THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

733/1 **BIOLOGY 1**

Time: 3 Hour. **ANSWERS** **Year: 2003**

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. List four differences between aerobic and anaerobic respiration.

Aerobic respiration requires oxygen, while anaerobic respiration occurs without oxygen.

Aerobic respiration produces more energy (about 36 ATP), whereas anaerobic respiration yields less energy (around 2 ATP).

In aerobic respiration, the end products are carbon dioxide and water, whereas anaerobic respiration produces substances like lactic acid or ethanol and carbon dioxide.

Aerobic respiration occurs in most plants and animals, while anaerobic respiration is common in some microorganisms and during intense activity in muscle cells.

2. State four functions of the mammalian skeleton.

The skeleton provides structural support, giving shape and stability to the body.

It protects vital organs such as the brain (skull), heart and lungs (rib cage), and spinal cord (vertebral column).

It enables movement through its connection with muscles via joints, facilitating locomotion.

The skeleton also produces blood cells in the bone marrow and stores minerals such as calcium and phosphorus.

3. Mention four diseases caused by bacteria.

Tuberculosis is caused by *Mycobacterium tuberculosis* and affects the lungs.

Cholera is caused by *Vibrio cholerae*, leading to severe dehydration and diarrhea.

Typhoid is caused by *Salmonella typhi* and spreads through contaminated food and water.

Gonorrhea is a sexually transmitted disease caused by *Neisseria gonorrhoeae*.

4. State four characteristics of the phylum Arthropoda.

Arthropods have segmented bodies divided into regions such as head, thorax, and abdomen.

They possess an exoskeleton made of chitin that provides protection and support.

They have jointed appendages that aid in movement, feeding, and sensory functions.

Arthropods exhibit bilateral symmetry and undergo molting (ecdysis) to grow.

5. Give four differences between veins and arteries.

Veins carry blood toward the heart, while arteries carry blood away from the heart.

Veins have thinner, less elastic walls compared to the thick, muscular walls of arteries.

Veins contain valves to prevent backflow of blood; arteries do not have valves (except in the aorta and pulmonary artery).

Blood in veins is usually deoxygenated (except pulmonary veins), whereas arterial blood is oxygenated (except pulmonary artery).

6. Mention four characteristics of hormones.

Hormones are chemical messengers secreted by endocrine glands directly into the bloodstream.

They are usually required in small quantities to produce significant effects.

Hormones are specific in action, targeting particular tissues or organs.

Their effects are often slower but longer-lasting compared to nerve impulses.

7. List four processes involved in excretion.

Filtration in the kidneys removes waste substances like urea from the blood.

Reabsorption returns useful substances like glucose and water to the bloodstream.

Secretion adds additional waste products to the filtrate before it leaves the body.

Elimination is the final step where the urine is expelled from the body through the urethra.

8. Give four reasons for classifying organisms.

Classification helps organize the diversity of life, making it easier to study and understand organisms.

It allows scientists to identify and name organisms in a standard way through taxonomy.

Classification shows evolutionary relationships between organisms based on shared characteristics.

It aids in predicting characteristics of organisms based on their groupings or related species.

9. Mention four uses of Biotechnology.

Biotechnology is used in agriculture to develop genetically modified crops with higher yields and resistance to pests.

It is applied in medicine to produce vaccines, insulin, and antibiotics.

In environmental management, biotechnology helps in waste treatment and bioremediation.

It is used in the food industry to ferment products like yogurt, cheese, and alcohol.

10. List four characteristics of living organisms.

All living organisms show movement, either internal or external.

They grow by increasing in size and complexity over time.

They respond to stimuli such as light, temperature, or chemicals.

Living organisms reproduce to ensure the continuation of their species.

SECTION B (30 Marks)

Answer two questions from this section.

11. Describe the role of the placenta during pregnancy.

The placenta acts as a connection between the mother and the developing fetus, facilitating the exchange of substances necessary for growth.

It allows oxygen and nutrients such as glucose and amino acids to diffuse from the mother's blood into the fetus's blood through the umbilical cord.

It removes waste products such as carbon dioxide and urea from the fetal blood, which are then excreted by the mother.

The placenta also produces hormones like progesterone and estrogen, which maintain the uterine lining and support the pregnancy.

It acts as a barrier, protecting the fetus from some harmful substances and microorganisms, although some can still pass through, such as alcohol or certain viruses.

12. Discuss the adaptations of the small intestine for absorption.

The small intestine is long and coiled, providing a large surface area for maximum nutrient absorption.

Its inner walls are lined with finger-like projections called villi and microvilli, which increase the surface area further and contain blood capillaries and lacteals.

The walls of the villi are thin, allowing rapid diffusion of nutrients into the blood and lymphatic system.

The presence of digestive enzymes on the surface of epithelial cells aids in the final stages of digestion before absorption.

Rich blood supply in the intestinal walls helps transport absorbed nutrients quickly to other parts of the body, maintaining a concentration gradient.

13. Explain five ecological factors that affect population size.

Availability of food influences population growth; adequate food supply promotes reproduction and survival.

Predation regulates population size as predators reduce the number of prey organisms.

Diseases and parasites can decrease populations by increasing mortality and lowering reproductive rates.

Space and shelter affect breeding and survival; overcrowding may lead to competition and reduced growth.

Environmental conditions like temperature, rainfall, and natural disasters directly impact organism survival and reproduction.

14. Describe the structure and functions of xylem and phloem tissues.

Xylem is composed of dead, hollow cells such as tracheids and vessel elements, which form continuous tubes for water conduction.

It transports water and dissolved minerals from roots to leaves through capillary action, cohesion, and transpiration pull.

Xylem also provides mechanical support to the plant due to its thick lignified walls.

Phloem consists of living cells such as sieve tube elements and companion cells, which work together in translocation.

Phloem transports organic substances like sugars and amino acids from leaves to other parts of the plant, both upwards and downwards.

Unlike xylem, phloem functions in both directions, supporting growth and storage throughout the plant.

SECTION C (40 Marks)

Answer two questions from this section.

15. In a Form Two Biology class, students insist that all bacteria are harmful. As their teacher, explain six steps you would take to correct this misconception and improve understanding.

First, I would begin by acknowledging the misconception respectfully and reassuring students that questioning and discussion are part of learning.

Second, I would guide learners to brainstorm examples of bacteria they know, then classify them into harmful and beneficial types on the chalkboard.

Third, I would provide concrete examples of useful bacteria, such as *Lactobacillus* in yogurt production, *Rhizobium* in nitrogen fixation, and gut flora aiding digestion.

Fourth, I would use visual aids, videos, or charts to compare the roles of harmful and beneficial bacteria, making abstract content more tangible.

Fifth, I would organize a class activity such as a debate or case study comparing bacteria's positive and negative roles to deepen student engagement.

Finally, I would assign a creative follow-up task like making posters or presentations that reflect a balanced understanding of bacteria, reinforcing the corrected concept.

16. A student complains that Biology is difficult and mostly about memorizing facts. Suggest six strategies you would use to motivate and support such a learner.

First, I would meet the learner individually to listen to their concerns and encourage them to share specific areas they struggle with.

Second, I would connect Biology topics to real-life examples such as nutrition, diseases, or farming to show the subject's practical relevance.

Third, I would introduce learning aids like diagrams, models, and games to make abstract content more interactive and less intimidating.

Fourth, I would teach study techniques such as concept mapping, summarizing notes, and spaced repetition to ease memorization and improve retention.

Fifth, I would recommend peer study groups where the student can learn in a supportive environment and build confidence through collaboration.

Lastly, I would praise any progress and celebrate small successes to boost their self-esteem and reinforce that effort leads to improvement.

17. A practical lesson on the respiratory system is planned, but some key materials are missing due to delayed procurement. Describe six adjustments you would make to ensure the lesson remains effective.

First, I would check the available resources and modify the practical plan to suit the materials on hand without compromising key objectives.

Second, I would substitute missing items with improvised or locally available materials, such as using balloons and straws to model lung function.

Third, I would use diagrams, posters, or animations to demonstrate the process of respiration and lung anatomy where actual models are unavailable.

Fourth, I would shift the practical to a demonstration mode where I perform the activity while learners observe and record results.

Fifth, I would prepare a worksheet with step-by-step procedures and follow-up questions to maintain student focus and reinforce key concepts.

Lastly, I would document the shortage and communicate with the school administration to prevent recurrence in future lessons.

18. A student group misinterprets a Biology data table during a practical session and draws incorrect conclusions. How would you use this as a teaching moment? Provide six actions.

First, I would ask the group to explain their interpretation and reasoning to understand their thinking and identify where the error occurred.

Second, I would gently guide them back to the table and prompt them with questions that help re-analyze the data accurately.

Third, I would clarify any misunderstood terminology or symbols in the data table, ensuring all learners grasp how to read it correctly.

Fourth, I would involve the whole class in a brief discussion on how to interpret scientific data, using the mistake as a learning opportunity.

Fifth, I would encourage students to double-check results and conclusions in all future practicals to build accuracy and critical thinking.

Lastly, I would provide similar practice tables in subsequent lessons to reinforce the skill and increase learners' confidence in data interpretation.