THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

033/2B **BIOLOGY 2B**

(ACTUAL PRACTICAL 2B)

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 Irish potato, knife/scalpel, scooper, table salt and water. Carry out experiments as directed in procedures (i) – (vii), then answer the questions that follow:

(a) With reference to your experiment, what does the part labelled by letter C represent?
The part labelled C represents the living tissue of the potato which acts as a selectively permeable membrane in osmosis.

(b) How does part C work in the process of osmosis?
Part C allows movement of water molecules across it, from a region of high concentration to a region of low concentration, while preventing the free movement of solute particles such as salt.

(c) What are the observations in the holes A and B after 40 minutes?
In hole A, water accumulates as it moves into the hole containing salt. In hole B, little or no significant change is observed since water concentration is already balanced.

(d) Account for the observations made in 1(c).
The salt in hole A creates a hypertonic environment, causing water molecules from surrounding potato cells to move into the hole by osmosis. In hole B, since the hole was filled with water, there is no significant concentration gradient to drive osmosis.

(e) Give the biological terms used for the concentrations in the holes A and B.
The concentration in hole A is hypertonic, while the concentration in hole B is hypotonic.

(f) Identify two osmotic activities which take place in plants by nature.
The absorption of water from the soil by root hairs is an osmotic activity. The opening and closing of stomata are also controlled by osmotic movement of water in and out of guard cells.

(g) Based on the observation made from the experiment, how the knowledge of osmosis can be applied in your daily life? Give two points.
Osmosis explains why excessive intake of salty food causes thirst, as water moves from body cells to balance salt concentration. It is also applied in food preservation methods like salting fish or meat, where high salt concentrations draw out water from microorganisms, preventing decay.

(h) What is the aim of the experiment?
The aim of the experiment is to demonstrate the process of osmosis using a potato tuber as a model system.

(i) How does osmosis differ from diffusion?
Osmosis is the movement of water molecules across a selectively permeable membrane from a region of high water concentration to low water concentration. Diffusion is the general movement of molecules or ions from a region of high concentration to low concentration, and it does not necessarily require a membrane.

2. You are provided with specimens Q, R, S and T. Study them and answer the following questions:

(a) (i) Identify each of the specimens Q, R, S and T by its common name.
Specimen Q – Housefly.
Specimen R – Cockroach.
Specimen S – Mosquito.
Specimen T – Grasshopper.

(ii) Why is it important for scientists to use the knowledge of classification in identification of the specimens instead of common names you used in 2(i)? Give two points.
Common names vary across different regions and languages, which may cause confusion. Classification uses scientific names that are universal and accepted globally, ensuring clarity and consistency in communication.

(b) (i) Classify each of the specimens Q and R to the class level.
Specimen Q (Housefly) – Class Insecta.
Specimen R (Cockroach) – Class Insecta.

(ii) Give three reasons for the specimens Q and R to be placed into different classes.
Specimen Q (Housefly) has only one pair of wings, while specimen R (Cockroach) has two pairs of wings.
Specimen Q undergoes complete metamorphosis, while specimen R undergoes incomplete metamorphosis.
Specimen Q has compound eyes adapted for flying, while specimen R has chewing mouthparts adapted for feeding on solid food.

(c) Why is the specimen R said to be economically important to human being while specimens S and Q are said to be detrimental? Give one point for each.

Specimen R (Cockroach) is economically important because it can be used as food for some domestic animals like poultry.

Specimen S (Mosquito) is detrimental because it transmits malaria and other diseases.

Specimen Q (Housefly) is detrimental because it spreads diseases such as cholera and typhoid by contaminating food.

(d) What are the two observable differences between the specimens S and T at class level?

Specimen S (Mosquito) has one pair of wings, while specimen T (Grasshopper) has two pairs of wings.

Specimen S undergoes complete metamorphosis, while specimen T undergoes incomplete metamorphosis.