THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

033/1 **BIOLOGY 1**

(For Both School and Private Candidates)

Time: 3 Hours **ANSWERS** **Year: 2021**

Instructions

1. This paper consists of FIFTEEN questions.

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

1. For each of the items (i) - (x), choose the correct answer from among the given alternatives and write its letter beside the item number in the answer booklet provided.

(i) Which respiratory surface is used for gaseous exchange in tadpoles?
A Spiracles
B Gills
C Lungs
D Skin
E Book lung

Answer: B Gills
Reason: Tadpoles are the aquatic larval stage of amphibians and use gills to breathe underwater.

(ii) Which of the following apparatuses are used for magnifying specimens?
A Hand lens and petri dish
B Hand lens and watch glass
C Microscope and watch glass
D Microscope and hand lens
E Measuring cylinder and beaker

Answer: D Microscope and hand lens
Reason: Both the microscope and hand lens are optical tools used to magnify small objects or specimens.

(iii) Which safety precaution should be taken when administering First Aid to a wounded person?
A Washing hands with soap
B Wearing protective gloves
C Calling the ambulance for pick-up
D Washing the wound with soap
E Drying the wound with clean cloth

Answer: B Wearing protective gloves
Reason: Wearing gloves prevents contamination and protects both the helper and the patient from infection.

(iv) The following are the characteristics of prokaryotes except
A have nuclear materials.
B they are microscopic.
C have nuclear membrane.
D have cell wall.
E they are single celled organisms.

Answer: C have nuclear membrane
Reason: Prokaryotes lack a nuclear membrane; their genetic material floats freely in the cytoplasm.

(v) Which of the following are the end products of digestion when lipids are digested completely?
A Glucose and fructose
B Fatty acids and glucose
C Amino acids and fructose
D Glucose and glycerol
E Fatty acids and glycerol

Answer: E Fatty acids and glycerol
Reason: Lipids are broken down by enzymes into fatty acids and glycerol during digestion.

(vi) What happens when a person moves from a bright lighted to a dim lighted room?
A Pupil becomes large
B Pupil becomes small
C Circular muscles contract
D Radial muscles relax
E Radial and circular muscles relax

Answer: A Pupil becomes large
Reason: In dim light, the pupil dilates (gets larger) to allow more light into the eye for better vision.

(vii) Which of the following set of conditions is necessary for seed germination?
A Temperature, soil and water
B Water and carbon dioxide
C Water, temperature and oxygen
D Water, temperature and food
E Soil, oxygen and water

Answer: C Water, temperature and oxygen
Reason: These are the three essential conditions for seed germination; light and food are not always necessary.

(viii) The laboratory technician investigated the faeces of a patient and found organisms with flattened segmented bodies. What is the name of the organisms?
A Tapeworms
B Roundworms
C Liver flukes
D Filarial worms
E Planaria

Answer: A Tapeworms
Reason: Tapeworms are flatworms with segmented bodies and are commonly found in the intestines of hosts.

(ix) The following balanced habitat contains grasses, wildebeests, lions and bacteria. What would happen if lions were removed?
A The number of bacteria would remain the same.
B The number of wildebeest would decrease.
C The amount of grasses would decrease.
D The amount of grasses would increase.
E The number of wildebeests would increase.

Answer: C The amount of grasses would decrease.
Reason: Without lions, wildebeests would overpopulate and overgraze, reducing the amount of grass.

(x) What will happen if phloem tissue is destroyed in green plants?
A Absorption of water in the plant body will stop.
B Absorption of mineral salts will stop.
C Transport of water and manufactured food will stop.
D Transport of manufactured food will stop.
E Transport of oxygen in the plant body will stop.

Answer: D Transport of manufactured food will stop.
Reason: Phloem tissue is responsible for transporting sugars (manufactured food) from leaves to other parts of the plant.

2. Match the descriptions of the parts of heart in List A with their corresponding terminologies in List B by writing the letter of the correct response beside the item number in the answer booklet provided.

List A
(i) A chamber of the heart which has relatively thick walls.
(ii) A valve that prevents the backflow of blood from the right ventricle to the right auricle.
(iii) A valve that prevents the backflow of blood from the pulmonary artery to the right ventricle.
(iv) A tissue that separates left and right chambers of the heart.
(v) A chamber of the heart which has relatively thin walls.

List B
A Auricle
B Aorta
C Bicuspid
D Myocardium
E Semilunar
F Septum
G Tricuspid
H Ventricle

Answers:
(i) H
(ii) G
(iii) E
(iv) F
(v) A

3. In a car accident many people were injured and felt pains all over their bodies. The victims were given First Aid before taken to hospital. What was the aim of administering first aid to the accident victims? Give four points.

The aims of administering first aid to accident victims are:
To preserve life by maintaining vital functions such as breathing and heartbeat.
To prevent the condition of the victim from worsening by controlling bleeding, preventing infection, and stabilizing fractures.
To promote recovery by reducing pain, relieving anxiety, and preventing shock.
To provide immediate and temporary care before professional medical help is obtained.

4. Puberty is the transition period from childhood to adulthood where the body undergoes different psychological and physiological changes. Give six physiological changes which occur in boys during puberty.

Deepening of the voice due to enlargement of the larynx.
Growth of facial and pubic hair.
Increased muscle mass and broadening of shoulders.
Development of the testes and penis.
Production of sperm begins.
Increase in height and body size.

5. In animals, not every mating leads to fertilization. Give four factors in males which account for this problem.

Low sperm count, which reduces the chances of fertilization.
Poor sperm motility, which prevents sperm from reaching the egg.
Impotence or erectile dysfunction, making mating unsuccessful.
Blocked or damaged sperm ducts preventing sperm from being released during ejaculation.

6. You have visited a school farm and observed that all maize plants have small yellowish leaves and show stunted growth.
(a) Name four elements which are absent in the soil of the school farm.

Nitrogen
Magnesium

Potassium
Phosphorus

(b) What functions do the named elements play in crop production? Give one function for each element.

Nitrogen: Promotes formation of proteins and leaf growth.
Magnesium: Forms the central atom in chlorophyll, essential for photosynthesis.
Potassium: Helps in the regulation of stomatal opening and closing and improves disease resistance.
Phosphorus: Promotes root development and energy transfer through ATP.

7. Differentiate anaerobic from aerobic respiration. Tabulate your answer as shown in following table.

Feature
(i) Site in the cell
Aerobic Respiration: Mitochondria
Anaerobic Respiration: Cytoplasm

(ii) Substrates involved
Aerobic Respiration: Glucose and oxygen
Anaerobic Respiration: Glucose only

(iii) End products
Aerobic Respiration: Carbon dioxide and water
Anaerobic Respiration: Lactic acid or alcohol and carbon dioxide

(iv) Amount of energy per molecule of glucose
Aerobic Respiration: Large amount of energy (38 ATP)
Anaerobic Respiration: Small amount of energy (2 ATP)

8. How is the axial skeleton adapted to perform its function? Give three points.

It is made of strong bones like the vertebral column and skull which support and protect vital organs such as the brain, heart, and lungs.
The vertebral column is flexible due to intervertebral discs, allowing bending and twisting while maintaining upright posture.
The rib cage has a curved structure and articulates with the spine to provide protection and room for lung expansion during breathing.

9. How does the skin of a man regulate internal body temperature when the external environment is overheated? Briefly explain by giving three ways.

Sweating: Sweat glands secrete sweat which evaporates from the skin surface, carrying heat away.
Vasodilation: Blood vessels near the skin surface widen, increasing blood flow and heat loss.

Reduced metabolic rate: Body processes slow down to reduce heat production internally.

10. Briefly explain the importance of the four excretory products of plants.

Oxygen: Released during photosynthesis and used in respiration by animals and other organisms.
Carbon dioxide: Released during respiration and used in photosynthesis by green plants.
Water: Helps in cooling the plant through transpiration and maintains turgor pressure.
Tannins and alkaloids: Some act as defense chemicals to protect plants from herbivores.

11. Albinism is the hereditary condition where the body lacks melanin pigment in hair, skin and eyes. Briefly explain two problems faced by albinos in their environment and how to overcome those problems.

High sensitivity to sunlight, causing sunburns and increased risk of skin cancer. Solution: Wearing protective clothing, hats, and using sunscreen.
Poor eyesight or visual impairments due to lack of pigmentation in the eyes. Solution: Use of prescribed glasses and regular eye check-ups.

12. Giving one example in each case, briefly explain how the following provide evidence for evolution.
(a) Homologous structures

Homologous structures like the forelimbs of a human, bat, and whale show similar structural design but serve different functions, indicating a common ancestor.

(b) Cell biology

All living organisms are made up of cells and use DNA and similar metabolic pathways (like glycolysis), suggesting that all life forms evolved from a common ancestral cell.

13. Irresponsible sexual behaviour among youths poses a problem to the Tanzanian community. Justify this statement by elaborating six effects.

One effect of irresponsible sexual behaviour among youths is the rise in teenage pregnancies. When young girls engage in unprotected sex, they are at risk of becoming pregnant at an early age. This often results in them dropping out of school, thereby ending their formal education prematurely. For example, a secondary school girl who becomes pregnant may be forced to stay home, missing out on critical learning and future career opportunities.

Another serious effect is the spread of sexually transmitted infections (STIs), including HIV/AIDS. Unprotected sex or having multiple sexual partners increases the risk of infection. Youths may lack adequate knowledge about prevention methods, such as the use of condoms. For instance, a youth who engages in casual sex without protection may contract gonorrhea, syphilis, or even HIV, which can impact their health and the health of others they interact with.

Early and unplanned marriages are also a consequence. In many communities, when a young girl becomes pregnant, the family may force her to marry the person responsible. This disrupts her emotional development and future aspirations. For example, a 17-year-old girl who gets married due to pregnancy may lose her chance to complete her secondary education and live independently.

Irresponsible sexual behaviour contributes to increased poverty. Young parents may not have the financial means to support a child, leading to struggles in providing food, clothing, and education. A youth who becomes a father while still in school may be forced to drop out and look for low-paying jobs, trapping him and his child in a cycle of poverty.

It also leads to social stigma and discrimination. Young girls who become pregnant outside of marriage may face rejection from family, school, and society. This can result in isolation and reduced self-worth. For example, a teenage mother may be mocked by peers or expelled from school, leading to emotional distress.

Lastly, irresponsible sexual behaviour can lead to psychological problems. Youths may experience anxiety, depression, and low self-esteem due to the consequences of their actions. A girl who has to raise a child alone may feel overwhelmed and unsupported, leading to mental health issues that affect her entire future.

14. When the bell was rang after break time, students entered into their classrooms. Explain the role of each part of the ear involved in the hearing mechanism which made the students respond by entering the classrooms after the bell was rang.

The pinna is the outer part of the ear that first receives the sound of the bell. It is shaped to collect and direct sound waves into the auditory canal efficiently. For example, when the bell rings, the curved shape of the pinna captures the sound vibrations from the air and channels them inward.

The auditory canal carries the sound waves to the eardrum. As the sound travels through the canal, it remains concentrated and directed. The canal also has protective hairs and wax that prevent dust and insects from entering. As students hear the bell, the sound travels down this passageway toward the eardrum.

The eardrum (tympanic membrane) vibrates when sound waves hit it. These vibrations are essential as they convert the sound waves into mechanical movements. When the bell rings, the eardrum vibrates rapidly in response to the high-pitched sound, initiating the next stage of hearing.

The vibrations from the eardrum are transmitted to the ossicles, which are three small bones in the middle ear called the malleus (hammer), incus (anvil), and stapes (stirrup). These bones amplify the sound and pass it on to the inner ear. The stapes, being the final bone, pushes against the oval window, transmitting the sound into the cochlea.

The cochlea is a spiral-shaped organ filled with fluid and lined with sensory hair cells. When vibrations enter the cochlea, the fluid moves, causing the hair cells to bend and create nerve impulses. For example, the vibrations caused by the bell move the fluid inside the cochlea, stimulating specific hair cells that detect the pitch and intensity of the sound.

The auditory nerve carries the nerve impulses from the cochlea to the brain. The brain interprets these signals as the ringing of a bell. Once the brain identifies the sound as the school bell, it triggers a response, and the students, recognizing that break time is over, move toward their classrooms.

15. Form One students in a certain secondary school were interested to know why it is necessary to study Biology. Assume you are a Biology teacher; educate these students on the importance of studying Biology by giving four points.

Biology helps students understand the structure and functioning of living organisms. It explains how various systems in the human body work together to maintain life. For example, studying the circulatory system shows how the heart pumps blood, delivering oxygen and nutrients throughout the body. This understanding lays the foundation for careers in medicine, nursing, and other health-related fields.

Biology provides knowledge on maintaining good health and preventing diseases. Students learn about hygiene, nutrition, and the immune system, which helps them make informed health decisions. For example, by studying pathogens and their transmission, students can understand how to prevent infections such as malaria and cholera through sanitation and proper hygiene practices.

Biology creates awareness about the environment and the need for conservation. It teaches about ecosystems, biodiversity, and human impact on nature. For instance, students learn about deforestation and its effects on climate change, encouraging them to participate in tree planting and sustainable living. This promotes environmental responsibility from a young age.

Biology opens up career opportunities in fields such as agriculture, biotechnology, and environmental science. Students who study biology can become doctors, veterinary officers, laboratory technicians, or agricultural extension workers. For example, a student interested in animal health may be inspired to become a veterinarian after learning about animal physiology and reproduction.