THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
DIPLOMA IN SECONDARY EDUCATTION EXAMINATION

733/1 **BIOLOGY 1**

Time: 3 Hours **ANSWERS** **Year: 2024**

Instructions.

1. This paper consists of sections A and B with a total of **Fourteen (14)** questions.
2. Answer **all** questions from section A and **four (4)** questions from section B.
3. Section A carries **forty (40)** marks and section B Carries **sixty (60)** marks.
4. Cellular phones are **note** allowed in the examination room.
5. Write your **examination Number** on every page of your answer booklet(s).

SECTION A (40 Marks)

Answer **All** questions from this section. Each question carries **four (4)** marks

1. Four types of Sexually Transmitted Infections (STIs) common in Tanzania include syphilis, which is a bacterial infection caused by *Treponema pallidum*. It affects the skin, genitals, and can spread to the brain and heart if untreated. It presents with painless sores and later skin rashes.

   Another common STI is gonorrhoea, caused by the bacterium *Neisseria gonorrhoeae*. It affects both males and females, causing painful urination, discharge, and in women, possible pelvic inflammatory disease, which may lead to infertility if not treated.

   HIV/AIDS is also prevalent in Tanzania. The Human Immunodeficiency Virus (HIV) weakens the immune system, making the body vulnerable to opportunistic infections and eventually leading to Acquired Immune Deficiency Syndrome (AIDS) if untreated.

   Genital herpes is another STI commonly found in Tanzania. It is caused by the Herpes Simplex Virus (HSV) and leads to painful sores and blisters around the genital area. Although it can be managed with antiviral drugs, it has no permanent cure.

2. One cause for the decrease in energy from one trophic level to another is energy lost through heat during metabolic processes like respiration. Organisms use part of the consumed energy for movement, digestion, and other life activities, releasing energy as heat.

   Another cause is energy lost through undigested food. Not all parts of the consumed food are digestible; some materials such as cellulose and bones are passed out as waste and hence, the energy contained in them is not transferred to the next level.

   A further cause is that some organisms at each trophic level die without being eaten. Their stored energy returns to the ecosystem through decomposers and does not pass on to the next trophic level.

   Additionally, energy is used in reproduction and maintenance of the body's structure and functions. These biological processes consume significant amounts of energy, further reducing the amount passed on to the next trophic level.

3. The first mistake is writing both parts of the scientific name without following the rule of italicisation or underlining if handwritten. Scientific names should be italicised when typed.

   The second mistake is starting both the genus and species names in lowercase and uppercase incorrectly as in *zeaMays*. The genus should begin with a capital letter while the species name should be in lowercase.

   The third error is writing both genus and species names joined together without a space. In proper scientific naming, there must be a space between *Zea* and *mays*.

   Lastly, it is a mistake not to write the names in Latin form, as per binomial nomenclature rules, scientific names are Latinised irrespective of the local language or origin of the species.

4. Complete the missing information in the table that shows the amount of ATP produced when one molecule of glucose is completely oxidized by naming the process/products represented using letters A-H as shown in the table below:

Site in a Cell	Respiratory Process	Number of $NADH_2$ Produced (×3 ATPs)	Number of $FADH_2$ Produced (×2 ATPs)	ATP Formed Directly	Total number of ATP Formed
Cytoplasm	Glycolysis (A)	2 (B)	-	2 (C)	8
Matrix of Mitochondrion	Link Reaction: Pyruvate to Acetyl CoA	2 (D)	-	-	6
Matrix of Mitochondrion (E)	Krebs Cycle	6 (F)	2	2 (G)	24 (H)

Explanation of ATP totals per stage:

- **Glycolysis**: 2 $NADH_2$ × 3 = 6 ATP, plus 2 ATP directly = 8 ATP
- **Link reaction**: 2 $NADH_2$ × 3 = 6 ATP
- **Krebs Cycle**: 6 $NADH_2$ × 3 = 18 ATP, 2 $FADH_2$ × 2 = 4 ATP, 2 ATP directly = 24 ATP

Grand total from all stages: 8 + 6 + 24 = 38 ATP

So the complete filled-in letters are:
A = Glycolysis
B = 2
C = 2
D = 2
E = Matrix of Mitochondrion
F = 6
G = 2
H = 24

5. Fibrous proteins are long, thread-like, and usually insoluble in water. They serve structural roles in organisms, for example, collagen in connective tissues and keratin in hair and nails.

On the other hand, globular proteins are compact, spherical, and generally soluble in water. They play functional roles like enzyme activity, transport of molecules, and as antibodies in the immune system.

6. (a) The sex ratio of offspring from the union of male and female gametes in the F1 generation is typically 1:1. This means there is an equal chance for the offspring to be either male (XY) or female (XX).

   (b) The ratios obtained are not always achieved in human populations due to factors such as selective abortion, natural miscarriage rates differing between male and female foetuses, social and cultural preferences, and random chance in small populations.

7. One technique for handling laboratory wastes is categorizing and separating hazardous waste from non-hazardous waste to avoid contamination and ensure safe disposal.

   Another technique is neutralizing acidic or basic wastes before disposal to minimise environmental harm and protect sewer systems.

   A further method is incinerating organic and volatile chemical wastes in specialized high-temperature incinerators to completely eliminate harmful compounds.

   Lastly, collecting broken glassware in designated sharps containers prevents injury and ensures they are handled separately and safely.

8. One strategy to solve students' massive failure in Biology is improving laboratory facilities and ensuring students get hands-on practical experiences.

   Another strategy is organizing regular remedial classes for weak students to reinforce their understanding of difficult topics.

   A further strategy is adopting learner-centred teaching approaches to increase student participation and interest in the subject.

   Lastly, providing continuous assessment tests helps teachers monitor progress and address learning difficulties early before final examinations.

9. The Ministry of Education, Science and Technology (MOEST) would reject the idea because syllabus development must be national and not restricted to individual contexts to ensure standardised education countrywide.

   Another reason is to maintain the integrity and consistency of examination standards, which require a uniform syllabus for fair assessment.

   The third reason is to uphold the national curriculum objectives which aim to develop holistic citizens who can function anywhere in Tanzania and beyond.

   Lastly, localised syllabuses might omit nationally significant knowledge, undermining students' preparation for national and regional development roles.

10. In modern teaching and learning environments, teachers' ability to keep students' progress in electronic spreadsheets is an achievement because it improves accuracy and reduces errors associated with manual record-keeping.

    It also enables quick access and easy analysis of students' performance data for timely interventions.

    Additionally, electronic spreadsheets can easily generate reports, graphs, and trends that help in monitoring students' progress over time.

Lastly, it facilitates data security and back-up options, ensuring important student records are not lost or damaged as can happen with paperwork.

SECTION B (60 Marks)

Answer all questions from this question. Each question carries **fifteen (15)** marks.

11. Analyze six features which help *Pinus sylvestris* to adapt to various climates.

    One important feature is the presence of needle-like leaves. These narrow, slender leaves reduce the surface area exposed to the atmosphere, which minimizes water loss through transpiration. This adaptation is particularly useful in cold and dry environments where water conservation is critical.

    Secondly, *Pinus sylvestris* has a thick cuticle covering its leaves. This waxy layer acts as a protective barrier, reducing water evaporation and offering protection against cold winds and frost, which are common in temperate and subarctic climates.

    Another feature is its deep and extensive root system. This allows the tree to access water from deeper soil layers, making it able to survive in areas with limited surface water availability or during dry seasons.

    The tree also exhibits evergreen behavior, retaining its leaves throughout the year. This allows it to continue photosynthesis whenever conditions are favorable, including during brief warm spells in cold climates, ensuring year-round energy production.

    Furthermore, *Pinus sylvestris* produces cones that protect seeds from harsh weather and predators. The tough, woody cones open only under favorable conditions, ensuring seeds are dispersed when there is a high chance of survival.

    Lastly, the tree has a high tolerance to poor and acidic soils. It can grow in rocky, sandy, or nutrient-poor soils where many other plant species cannot thrive, giving it an advantage in varied and harsh environments.

12. Analyze six strategies to address the challenge of drug abuse and addiction among adolescents in Tanzania.

    The first strategy involves conducting comprehensive education programs in schools and communities. These programs should inform young people about the dangers of drug abuse, the long-term consequences of addiction, and healthy lifestyle choices.

    Secondly, there is a need to strengthen family guidance and parental involvement. Families should be encouraged to build close relationships with their children, openly discuss the risks of drug abuse, and provide emotional support to help adolescents resist peer pressure.

    Another effective strategy is to establish counseling and rehabilitation centers. These facilities would offer professional counseling, medical treatment, and rehabilitation services to adolescents already affected by drug abuse, helping them to recover and reintegrate into society.

Law enforcement should also be reinforced to control the availability and distribution of illegal drugs. This involves tightening border control, patrolling drug trafficking routes, and imposing strict penalties on those involved in drug supply networks.
Creating youth recreational and empowerment programs is another essential strategy. Engaging young people in sports, arts, music, and vocational training reduces idle time, builds self-esteem, and provides alternatives to drug use.

Finally, collaboration between government agencies, non-governmental organizations, religious groups, and community leaders is vital. A unified approach ensures consistent messaging, resource sharing, and community-based monitoring to effectively combat drug abuse.

13. Prepare a 10 minutes' lesson plan without including preliminary information to be used in a micro-teaching class session using the topic of safety in our environment and the subtopic of first aid.

Lesson Plan

Competence:
To enable students to understand the meaning, importance, and basic procedures of first aid.

Topic:
Safety in Our Environment

Sub-topic:
First Aid

Lesson Objectives:
By the end of the lesson, the students should be able to:
1. Define the term first aid.
2. State the importance of first aid.
3. Mention at least four basic items found in a first aid kit.
4. Describe the procedure for managing a minor cut injury.

Teaching and Learning Materials:
A real or improvised first aid box, chart showing items in a first aid kit, and a sample role-play scenario.

Lesson Stages:

Introduction (2 minutes)
The teacher greets students and introduces the lesson by asking them if they have ever witnessed someone getting injured at school or home. The teacher then asks what was done immediately to help the person. Through their responses, the teacher introduces the term **first aid** as the immediate assistance given to an injured person before professional medical help arrives.

Lesson Development (6 minutes)

Step 1 (Definition) — 1 minute
The teacher defines first aid as the immediate help given to a person who has been injured or suddenly taken ill before proper medical treatment is available.

Step 2 (Importance) — 1 minute
The teacher explains why first aid is important, such as saving lives, preventing a condition from worsening, and reducing pain.

Step 3 (First Aid Kit Contents) — 2 minutes
Using a chart or real first aid box, the teacher shows and names at least four items commonly found in a first aid kit. Items may include bandages, antiseptic, scissors, plasters, cotton wool, and gloves.

Step 4 (Managing a Minor Cut) — 2 minutes
The teacher demonstrates and explains the steps for managing a minor cut:

- Clean the wound with clean water.
- Apply antiseptic.
- Cover with a clean bandage.

A student may be asked to volunteer in a role-play of this simple procedure.

Conclusion (2 minutes)
The teacher summarizes the key points covered: the meaning of first aid, its importance, the items in a first aid kit, and how to manage a minor cut.
The teacher then asks a few quick oral questions to assess understanding, for example:

- What is first aid?
- Name two items found in a first aid kit.
- Why is first aid important?

Finally, the teacher reminds students that learning first aid is a life skill that helps to save lives in emergencies.

14. Show how Sudan III solution as one of the reagents used for food test in biology practicals can be prepared. The following guidelines should be adhered to:

(a) **6 apparatuses**

- Beaker
- Measuring cylinder
- Stirring rod
- Funnel
- Filter paper
- Dropper bottle

(b) **2 chemicals**

- Sudan III powder
- Ethanol (absolute alcohol)

(c) **5 procedures**
First, measure an appropriate quantity of ethanol using a measuring cylinder and pour it into a beaker. Ethanol acts as a solvent to dissolve Sudan III powder.

Second, weigh a specific amount of Sudan III powder, usually around 0.5 grams for every 100 cm^3 of ethanol, and carefully add it into the beaker containing ethanol.

Third, stir the mixture thoroughly using a stirring rod until all the Sudan III powder has completely dissolved, forming a uniform solution.

Fourth, filter the solution using filter paper and a funnel to remove any undissolved particles. This ensures that the final reagent is clear and effective for use in food tests.

Finally, transfer the prepared Sudan III solution into a clean dropper bottle for storage and label it clearly. The solution is now ready to be used for testing the presence of lipids in food samples during biology practicals.