THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

733/1 BIOLOGY 1

Time: 3 Hours **ANSWERS** **Year: 2019**

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. Outline four distinctive characteristic features which place human being in the Phylum Chordata.

Humans are placed in the Phylum Chordata due to the presence of a notochord during embryonic development, providing structural support.

They possess a dorsal hollow nerve cord, which develops into the spinal cord and brain, central to the nervous system.

Humans have pharyngeal slits or pouches in the embryo, which evolve into structures like the tonsils, indicating evolutionary ties.

They exhibit a post-anal tail during early development, though it regresses in adults, aligning with chordate characteristics.

2. Why is it important for a student teacher to carry out microteaching? Give four points.

Microteaching allows student teachers to practice specific skills, like explaining photosynthesis, in a controlled setting, building confidence.

It provides immediate feedback from peers or supervisors, helping refine techniques, such as classroom management, early on.

It enables focused skill development, such as questioning techniques for genetics, improving teaching effectiveness.

It reduces anxiety by simulating real classroom scenarios, preparing student teachers for full teaching responsibilities.

3. Outline four basic information required during preparing common dilute acids in the laboratory.

The concentration of the acid, such as 0.1 M hydrochloric acid, is needed to determine the amount of solute and solvent.

The molar mass of the acid, like 36.5 g/mol for HCl, is required to calculate the mass needed for preparation.

Safety precautions, such as wearing goggles and adding acid to water, must be known to prevent hazards.

The volume of the final solution, typically in liters or milliliters, guides the dilution process to achieve the desired concentration.

4. State four structural differences between DNA and RNA.

DNA is a double-stranded helix, while RNA is typically single-stranded, affecting their stability and function.

DNA contains the sugar deoxyribose, whereas RNA has ribose, influencing their chemical properties.

DNA uses thymine as a base, while RNA uses uracil, impacting base pairing during replication and transcription.

DNA is longer and resides in the nucleus, while RNA is shorter and can move to the cytoplasm for protein synthesis.

5. Give four importance of using teacher's manual in the teaching and learning process.

A teacher's manual provides structured lesson plans, guiding topics like cell division, ensuring organized teaching.

It offers teaching strategies, such as group activities for ecology, enhancing student engagement.

It includes assessment tools, like quizzes on respiration, aiding in evaluating student progress.

It suggests resources, such as diagrams for genetics, enriching the learning experience with visual aids.

6. (a) What are enzymes inhibitors?

(b) Briefly describe the concept of "key and lock" mechanism of enzyme action.

(a) What are enzymes inhibitors?

Enzyme inhibitors are substances that reduce or block enzyme activity, such as competitive inhibitors binding to the active site, slowing reactions like digestion.

(b) Briefly describe the concept of "key and lock" mechanism of enzyme action:

The "key and lock" mechanism describes how an enzyme's active site (lock) fits a specific substrate (key) perfectly, facilitating a reaction, like amylase breaking down starch, ensuring specificity.

7. Mention four advantages of true/false items.

True/false items are quick to construct, allowing teachers to cover topics like photosynthesis efficiently.

They are easy to score, saving time during assessment of large classes.

They test recognition of facts, such as identifying correct cell structures, aiding in foundational learning.

They can cover a broad range of content, like genetics and ecology, in a single test.

8. (a) What is the difference between active immunity and passive immunity?

(b) Briefly explain how each of the following blood cells carries out body defense:

(i) Phagocytes.

(ii) Lymphocytes.

(a) What is the difference between active immunity and passive immunity?

Active immunity develops from the body's own immune response, like after a vaccine, providing long-term protection, while passive immunity involves receiving antibodies, such as from mother to fetus, offering temporary defense.

(b) (i) Phagocytes:

Phagocytes engulf and destroy pathogens, like bacteria, through phagocytosis, neutralizing infections in the bloodstream.

(ii) Lymphocytes:

Lymphocytes, including B and T cells, produce antibodies or coordinate immune responses, targeting specific antigens like viruses for elimination.

9. Outline four principles of teaching and learning Biology that teachers should follow for effective teaching and learning.

Teachers should ensure clarity in objectives, stating goals like understanding respiration, to guide lessons effectively.

They must use active learning methods, such as dissections for anatomy, to engage students practically.

Continuous assessment, like quizzes on genetics, should be employed to monitor progress and provide feedback.

A safe learning environment, with proper lab protocols for chemical handling, should be maintained to protect students.

10. State four uses of the energy released during respiration.

Energy released during respiration powers muscle contraction, enabling physical activities like running.

It supports active transport, such as moving ions across cell membranes in nerve cells.

It drives protein synthesis, facilitating growth and repair in tissues like muscles.

It maintains body temperature, keeping metabolic processes stable in humans.

11. Describe six artificial methods of birth control and for each give one advantage and one disadvantage.

Oral contraceptives:

Advantage: Highly effective at preventing pregnancy when taken correctly.

Disadvantage: May cause side effects like nausea or weight gain.

Intrauterine devices (IUDs):

Advantage: Long-term protection, up to 10 years, with minimal maintenance.

Disadvantage: Risk of infection or uterine perforation in rare cases.

Condoms:

Advantage: Protects against sexually transmitted infections (STIs) in addition to pregnancy.

Disadvantage: Can break or slip if not used properly, reducing reliability.

Diaphragm with spermicide:

Advantage: Non-hormonal option, suitable for those avoiding hormones.

Disadvantage: Requires correct placement, which may be inconvenient.

Hormonal implants:

Advantage: Provides long-term contraception for up to 3 years.

Disadvantage: May cause irregular bleeding or mood changes.

Tubal ligation:

Advantage: Permanent and highly effective for those not wanting future children.

Disadvantage: Irreversible, posing a challenge if fertility is desired later.

12. (a) Describe the process of energy flow in the ecosystem.

(b) Study Figure 1 that represents a food web in Serengeti National Park then construct seven food chains.

(a) Describe the process of energy flow in the ecosystem:

Energy flow begins with producers, like grasses, converting sunlight into chemical energy via photosynthesis. This energy transfers to primary consumers, such as zebras, through consumption. Secondary consumers, like hyenas, gain energy by feeding on primary consumers. Tertiary consumers, such as lions, obtain energy from secondary consumers. Decomposers, like bacteria, break down dead organisms, releasing nutrients and some energy back into the ecosystem. Energy diminishes at each trophic level due to heat loss and incomplete consumption, following the 10% rule.

(b) Study Figure 1 that represents a food web in Serengeti National Park then construct seven food chains:

Grass --> Wildebeest ---> Hyena

Shrubs ----> Gazelle ---> Lion

Grass ----> Zebra ----> Lion

Shrubs ---> Wildebeest ---> Hyena

Grass ---> Gazelle ---- Hyena

Shrubs ----> Zebra ----> Lion

Grass ----> Wildebeest ----> Decomposers

13. With the aid of a diagram, describe the life cycle of a moss plant.

Description: The moss life cycle is alternation of generations between gametophyte and sporophyte. The gametophyte, the dominant green leafy stage, produces gametes (sperm and eggs) in archegonia and antheridia. Sperm swims to fertilize the egg in water, forming a zygote. The zygote develops into a sporophyte, a stalk with a capsule, dependent on the gametophyte. Spores are released from the capsule via meiosis, dispersing to grow into new gametophytes under moist conditions, completing the cycle.

14. Describe seven qualities of a well-prepared Biology syllabus.

A well-prepared Biology syllabus clearly outlines learning objectives, specifying what students should master, such as understanding photosynthesis, to guide teaching and learning.

It is structured and sequential, organizing topics logically, like studying cell structure before genetics, ensuring a progressive build-up of knowledge.

The syllabus aligns with educational standards, incorporating core concepts like evolution, making it relevant for national assessments and curricula.

It includes a variety of assessment methods, such as practical exams on dissection and written tests on ecosystems, ensuring comprehensive evaluation.

It provides timeframes for each topic, allocating specific weeks for subjects like respiration, helping teachers manage the academic calendar effectively.

The syllabus incorporates practical activities, like lab experiments on enzyme activity, bridging theoretical knowledge with hands-on application.

Lastly, it is flexible, allowing teachers to adapt to student needs, such as extending time on challenging topics like the Krebs cycle, ensuring effective learning.

15. What will happen if one fails to abide to the laboratory rules? Explain by giving six points.

Failing to abide by laboratory rules can lead to accidents, such as chemical spills from mishandling acids, causing burns or damage to equipment.

It increases the risk of exposure to hazardous substances, like inhaling formaldehyde during dissections, potentially causing respiratory issues.

Non-compliance may result in contamination, such as improper disposal of microbial cultures, spreading pathogens and affecting experiment accuracy.

It can cause equipment damage, like breaking glassware by not following handling protocols, leading to costly replacements and delays.

Failure to follow rules disrupts learning, as unsafe practices during experiments on osmosis distract students and hinder focus.

Lastly, it poses a legal and ethical issue, as violations like neglecting safety gear usage can lead to liability for injuries, impacting the school's reputation.

16. Why is it advised to improvise teaching and learning aids and materials in the teaching and learning process? Explain by giving six reasons.

Improvising teaching aids saves costs, using locally available materials like cardboard for cell models instead of expensive kits.

It encourages creativity, as teachers design tools like flowcharts for the Krebs cycle, enhancing their teaching skills.

It ensures availability, making up for missing resources, such as using drawings for dissections when specimens are scarce.

Improvised aids make learning relevant, connecting biology to local environments, like using local plants for ecology lessons.

They enhance student engagement, as hands-on tools like improvised microscopes spark interest in topics like microbiology.

Lastly, they promote adaptability, allowing teachers to adjust materials to student levels, ensuring effective understanding of complex topics like genetics.