THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

033/2B **BIOLOGY 2B**

(ACTUAL PRACTICAL B)

(For Both School and Private Candidates)

Time: 2:30 Hours **ANSWERS** **Year: 2013**

Instructions

1. This paper consists of two questions.

2. Answer all questions.

1. You have been provided with specimens S_1 and S_2 for food substances identification.

(a)
Explain how you will prepare specimens S_1 and S_2 for identification of food substances they contain.

Each of the specimens S_1 and S_2 is first crushed using a mortar and pestle to break them into small particles. A small amount of distilled water is added and mixed thoroughly to extract the soluble food contents. The mixture is then filtered using filter paper and a funnel to obtain a clear filtrate. The filtrate is then used to carry out food substance tests.

(b)
Carry out food test experiments to establish the food substances present in specimen S_1 and S_2. Tabulate your experimental work as shown in the table below:

Food tested: Starch
Procedure: Add a few drops of iodine solution to the filtrate from specimen S_1 or S_2
Observation: A blue-black coloration appears
Inference: Starch is present

Food tested: Reducing sugars
Procedure: Add Benedict's solution to the filtrate and heat it in a water bath
Observation: A brick-red precipitate forms
Inference: Reducing sugars are present

Food tested: Proteins
Procedure: Add Biuret solution to the filtrate and shake gently
Observation: A purple coloration appears
Inference: Proteins are present

Food tested: Lipids
Procedure: Mix the filtrate with ethanol, shake, then add water
Observation: A milky white emulsion forms
Inference: Lipids are present

(c)
For the food substance identified in (b) above:

(i)
Name the end products of their digestion.

Starch: Glucose
Reducing sugars: Glucose
Proteins: Amino acids

Lipids: Fatty acids and glycerol

(ii)
State the part of the body where excess end products in (i) are stored.

Glucose is stored in the liver and muscles as glycogen.
Amino acids are not stored directly but excess are deaminated in the liver.
Fatty acids and glycerol are stored in adipose tissue as fat.

(iii)
State the function in the human body of each food substance identified in (b).

Starch/reducing sugars provide energy.
Proteins are used for growth and repair of tissues.
Lipids provide energy, insulation, and protection of organs.

(iv)
Mention the enzymes responsible for their digestion.

Starch: Amylase
Reducing sugars: Maltase
Proteins: Pepsin and trypsin
Lipids: Lipase

(v)
Name the medium under which the digestion of food substances in S_1 is favourable.

Starch digestion is favourable in a slightly alkaline medium (mouth, pH around 7).
Protein digestion is favourable in an acidic medium (stomach, pH around 2).
Lipid digestion occurs in an alkaline medium (small intestine, pH around 8).

(vi)
Name the part of alimentary canal in which absorption of the food substances identified in (b) above takes place.

Absorption of glucose, amino acids, fatty acids, and glycerol takes place in the small intestine, particularly in the ileum.

2(a) Study carefully specimens K_1 and K_2 then:

(i) Identify specimens K_1 and K_2 by their common names.
K_1 is a toad and K_2 is a fish.

(ii) Name the habitats for each of specimen K_1 and K_2.
K_1 lives in moist terrestrial areas such as under leaves, soil, or near ponds. K_2 lives in aquatic habitats like rivers, lakes, or oceans.

(iii) Briefly explain the features which enable specimen K_1 to survive in its habitat.
K_1 has a moist skin that allows cutaneous respiration, strong hind limbs for hopping, and webbed feet to aid in swimming. It also has coloration that blends with its environment for protection from predators.

(iv) What terms are used to describe these organisms in relation to water economy?
K_1 is poikilohydric because its body water content changes with the environment. K_2 is hydrophilic as it lives fully in water and depends on water for physiological functions.

(v) Suggest the mode of reproduction of specimen K_2. Give reason to support your answer.
K_2 reproduces sexually through external fertilization. This is supported by the fact that fish usually lay eggs in water and the male releases sperm over the eggs to achieve fertilization outside the body.

2(b) Study carefully specimens X_1 and X_2 then:

(i) Identify specimens X_1 and X_2 by their common names.
X_1 is a mushroom and X_2 is a fern.

(ii) Classify specimen X_1 to class level.
Specimen X_1 (mushroom) belongs to Class Basidiomycetes.

(iii) State the features used to place specimens X_1 and X_2 in their respective kingdom.
X_1 lacks chlorophyll, feeds saprophytically, and has mycelium composed of hyphae, placing it in Kingdom Fungi. X_2 has chlorophyll, performs photosynthesis, has vascular tissues, true roots, stems, and leaves, and shows alternation of generations, placing it in Kingdom Plantae.

(iv) Write down the advantages and disadvantages of each specimen X_1 and X_2.
Advantages of X_1: Some mushrooms are edible and rich in protein. They help decompose organic matter, improving soil nutrients.
Disadvantages of X_1: Some mushrooms are poisonous and can cause health issues. Others spoil stored food.

Advantages of X_2: Ferns prevent soil erosion and are used as decorative plants. They also improve air quality through photosynthesis.
Disadvantages of X_2: Some species grow aggressively and can take over farm spaces. Others may be toxic to animals if consumed.