THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

733/1 **BIOLOGY 1**

Time: 3 Hours **ANSWERS** **Year: 2018**

Instructions

1. This paper consists of section A, B and C.

2. Answer all questions in section A and two questions from section B and C.

1. Why are tests scores important in the teaching and learning process? Give four points.

Tests scores provide feedback on student understanding, identifying areas of weakness, such as genetics, for targeted improvement.

They measure progress, allowing teachers to track mastery of topics like respiration over time.

Scores motivate students, as good results in ecology encourage continued effort and engagement.

They inform teaching adjustments, helping educators refine methods for topics like cell division based on performance.

2. (a) What are the enzymes?

(b) List down three properties of enzymes.

(a) What are the enzymes?

Enzymes are biological catalysts, typically proteins, that speed up chemical reactions in living organisms, such as amylase breaking down starch, without being consumed.

(b) List down three properties of enzymes:

Enzymes are specific, acting only on particular substrates, like lipase on lipids.

They are efficient, lowering activation energy to accelerate reactions like digestion.

Enzymes are reusable, remaining unchanged after catalyzing reactions, enabling repeated use.

3. Briefly elaborate the following biological terms:

(a) Exoskeleton

(b) Molting

(c) Jointed appendages

(d) Haemocoel

(a) Exoskeleton:

An exoskeleton is a hard external covering, like the chitin shell of insects, providing support and protection.

(b) Molting:

Molting is the process where organisms, such as insects, shed their exoskeleton to grow, replacing it with a larger one.

(c) Jointed appendages:

Jointed appendages are segmented limbs, like insect legs, allowing flexibility and movement for locomotion.

(d) Haemocoel:

Haemocoel is the body cavity in arthropods filled with hemolymph, facilitating nutrient and waste transport.

4. Briefly explain any four phases of population growth of organisms.

The lag phase is the initial stage where organisms, like bacteria, adapt to their environment, showing slow growth.

The exponential phase follows, with rapid population increase due to abundant resources, doubling numbers quickly.

The stationary phase occurs when growth stabilizes as resources, like food, become limited, balancing birth and death rates.

The decline phase happens when resources are depleted, leading to population decrease due to starvation or competition.

5. (a) Why does a teacher need to do reflection of the teaching and learning process?

(b) Describe three components of a lesson plan that can be filled after a lesson has been taught.

(a) Why does a teacher need to do reflection of the teaching and learning process?

Reflection helps teachers assess lesson effectiveness, identifying what worked, like a genetics discussion, for future improvement.

It reveals student challenges, such as struggles with photosynthesis, allowing adjustments to teaching strategies.

Reflection fosters professional growth, encouraging teachers to refine methods and enhance engagement.

It ensures alignment with objectives, confirming goals like understanding ecosystems were met.

(b) Describe three components of a lesson plan that can be filled after a lesson has been taught:

The evaluation section records student performance, noting comprehension of topics like respiration through quizzes.

Teacher's comments document what went well or poorly, such as engagement during a cell division demo.

Recommendations for future lessons suggest improvements, like adding more visuals for ecology, based on student feedback.

6. (a) What is menopause?

(b) Briefly explain two roles of oestrogen hormone in the menstrual cycle.

(a) What is menopause?

Menopause is the natural cessation of menstruation in women, typically around age 50, marking the end of reproductive capability.

(b) Briefly explain two roles of oestrogen hormone in the menstrual cycle:

Oestrogen stimulates the growth of the uterine lining, preparing it for potential pregnancy.

It triggers the luteinizing hormone surge, promoting ovulation around day 14 of the cycle.

7. List four non-textual curriculum materials.

Models, such as a 3D cell structure, aid in visualizing biological concepts.

Charts, like the human digestive system, provide clear, illustrative information.

Videos on topics like animal behavior engage students with dynamic visuals.

Specimens, such as preserved insects, allow hands-on study of real organisms.

8. (a) What is instructional media?

(b) Outline three roles of instructional media in the teaching and learning process.

(a) What is instructional media?

Instructional media are tools, like videos or models, used to enhance teaching and learning by making concepts more accessible.

(b) Outline three roles of instructional media in the teaching and learning process:

It enhances understanding, as diagrams of the heart clarify circulation for students.

Media increases engagement, with videos on ecosystems capturing student interest.

It supports retention, as interactive simulations of mitosis help students remember processes.

9. What are the roles of a Biology teacher in managing and maintaining the Biology laboratory? Give four points.

A Biology teacher ensures safety by enforcing rules, like proper handling of chemicals during experiments.

They maintain equipment, such as microscopes, through regular checks and calibration for accurate use.

The teacher manages inventory, tracking supplies like agar for microbial cultures to ensure availability.

They supervise experiments, guiding students in dissections to prevent mishaps and ensure learning.

10. Outline four benefits of genetic engineering in human daily life.

Genetic engineering produces insulin for diabetes treatment, improving health outcomes.

It develops genetically modified crops, like pest-resistant maize, increasing food security.

It enables gene therapy, treating disorders like cystic fibrosis by correcting defective genes.

It creates diagnostic tools, such as DNA tests for hereditary diseases, aiding early intervention.

11. (a) Explain the concept “Oxygen debt”.

(b) Describe the respiratory pathway at which fat is used as a respiratory substrate.

(c) Why the oxidation of fat produces more energy than carbohydrates?

(a) Explain the concept “Oxygen debt”:

Oxygen debt is the extra oxygen needed after intense exercise to metabolize lactic acid, accumulated during anaerobic respiration, back to pyruvate for energy production.

(b) Describe the respiratory pathway at which fat is used as a respiratory substrate:

Fats are broken into glycerol and fatty acids; glycerol enters glycolysis, while fatty acids undergo beta-oxidation in mitochondria, producing acetyl-CoA for the Krebs cycle, generating ATP.

(c) Why the oxidation of fat produces more energy than carbohydrates?

Fats have more carbon-hydrogen bonds than carbohydrates, yielding more electrons for the electron transport chain, thus producing more ATP (e.g., 129 ATP from palmitic acid vs. 38 from glucose).

12. Why adolescence engage in drug abuse and addiction? Explain by giving six reasons.

Adolescents may seek peer acceptance, using drugs to fit in with social groups experimenting with substances.

Curiosity drives them to explore drugs, wanting to experience their effects firsthand.

Stress from academic pressure leads some to use drugs as a coping mechanism.

Lack of awareness about long-term consequences, like addiction, makes drug use seem harmless.

Media influence, glamorizing drug use in movies, encourages experimentation among impressionable teens.

Family issues, such as neglect or exposure to parental drug use, increase the likelihood of abuse.

13. (a) With the aid of a diagram, describe the process of binary fission in bacteria.

(b) Giving three points, justify the assertion that life on earth could not exist without bacteria.

(a) With the aid of a diagram, describe the process of binary fission in bacteria:

(Description since a diagram cannot be drawn: Binary fission starts with a bacterium, like E. coli, replicating its circular DNA. The cell elongates, and the DNA copies move to opposite ends. The cell membrane pinches inward at the center, forming a septum. The cell splits into two identical daughter cells, each with one DNA copy, completing the process.)

(b) Giving three points, justify the assertion that life on earth could not exist without bacteria:

Bacteria decompose organic matter, recycling nutrients like carbon back into ecosystems for plant growth.

They fix nitrogen in soil, converting it into compounds plants use for growth, supporting food chains.

Bacteria in human guts, like Lactobacillus, aid digestion and synthesize vitamins, essential for health.

14. (a) With the aid of a diagram, describe parts of a lesson plan.

(b) Examine and re-write correctly the following specific objectives written by student teachers during microteaching:

(i) Students should define the term Biology.

(ii) Explain factors affecting the rate of photosynthesis.

(iii) Student must understand to explain the roles of enzymes.

(a) With the aid of a diagram, describe parts of a lesson plan:

(Description since a diagram cannot be drawn: A lesson plan includes the title (e.g., Photosynthesis), objectives (understand the process of photosynthesis), introduction (brief overview or activity), main content (steps of photosynthesis), teaching methods (demonstration or discussion), assessment (quiz or questions), and closure (summary or reflection).)

(b) Examine and re-write correctly the following specific objectives:

(i) Original: Students should define the term Biology.

Rewritten: By the end of the lesson, students will be able to define the term Biology accurately.

(ii) Original: Explain factors affecting the rate of photosynthesis.

Rewritten: By the end of the lesson, students will be able to explain the factors affecting the rate of photosynthesis.

(iii) Original: Student must understand to explain the roles of enzymes.

Rewritten: By the end of the lesson, students will be able to explain the roles of enzymes in biological processes.

15. (a) Analyze five scientific approaches that are followed in gathering information about the natural world.

(b) Identify three different skills that Biology students should have in order to perform practical tasks successfully.

(a) Analyze five scientific approaches that are followed in gathering information about the natural world:

Observation involves systematically watching phenomena, like animal behavior, to identify patterns.

Experimentation tests hypotheses, such as measuring plant growth under different light conditions.

Data collection gathers measurable results, like recording temperature effects on enzyme activity, for analysis.

Hypothesis formation predicts outcomes, such as proposing that CO_2 increases photosynthesis rates, guiding research.

Modeling creates representations, like food web diagrams, to simulate ecosystem interactions.

(b) Identify three different skills that Biology students should have in order to perform practical tasks successfully:

Observation skills enable students to notice details, such as color changes in experiments like Benedict's test.

Measurement skills ensure accurate use of tools, like pipettes for titration, yielding reliable data.

Safety skills, such as proper handling of chemicals, prevent accidents during dissections or reactions.

16. Imagine you are assigned a task by your head of department to buy at least three Biology textbooks. Explain seven factors you will consider in selecting quality textbooks.

The textbook should align with the curriculum, covering topics like genetics and ecology as per the syllabus.

Content accuracy is crucial, ensuring scientific facts, such as the Krebs cycle, are correct and up-to-date.

Clarity of language ensures concepts like osmosis are explained simply for student comprehension.

Inclusion of visuals, like diagrams of cell structures, aids understanding and engagement.

Practical activities, such as experiments on respiration, should be included to support hands-on learning.

Durability of the book, with a sturdy cover and binding, ensures long-term use in classrooms.

Cost-effectiveness balances quality with budget, ensuring affordability for the school's resources.