THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

733/1 **BIOLOGY 1**

Time: 3 Hour. **ANSWERS** **Year: 2004**

Instructions

1. This paper has Section A, B and C.
2. Answer **all** questions from Section A and **two (2)** questions from Section B and C each.
3. Section A and B carry 30 marks each and Section C carries 40 marks.
4. Mobile phones are not allowed inside the examination room.
5. Write your Examination Number on every page of your answer booklet.

SECTION A (30 Marks)

Answer all questions from this section.

1. State four methods of conserving biodiversity.

Establishing protected areas such as national parks and game reserves helps preserve habitats and species by limiting human activity in those regions.

Enforcing laws against illegal hunting, logging, and trade in endangered species helps protect biodiversity by controlling exploitation.

Promoting reforestation and afforestation activities restores natural habitats and increases plant diversity, supporting wildlife.

Raising awareness and educating the public about the importance of biodiversity encourages sustainable practices and conservation efforts at community level.

2. List four roles of enzymes in metabolism.

Enzymes act as biological catalysts that speed up chemical reactions in the body without being consumed in the process.

They aid in digestion by breaking down large food molecules into smaller, absorbable units, such as converting starch into glucose.

Enzymes regulate metabolic pathways by controlling the rate and direction of biochemical reactions necessary for cellular function.

They help in energy production by facilitating the breakdown of glucose during respiration and the synthesis of ATP.

3. Give four structural differences between monocots and dicots.

Monocots have one cotyledon in their seeds, while dicots have two cotyledons.

The leaf venation in monocots is parallel, whereas in dicots it is net-like or reticulate.

Monocots usually have fibrous root systems, while dicots typically develop taproot systems.

In monocots, vascular bundles in the stem are scattered, whereas in dicots they are arranged in a ring.

4. Name four kinetic properties affecting diffusion rate.

Temperature influences diffusion; higher temperatures increase the kinetic energy of molecules, making them diffuse faster.

Concentration gradient affects the rate; a steeper gradient leads to faster diffusion as molecules move from high to low concentration areas.

Molecular size matters; smaller molecules diffuse more quickly than larger ones due to less resistance.

The medium through which diffusion occurs plays a role; diffusion is faster in gases than in liquids or solids because molecules move more freely.

5. List four sources of human exposure to pathogens.

Contaminated food and water can carry bacteria, viruses, or parasites that cause diseases such as cholera or typhoid.

Physical contact with infected individuals or surfaces can spread pathogens, especially in crowded or unsanitary conditions.

Airborne droplets from coughing or sneezing can transmit respiratory pathogens like influenza and tuberculosis.

Insect vectors such as mosquitoes or ticks transmit pathogens that cause malaria, dengue, and Lyme disease.

6. State four steps in carbohydrate digestion.

Salivary amylase in the mouth begins the breakdown of starch into maltose during chewing.

In the stomach, carbohydrate digestion pauses due to acidic pH which inactivates salivary amylase.

In the small intestine, pancreatic amylase continues the breakdown of starch into disaccharides.

Enzymes like maltase, sucrase, and lactase in the intestinal lining break disaccharides into monosaccharides like glucose, which are absorbed into the bloodstream.

7. Give four effects of deforestation on ecosystems.

Loss of habitat leads to decreased biodiversity as many species lose their homes and food sources.

Soil erosion increases because tree roots that bind and stabilize soil are removed.

Climate regulation is disrupted as fewer trees mean less carbon dioxide is absorbed from the atmosphere, contributing to global warming.

Water cycles are affected, leading to reduced rainfall and altered weather patterns due to decreased transpiration and evaporation.

8. List four types of connective tissue.

Loose connective tissue, such as areolar tissue, binds organs together and provides support.

Dense connective tissue forms tendons and ligaments, connecting muscles to bones and bones to each other.

Adipose tissue stores fat for energy, insulation, and cushioning of organs.

Cartilage provides flexible support in areas like the nose, ears, and joints.

9. Mention four benefits of using ICT in Biology lessons.

ICT enables access to multimedia resources such as videos and simulations that enhance understanding of complex concepts.

It allows for interactive learning through online quizzes, games, and virtual labs that engage students actively.

Teachers can use presentation software to organize and deliver lessons more effectively with visual support.

ICT facilitates research and information sharing, helping students deepen their knowledge through reliable online sources.

10. State four criteria for choosing practical assessment methods.

The method should align with the specific learning objectives and skills intended to be assessed.

It should be feasible and practical within the available time, equipment, and class size.

The assessment should be valid, meaning it accurately measures what it is supposed to.

It should be fair and unbiased, providing equal opportunity for all learners to demonstrate their understanding.

SECTION B (30 Marks)

Answer two questions from this section.

11. Describe the process of fertilization and development in flowering plants.

Fertilization in flowering plants begins when pollen grains land on a compatible stigma. The pollen grain germinates, forming a pollen tube that grows down the style toward the ovary.

Inside the ovary, the pollen tube enters the ovule through the micropyle and releases two male nuclei into the embryo sac. One male nucleus fuses with the egg cell to form a diploid zygote — this is true fertilization.

The other male nucleus fuses with the two polar nuclei to form a triploid endosperm, which provides nourishment to the developing embryo. This process is called double fertilization, unique to flowering plants.

After fertilization, the zygote divides to form an embryo, which eventually develops into a seed. The ovule becomes the seed, and the ovary develops into the fruit, enclosing the seed(s).

The seed undergoes maturation, loses water, and becomes dormant until conditions are favorable for germination, marking the beginning of a new plant's life cycle.

12. Explain five roles of the skin in maintaining homeostasis.

The skin helps regulate body temperature through sweating and vasodilation. Sweat evaporates and cools the body, while dilated blood vessels increase heat loss.

It acts as a barrier against pathogens, chemicals, and physical damage, forming the first line of defense in the immune system.

The skin is involved in excretion by removing waste products like urea and excess salts through sweat glands.

It contains sensory receptors that detect changes in the environment, such as temperature, pressure, and pain, allowing the body to respond appropriately.

The skin synthesizes vitamin D when exposed to sunlight, which is important for calcium absorption and bone health.

13. Describe four causes and four effects of eutrophication.

Eutrophication is caused by excessive nutrients in water bodies, especially nitrates and phosphates from agricultural runoff, sewage discharge, and detergents.

It can also result from industrial waste containing organic matter or from leaching of fertilizers into rivers and lakes.

Warm temperatures can accelerate eutrophication by encouraging algal growth and microbial activity.

Deforestation near water bodies increases erosion and runoff, further adding nutrients and sediments that support eutrophication.

One effect is rapid algal growth (algal bloom), which blocks sunlight from reaching aquatic plants, disrupting photosynthesis.

The decay of dead algae consumes oxygen in the water, leading to hypoxia (oxygen depletion), which suffocates fish and other aquatic life.

Biodiversity in the water decreases as oxygen-dependent species die off, leading to a shift in species composition.

Eutrophication also renders water bodies unsuitable for recreation and drinking, posing health risks to humans and animals.

14. Explain five ways by which plants excrete waste products.

Plants excrete some waste products through transpiration, where excess water and some dissolved substances are lost via stomata in leaves.

They store waste substances in vacuoles, isolating them from the rest of the cell to prevent damage, especially in non-growing tissues.

Some waste products are converted into non-toxic substances and stored in old or dead tissues such as bark, leaves, or wood.

Volatile substances such as essential oils or gases like oxygen are released into the atmosphere through stomata or lenticels.

Plants may also excrete waste products through leaf fall or shedding of parts like bark, where waste materials are compartmentalized before being discarded.

SECTION C (40 Marks)

Answer two questions from this section.

15. During a lesson on food chains, some learners argue that humans can be both primary and tertiary consumers. As a teacher, how would you use this moment to enhance learning? Explain six actions.

First, I would acknowledge the students' observation positively to encourage participation and highlight the value of their critical thinking.

Second, I would guide the discussion by asking probing questions that help students trace various food chains where humans appear at different trophic levels, like eating plants (primary) or fish (tertiary).

Third, I would draw food chains and food webs on the chalkboard, inserting humans at multiple points to visually demonstrate the flexibility of their role in ecosystems.

Fourth, I would introduce the term "omnivore" and explain how organisms that eat both plants and animals can occupy multiple trophic levels depending on the food source.

Fifth, I would encourage students to research and present examples of other animals with similar feeding versatility to reinforce the concept.

Lastly, I would assess understanding through a quick activity where learners classify humans and other organisms within different food chains, reinforcing dynamic ecological roles.

16. A student-teacher fails to complete the lesson within the allocated time, leaving learners confused. Suggest six strategies for managing instructional time more effectively.

I would advise the student-teacher to create a clear and realistic lesson plan with time estimates for each activity to ensure proper pacing.

Secondly, I would recommend setting specific learning objectives and focusing on the most essential content during the lesson.

Third, I would suggest preparing teaching aids and materials in advance to avoid wasting time during the actual lesson.

Fourth, I would encourage the use of attention signals and clear transitions to manage class movement and minimize time lost to disruptions.

Fifth, I would advise the teacher to monitor time actively using a watch or clock and adjust activities as needed to stay on track.

Lastly, I would recommend reflecting after each lesson on what caused delays and adjusting future plans to ensure better time management.

17. During a biology practical on the circulatory system, learners mishandle preserved specimens. What six steps would you take to ensure safety, proper conduct, and learning continuation?

First, I would immediately stop the mishandling and calmly remind students of laboratory rules and safety procedures without causing panic.

Second, I would review how the specimens should be handled, emphasizing respect for biological materials and ethical considerations.

Third, I would demonstrate the correct procedure again, using clear explanations and involving students in modeling appropriate behavior.

Fourth, I would organize students into smaller supervised groups to ensure better control and individual attention during practical work.

Fifth, I would assign roles within each group such as recorder, observer, and handler to reduce confusion and share responsibility.

Lastly, I would reflect with the class on what went wrong, how it affected the learning process, and how they can improve their conduct in future sessions.

18. A Biology lesson on HIV/AIDS is disrupted when some learners begin mocking others during the discussion. Explain six ways to address the situation sensitively and restore a respectful learning environment.

First, I would pause the lesson and calmly address the inappropriate behavior, reminding learners about classroom respect and rules without embarrassing anyone.

Second, I would re-establish ground rules for sensitive topics, including confidentiality, respect for others' experiences, and zero tolerance for discrimination.

Third, I would facilitate a short discussion on empathy, stigma, and the social implications of HIV/AIDS, helping learners understand the importance of compassion.

Fourth, I would share accurate information about HIV/AIDS to dispel myths and emphasize the importance of factual knowledge over jokes or stereotypes.

Fifth, I would involve a counselor or health professional, if available, to lead a follow-up session for deeper understanding and emotional support.

Lastly, I would encourage learners to reflect privately on their behavior and write down what they learned from the situation, promoting personal accountability and growth.