THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

133/3A **BIOLOGY 3A**

ACTUAL PRACTICAL A

(For Both Private and School Candidates)

Duration: 3:30 Hour. **ANSWERS** **Year: 2025**

Instructions

1. This paper consists of **three (3)** questions**.**
2. Answer all questions.
3. Write your **Examination Number** on every page of your answer booklet(s).

1. You have been provided with specimen C_1. Dissect it in a usual way to fully display the viscera in situ. Leave your dissection properly displayed for assessment.

(a) Draw a neat diagram of your dissection and label ten parts.
Answer should be a labeled drawing of the dissected specimen C_1, showing viscera such as liver, stomach, intestine, heart, lungs, kidneys, pancreas, spleen, gall bladder, and esophagus.

(b) (i) From the parts you labeled in 1 (a), identify two associate organs attached to the digestive system of specimen C_1.
The two associate organs are the liver and pancreas.

(ii) Suggest one role played by each organ identified in 1 (b)(i).
The liver produces bile, which emulsifies fats during digestion.
The pancreas secretes digestive enzymes such as amylase, protease, and lipase that break down carbohydrates, proteins, and fats respectively.

(c) Draw the digestive system of specimen C_1 and label its main parts and the associate organs.
Answer should be a labeled diagram of the digestive system showing the mouth, esophagus, stomach, small intestine, large intestine, liver, pancreas, and anus.

(i) Which structure is responsible for deamination process in specimen C_1?
The liver is responsible for the deamination process in specimen C_1.

(ii) Apart from deamination process, give other two functions performed by the structure you named in 1(d)(i).
The liver stores glycogen and releases glucose into the blood when needed. It also detoxifies harmful substances in the body such as alcohol and drugs.

2. You have been provided with solution P_1.

(a) Using chemical reagent provided, carry out biochemical experiments to identify the food substances present in solution P_1. Your experimental report should be tabulated as shown in the Table.

Food Tested	**Procedure**	**Observation**	**Inference**
Starch	Add a few drops of iodine solution to the sample.	Blue-black coloration	Starch is present

Reducing sugar	Add Benedict's solution and heat in boiling water bath for 5 minutes.	Brick-red precipitate	Reducing sugar is present
Protein	Add Biuret reagent to the sample and shake.	Purple/violet coloration	Protein is present
Lipid	Add ethanol to the sample, shake, then add cold water.	White emulsion appears	Lipid is present

(b) Suggest two natural sources from which each food substance identified in 2 (a) could have been extracted.

Starch: maize, potatoes

Reducing sugar: fruits (e.g. bananas), honey

Protein: beans, meat

Lipid: groundnut, milk

(c) Identify one characteristic of each food substance identified in 2 (a).

Starch is a complex carbohydrate and is insoluble in water.

Reducing sugars are simple sugars that can be oxidized and reduce other substances.

Proteins are made of amino acids and coagulate when heated.

Lipids are hydrophobic and do not mix with water.

(d) Name one enzyme and secretion which facilitate digestion of each food substance identified in 2 (a).

Starch: Enzyme – amylase; Secretion – saliva or pancreatic juice

Reducing sugar: Enzyme – maltase; Secretion – intestinal juice

Protein: Enzyme – pepsin; Secretion – gastric juice

Lipid: Enzyme – lipase; Secretion – bile and pancreatic juice

3. You have been provided with specimens E, F, G, H and I obtained from different habitats. Carefully study them, then answer the following questions:

(a) (i) Identify the specimens E, F, G, H and I by their common names.

Specimen E is a cockroach.
Specimen F is a housefly.
Specimen G is a mosquito.
Specimen H is a butterfly.
Specimen I is a bee.

(a) (ii) Give the habitat of each specimen E and H.

Specimen E (cockroach) inhabits dark, moist, and warm places like kitchens, cupboards, and under sinks. Specimen H (butterfly) is found in open fields, gardens, forests, and areas with flowering plants.

(b) (i) To which common hierarchy does the specimens E, F, G, H and I belong?

All five specimens belong to the Phylum Arthropoda, Class Insecta.

(b) (ii) Give two advantages and disadvantages of the members belonging to the hierarchy in 3 (b)(i) to human beings.

One advantage of insects is that some act as pollinators, which help in the reproduction of flowering plants, benefiting agriculture. Another advantage is that some insects like bees produce useful substances such as honey and wax.

One disadvantage is that some insects act as vectors, transmitting diseases to humans and animals, such as mosquitoes spreading malaria. Another disadvantage is that some destroy crops and stored food, leading to economic losses.

(c) (i) Closely observe the specimens E, F, G, H and I and then, place them in their respective classes.

All specimens E, F, G, H and I belong to the class Insecta under phylum Arthropoda. They are all insects as they have three body parts (head, thorax, abdomen), three pairs of legs, and one or two pairs of wings.

(c) (ii) Account for three observable characteristic features of specimen H at class level.

Specimen H (butterfly) has two pairs of large, colorful wings which are covered with scales, a characteristic feature of class Insecta.

It has three distinct body segments: the head, thorax, and abdomen, which is a diagnostic feature of insects.

It possesses compound eyes and a coiled proboscis adapted for sucking nectar from flowers, another defining trait of the class Insecta.