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: 2005**

Instructions

1. This paper consists of two questions.

2. Answer all questions.

1. (a) Carry out food test experiments to identify the food substances present in solution S_1. Record your work as shown in the table below:

TEST FOR	PROCEDURE	OBSERVATIONS	INFERENCES
Starch	Add iodine solution to solution S_1	Blue-black color appears	Starch is present
Reducing sugars	Add Benedict's solution, heat in water bath	Brick-red precipitate forms	Reducing sugar present
Proteins	Add Biuret solution, shake gently	Purple color appears	Protein is present
Lipids	Mix with ethanol, shake, then add water	Milky-white emulsion forms	Lipid is present

(b) Suggest one natural food substance from which solution S_1 might have been prepared.
Potato or maize paste.

(c) What are the functions of food substances present in solution S_1 to human beings?
- Starch provides energy
- Reducing sugar gives quick energy
- Protein supports body growth and tissue repair
- Lipids store energy and provide insulation

2. Stage I: A 6 cm petiole is cut longitudinally halfway to make 4 strips at one end.
(Sketch No. 1 should show the petiole structure with labelled measurements)

Stage II: Dip the petiole in solution S_3 for 10 minutes. Remove and check texture.
(Sketch No. 2 should reflect any visible changes)

Stage III: Dip the petiole in solution S_1 for another 10 minutes. Observe and record.
(Sketch No. 3 shows differences compared to stage II)

(a) Record your observations and explanations for stages II and III:

Stage of Experiment	Observation	Explanation
Stage II	Petiole becomes soft and flexible	Water moved into cells by osmosis from hypotonic solution
Stage III	Petiole remains firm	Water left cells due to hypertonic solution

(b) What was the aim of the experiment?

To demonstrate the effect of osmosis on plant cells and how cells gain or lose water in different solutions.

(c) Give brief comments on the concentrations of solutions S_3 and S_1.
S_3 is hypotonic (lower solute concentration), S_1 is hypertonic (higher solute concentration).

(d) Why is the biological process demonstrated by the above experiment important to plants?
Osmosis helps in water absorption, cell turgidity for support, and nutrient transport.

(e) Define the process demonstrated by the above experiment.
Osmosis is the movement of water molecules from a region of lower solute concentration to a region of higher solute concentration across a selectively permeable membrane.

(f) Explain what happened to the cells of the petioles in stage II and III. Illustrate your answer.
In stage II, water entered cells causing them to swell and become turgid.
In stage III, water moved out, cells shrank and became flaccid.
(Turgid vs flaccid cells can be illustrated with two simple diagrams)

3. Study carefully specimens A, B, C and D.

(a) Give the common name of each specimen.
A: Amoeba
B: Paramecium
C: Frog
D: Fish

(b) Compare the modes of reproduction in A and B.
Both reproduce asexually by binary fission but differ in structure—Amoeba has no definite shape while Paramecium has a cilia-covered structure.

(c) Give three (3) differences between the modes of reproduction of specimens C and D.
- C lays eggs in water, D lays eggs with external fertilization
- C has visible metamorphosis stages, D does not
- C reproduces seasonally, D may reproduce throughout the year depending on environment

(d) What are the merits and demerits of the modes of reproduction in C and D?

Merits:
- Produces many offspring
- Increases species survival in aquatic habitats

Demerits:
- No parental care so high mortality
- Eggs exposed to predators and harsh environment