questions:

(a) (i) Identify each of the specimens A, B, C and D by its common name.
Specimen A – Earthworm.
Specimen B – Termite.
Specimen C – Grasshopper.
Specimen D – Cockroach.

(ii) Why scientists prefer binomial nomenclature in naming the organisms A, B, C and D instead of common names?
Because common names vary across regions and languages and may cause confusion, while binomial nomenclature is universal and precise.

(b) (i) Classify the specimen A to Phylum level.
Specimen A belongs to the Phylum Annelida.

(ii) Give two benefits of the specimen A to man.
The earthworm improves soil fertility through burrowing and mixing organic matter.
It increases soil aeration and water penetration.

(c) Classify each of the specimens C and D to class level.
Specimen C (grasshopper) – Class Insecta.
Specimen D (cockroach) – Class Insecta.

(d) Why are the specimens C and D placed in the same phylum but different classes?
Both specimens belong to Phylum Arthropoda because they have segmented bodies, jointed legs and exoskeleton. They differ in classes because they have different body features, feeding habits, and modes of development.

(e) What are the two benefits that specimen B has in the ecosystem?
Termites decompose dead plant material, recycling nutrients back into the soil.
They improve soil structure by creating tunnels that enhance aeration and water infiltration.