THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

133/3C **BIOLOGY 3C**

(ACTUAL PRACTICAL C)

(For Both School and Private Candidates)

Time : 3:20 Hours **ANSWERS** **Year : 2022**

Instructions

1. This paper consists of three questions, answer all questions
2. All writing should be in **blue** or **black** ink.
3. Communication devices and any unauthorised materials are **not** allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet(s).

1. You are provided with the specimen S. Dissect it to fully display the viscera general.
   Questions
   (a) Draw a neat diagram of the dissection and label twelve (12) parts.

The diagram of specimen S (rat or small mammal) should show labelled parts such as mouth, esophagus, stomach, liver, pancreas, small intestine, ileum, caecum, large intestine, rectum, anus, and kidneys.

(b) (i) State the natural habitat of the specimen S.

Specimen S (rat) naturally inhabits terrestrial environments such as fields, bushes, houses, and grain stores.

(ii) Give five observable features which enable the specimen S to adapt its natural environment.

It has sharp incisors for gnawing food and defending itself.
It has whiskers (vibrissae) that act as sensory organs for detecting objects in the dark.
It has a long tail for balance during movement.
It has fur to regulate body temperature in both hot and cold environments.
It has strong hind limbs adapted for fast running and jumping to escape predators.

2. You are provided with solutions C1 and C2 which contained unknown food substances.
   Questions
   (a) Use the chemicals and reagents provided only to identify the food substances present in solutions C1 and C2, and tabulate their experimental work as shown in the table below:

Food tested	**Procedures**	**Observation**	**Inference**
Reducing sugar	Add Benedict's solution and heat in water bath	Brick-red precipitate formed	Reducing sugar present

Protein	Add Biuret reagent	Violet/purple colour appears	Protein present
Starch	Add iodine solution	Blue-black coloration observed	Starch present
Fat	Rub solution on filter paper, dry, observe	Translucent spot formed	Fat present

(b) Explain the importance of the following in the experiments

(i) Neutralization process

The neutralization process ensures that the test solution is not too acidic or alkaline, since extreme pH may interfere with the accuracy of enzyme reactions or chemical tests.

(ii) Cooling process.

Cooling prevents overheating, which can denature enzymes or destroy sensitive food substances, thus ensuring valid results.

(c) State the factors affecting enzyme activities when digesting the food substances identified in 2(a).

Temperature affects enzyme activity because very high temperatures denature enzymes, while low temperatures slow down the reaction.
pH affects enzyme activity, as each enzyme works best within a specific pH range.
Concentration of substrate affects the rate of reaction; higher substrate concentration increases enzyme activity up to saturation point.
Presence of enzyme inhibitors slows down or completely prevents enzyme action.
Time of reaction also determines how much product is formed, with longer times allowing more digestion.

3. You are provided with specimen L, M, P and Q.

   Questions

   (a) Give two observable features common to specimens M, P and Q at the Kingdom level.

They are multicellular organisms.
They are eukaryotic with well-defined nuclei and organelles.

(b) State the observable features which make the specimen P and Q look different at Class level.

Specimen P (fish) has fins and gills for movement and respiration.
Specimen Q (frog) has limbs and lungs for movement and respiration.

(c) Classify each of the specimens L, M, P and Q from the Phylum/Division to Class level.

Specimen L: Phylum Annelida, Class Oligochaeta.
Specimen M: Phylum Arthropoda, Class Insecta.
Specimen P: Phylum Chordata, Class Pisces.
Specimen Q: Phylum Chordata, Class Amphibia.

(d) Give two importance of the specimen L to the organism from which it was taken.

Specimen L (earthworm) aerates the soil, improving air circulation for plant roots.
It adds humus to the soil by decomposing organic matter, increasing soil fertility.

(e) State where specimen P and Q are naturally found.

Specimen P (fish) is naturally found in aquatic habitats such as rivers, lakes, and oceans.
Specimen Q (frog) is naturally found in moist terrestrial and aquatic habitats like ponds, swamps, and marshes.

(f) Draw a well labelled diagram of specimen M.

The diagram of specimen M (insect, e.g., grasshopper) should show labelled parts such as head, thorax, abdomen, antennae, compound eyes, fore wings, hind wings, and legs.