THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

733/2A **BIOLOGY 2A**

Time: 3 Hour. **ANSWERS** **Year: 2016**

Instructions

1. This paper has three papers.
2. Answer **all** questions.
3. Question **1** contains 30 marks while question 2 and 3 have 10 marks each.
4. Mobile phones are not allowed inside the examination room.
5. Write your Examination Number on every page of your answer booklet.

1. Dissect specimen K (a frog or toad) to expose its digestive system.
(a) Draw a diagram showing seven labelled parts of the digestive system.

This should be done practically. Ensure the diagram includes the mouth, oesophagus, stomach, small intestine, large intestine, liver, and cloaca.

(b) State two precautions you must take when opening the inner body skin of specimen K.

Use a scalpel or scissors carefully to avoid damaging internal organs like the liver, stomach, or intestines, which may lie just beneath the skin.

You must also avoid cutting blood vessels such as the anterior abdominal vein, as this can cause excessive bleeding and hinder visibility during dissection.

(c) Give three major differences between digestive systems of amphibians and insects.

Amphibians like frogs have a closed digestive system with a well-defined stomach and a complete alimentary canal ending in a cloaca, while insects have a simpler tube-like digestive tract with distinct regions for digestion and absorption.

Amphibians use salivary and gastric secretions to chemically break down food, while many insects rely more heavily on enzymatic secretions from organs like the salivary glands or gastric caeca.

Amphibians have a liver and pancreas that assist digestion by producing bile and enzymes, while most insects lack a true liver and instead have structures like Malpighian tubules for excretion, not digestion.

---

2. You are given solution X.
(a) Using the provided reagents, conduct food tests and complete the table below:

Food Tested	Procedure	Observation	Inference
Starch	Add iodine solution	No colour change	Starch absent
Protein	Add Biuret solution	Purple colour	Protein present
Reducing Sugar	Add Benedict's solution and heat	Orange precipitate	Reducing sugar present

Lipids	Rub on brown paper and heat	Translucent spot	Lipids present

(b) Mention two roles of each food substance found in solution X in human nutrition.

Proteins are used for body tissue repair and growth. They also help in enzyme and hormone formation.

Reducing sugars such as glucose provide immediate energy through cellular respiration and are also essential for brain function.

Lipids serve as long-term energy storage. They also help in the absorption of fat-soluble vitamins (A, D, E, K).

(c) Why is heat important during Benedict's test?

Heat is necessary to activate the chemical reaction between Benedict's solution and reducing sugars, allowing the copper ions to be reduced. This causes a colour change, which indicates the presence of reducing sugars in the tested solution.

3. Observe specimens D (Cactus), F (Beetle), and G (Tilapia scale).
(a) (i) Give two observable features that classify specimen D into its kingdom.

Cactus has green tissue with chlorophyll, allowing it to carry out photosynthesis, a key trait of Kingdom Plantae.

It also shows a cellular structure with rigid cell walls, indicating that it is a multicellular plant organism.

(ii) How is specimen D adapted to arid conditions? Give three ways.

Cactus has thick, fleshy stems that store water, allowing survival during long periods of drought.

Its leaves are modified into spines to reduce water loss through transpiration and also protect the plant from herbivores.

The plant has a deep and extensive root system that allows it to absorb water from deep underground sources.

(b) (i) From which organism was specimen G taken?

Specimen G was taken from a Tilapia fish, as the scale structure and pattern are characteristic of bony fish.

(ii) State two functions of specimen G.

Scales protect the fish's body from mechanical injury and pathogens in water.

They also reduce friction as the fish swims, making movement more efficient in water.

(c) State three features that classify specimen F into its class.

Beetles have a hard exoskeleton made of chitin, typical of insects in Class Insecta.

They have three distinct body segments: head, thorax, and abdomen.

Beetles possess compound eyes and three pairs of jointed legs, another clear indicator of Class Insecta.