THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

133/3A **BIOLOGY 3A**

(ACTUAL PRACTICAL A)

(For Both School and Private Candidates)

Time: 2:30 Hours **ANSWERS** **Year: 2022**

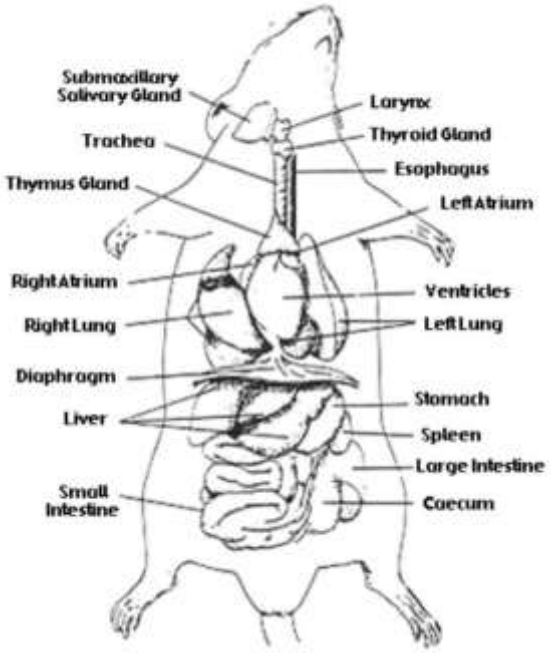
Instructions

1. This paper consists of three questions.

2. Answer all questions.

1. You have been provided with specimen S_1. Dissect the specimen in a usual way to fully display the viscera in situ.

(a) Draw a neat diagram of your dissection and label ten parts.
Leave your dissection properly displayed for assessment.



(b)(i) What are the associate organs of the digestive system present in the specimen?

Liver
Pancreas
Gall bladder

(ii) Which digestive role is played by each of the associate organs identified in (b)(i)?

Liver – Produces bile for emulsification of fats.
Pancreas – Secretes digestive enzymes and bicarbonate to aid digestion in small intestine.
Gall bladder – Stores and releases bile into the duodenum when needed.

(iii) How does each of the associate organs identified in (b)(i) adapt to perform its digestive role in the specimen?

Liver – Has many lobes and rich blood supply to efficiently process and secrete bile.
Pancreas – Contains acini which produce enzymes and duct systems for quick enzyme delivery.
Gall bladder – Muscular walls allow contraction for rapid bile release.

(iv) How does each associate organ identified in (b)(i) adapt to regulate sugar in the body of the specimen?

Liver – Stores glucose as glycogen and breaks it down when needed to regulate blood sugar.
Pancreas – Contains islets of Langerhans which produce insulin and glucagon to regulate sugar levels.
Gall bladder – Not directly involved in sugar regulation.

2. You have been provided with 5 cm^3 of fresh liver, water and the chemical reagents, use them to perform procedures (i) and (ii) then answer the questions that follow:

Procedures
(i) Cut the 3 cm^3 of the liver into small pieces, then crush it to paste by using a mortar and pestle provided. Add a little amount of water into the paste, mix well and label it as liver solution.
(ii) Put the remaining 2 cm^3 of a liver into a test tube, add 3 drops of solution X in the test tube. Observe the results.

Questions

(a) Using the chemical reagents provided, carry out biochemical test to identify the food substances present in the liver solution. Tabulate your results as shown in the following table:

Food tested	Procedure	Observation	Inference
Protein	Add Biuret solution to liver solution	Colour changes to purple	Protein present
Reducing sugar	Add Benedict's solution and warm	Brick-red precipitate forms	Reducing sugar present
Fat	Add ethanol and shake with water	Emulsion forms	Fat present

(b) What is a name of solution X?

Hydrogen peroxide

(c) With the aid of the chemical formula, illustrate the reaction led to the observation made in procedure (ii).

$2H_2O_2 \rightarrow 2H_2O + O_2$
(The enzyme catalase in liver breaks down hydrogen peroxide into water and oxygen)

(d) How can one set a control experiment for the reaction presented in (c)?

Use a test tube with boiled liver (enzymes denatured) and add hydrogen peroxide. No bubbling or effervescence should be observed. This confirms that catalase is responsible for the reaction.

3. You have been provided with specimens A_1, A_2 and A_3.

(a) Suggest four organisms from which the specimen A_3 must have been taken.

Frog
Lizard
Rat
Fish

(b) Carefully observe the specimens A_1 and A_2.
(i) What is the Kingdom and Phylum of specimen A_2?

Kingdom: Animalia
Phylum: Arthropoda

(ii) What observable features in each of the specimens A_1 and A_2 represent their respective Class level? Give four points.

Specimen A_1 (Insecta):
- Three distinct body parts (head, thorax, abdomen)
- One pair of antennae
- Compound eyes
- Three pairs of legs

Specimen A_2 (Arachnida):
- Body divided into cephalothorax and abdomen
- Four pairs of legs
- Absence of antennae
- Simple eyes

(c) What are the functions of specimen A_3 to the organism from which it was taken? Give three functions.

Helps in locomotion (muscle attachment)
Supports internal organs
Provides shape and structure to the body