THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

033/2A **BIOLOGY 2A**

(ACTUAL PRACTICAL A)

(For Both School and Private Candidates)

Time: 2:30 Hours **ANSWERS** **Year: 2021**

Instructions

1. This paper consists of two questions.

2. Answer all questions.

1. You are provided with two Irish potatoes, two water trough, boiling water and two watch glasses with sample A. Carry out an experiment as directed in procedures (i) – (ix), then answer the questions that follow:

(a) What is the aim of the experiment?
The aim of the experiment is to investigate the process of osmosis in living plant tissues using Irish potato specimens and a solute (sample A).

(b) Draw a well labeled diagram to indicate the setup of the experiment:
(i) at the beginning
half potato with central hole filled with sample A, placed in a trough with water up to half its height; labels: potato specimen U or V, hole with sample A, water level, trough.]
(ii) after 40 minutes
same setup but with visible rise in the level of liquid in hole of specimen U; no change or minimal change in V.

(c) Identify two changes observed after 40 minutes of the experiment.
- The level of liquid in the hole of specimen U increased.
- There was no significant change in the level of liquid in specimen V.

(d) Give a reason for the observed changes in the holes and the troughs after 40 minutes of the experiment.
In specimen U, which was not boiled, the living cells allowed osmosis, causing water from the trough to move into the hole with sample A. In specimen V, boiling destroyed cell membranes, preventing osmosis.

(e) Identify the specimen which acts as a control experiment.
Specimen V acted as the control experiment since it was boiled and its cells were dead, preventing osmosis.

(f) Give the biological terminologies used to identify the concentration of the solution in each of the following:
(i) Holes of the specimens – Hypertonic solution
(ii) Water troughs – Hypotonic solution

2. You have been provided with specimens D, E and F. Study them carefully and then answer the questions that follow:

(a)(i) What is the common name for each of the specimens D, E and F?
- Specimen D: Maize
- Specimen E: Sugarcane
- Specimen F: Onion

(ii) Why is it important to the scientists to classify specimens D, E and F to their lowest taxonomic groups? Give two reasons.
- It helps in identifying relationships and evolutionary history among organisms.
- It enables accurate communication and documentation of biological information globally.

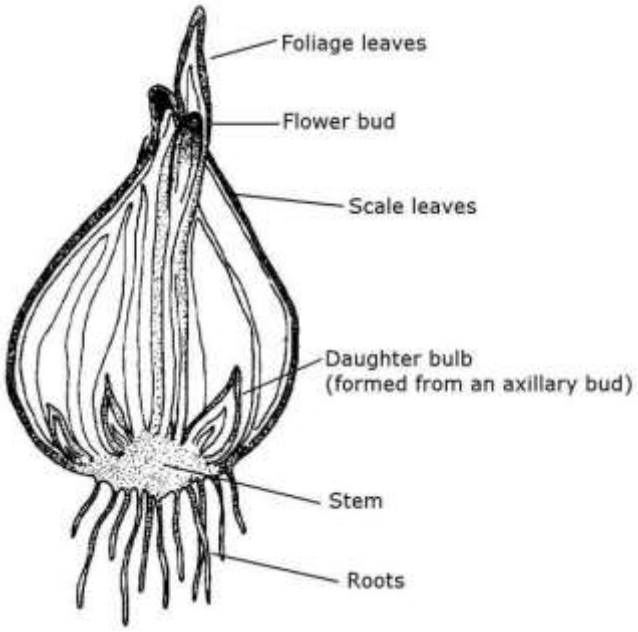
(b) Classify each of the specimens D, E and F to the Phylum/Division level.
- Specimen D: Division – Angiospermophyta
- Specimen E: Division – Angiospermophyta
- Specimen F: Division – Angiospermophyta

(c) Why are specimens D and F placed to the Phylum/Division you named in (b)? Give two reasons for each specimen.
Specimen D (Maize):
- It produces flowers and seeds enclosed in fruits.
- It has vascular tissues (xylem and phloem).

Specimen F (Onion):
- It produces flowers and seeds enclosed in bulbs.
- It shows clear differentiation into root, stem (bulb), and leaves.

(d) What do the processing industries benefit from using the plants in which the specimen E was taken? Give three benefits.
- Source of sugar for food and beverage industries.
- Used in alcohol production through fermentation.
- Waste products are used in animal feed and energy generation (biofuel).

(e)(i) Draw a well labeled diagram of the specimen F.



(ii) State the habitat of the specimen F.
It grows in well-drained loamy soils in temperate and tropical regions.

(iii) What are the two advantages of the specimen F to the farmer?
- It serves as a source of income due to high market demand.
- It can be stored for long periods and used in food and medicinal applications.