THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

BIOLOGY 1

(For Both School and Private Candidates)

Time: 3 Hours **Year: 2024**

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 part is the functional unit of the kidney?
A Pelvis
B Nephron
C Cortex
D Medulla
E Ureter

Answer: B Nephron
Reason: The nephron is the structural and functional unit of the kidney responsible for filtering blood and forming urine.

(ii) Form Two students were required to measure 250 cm^3 of water when doing food test experiment. Which apparatus did they use?
A Beaker
B Dropper
C Petri dish
D Watch glass
E Spatula

Answer: A Beaker
Reason: A beaker is used for measuring and pouring relatively large volumes of liquids such as 250 cm^3.

(iii) How can a patient diagnosed with kidney stones control the disorder?
A Eating very salty foods
B Eating enough fibre food
C Taking food rich in sodium
D Taking diet high in protein
E Drinking plenty of water

Answer: E Drinking plenty of water
Reason: Drinking water helps to dilute urine and flush out kidney stones or prevent them from forming.

(iv) Form Three students took a thermometer and measured the temperature of the following organisms: frog, duck, rat, lizard, and rabbit under cold and later under hot environment. Which organisms would the temperature remain constant? A Rabbit, Lizard and Rat
B Frog, Rabbit and Duck
C Rabbit, Duck and Rat
D Lizard, Rabbit and Duck
E Duck, Lizard and Frog

Answer: C Rabbit, Duck and Rat
Reason: These are warm-blooded animals (homeotherms) whose body temperatures remain constant regardless of the environment.

(v) What is the function of the nucleus in a cell?
A Controls all cell activities
B Determines the cell permeability
C Produces energy for the cell
D Excretes wastes from the cell
E Protects and support the cell

Answer: A Controls all cell activities
Reason: The nucleus contains genetic material and directs all cellular processes such as growth, metabolism, and reproduction.

(vi) Which statements support the Darwin's theory of organic evolution?
(i) Living organisms produce more offspring than the environment can support.
(ii) An individual is able to develop structures to suit the need.
(iii) Organisms struggle for existence of the limited resources such as mates.
(iv) The fittest organisms survive while the less adapted organisms are eliminated.
(v) The more an individual used a part of its body the more developed that part became.

A (i), (ii) and (iii)
B (i), (ii) and (iv)
C (i), (iii) and (iv)
D (ii), (iv) and (v)
E (iii), (iv) and (v)

Answer: C (i), (iii) and (iv)
Reason: These are key points of natural selection in Darwin's theory—overproduction, competition, and survival of the fittest.

(vii) Form Three students were given a scalpel and hibiscus flower and they were required to dissect and display the female reproductive parts. Which parts were expected to be displayed?
A Ovary, Style and Stigma
B Filament, Anther and Ovary
C Petal, Ovary and Anther
D Ovary, Stigma and Filament
E Anther, Ovary and Stigma

Answer: A Ovary, Style and Stigma

Reason: These are the female reproductive parts of a flower involved in receiving pollen and producing seeds.

(viii) Two people were cutting firewood in the forest then they saw a lion and suddenly climbed a tree to escape the lion. Which hormone prepared them for that action?
A Prolactin hormone
B Aldosterone hormone
C Adrenaline hormone
D Growth hormone
E Antidiuretic hormone

Answer: C Adrenaline hormone
Reason: Adrenaline is secreted in response to fear or danger and prepares the body for the "fight or flight" response.

(ix) Which one of the following is the correct classification of paramecium?
A Kingdom Protoctista, Phylum Apicomplexa
B Kingdom Animalia, Phylum Rhizopoda
C Kingdom Protoctista, Phylum Zoomastigina
D Kingdom Protoctista, Phylum Ciliophora
E Kingdom Fungi, Phylum Ascomycota

Answer: D Kingdom Protoctista, Phylum Ciliophora
Reason: Paramecium is a unicellular organism with cilia and is correctly classified under Ciliophora in the kingdom Protoctista.

(x) Which chemical composition is correct about DNA?
A Deoxyribose, Uracil, Guanine and Phosphate group
B Phosphate group, Deoxyribose, Thymine and Uracil
C Deoxyribose, Adenine, Ribose and Phosphate group
D Uracil, Phosphate group, Cytosine and Deoxyribose
E Phosphate group, Deoxyribose, Cytosine and Adenine

Answer: E Phosphate group, Deoxyribose, Cytosine and Adenine
Reason: DNA contains the sugar deoxyribose, phosphate group, and nitrogenous bases including cytosine and adenine.

2. Match the uses of components of the First Aid kit in List A with their corresponding components in List B by writing the letter of the correct response beside the item number in the answer booklet provided.

List A
(i) Covering wounds to protect them from dirt and germs.
(ii) Cleaning and drying wounds.

(iii) Covering the hands to avoid infection of the wounds.
(iv) Treating burns and scalds.
(v) Securing bandages.
(vi) Reducing muscle pain.

List B
A Soap
B Liniment
C Cotton wool
D Sterile gauze
E Petroleum jelly
F Razor blades
G Sterile gloves
H Safety pins

Answers:

LIST A	(i)	(ii)	(iii)	(iv)	(v)	(vi)
LIST B	D	G	E	H	B	

3. A woman visited a food seller and bought the following foods: eggs, Irish potatoes and sunflower seeds.
(a) Identify the type of nutrient found in each of the food items listed.

Eggs contain proteins which are essential for body building and repair of worn-out tissues.
Irish potatoes are rich in carbohydrates, mainly starch, which provide energy for body functions.
Sunflower seeds contain fats (lipids), which serve as a source of energy and help in the absorption of fatsoluble vitamins.

(b) Give four functions of the nutrient identified in the eggs.

Proteins are used for the growth and repair of body tissues, helping to heal wounds and maintain body structure.
They are essential for the formation of enzymes and hormones that regulate body processes such as digestion and metabolism.
Proteins help in the production of antibodies which strengthen the immune system against diseases.
They provide energy when carbohydrates and fats are insufficient in the body.

4. Why are personal hygiene and good manner important in our daily life? Give six points.

They help to prevent the spread of infectious diseases such as cholera, typhoid, and skin infections.
Good hygiene promotes self-respect and confidence, allowing people to interact freely and comfortably.
Maintaining cleanliness prevents body odor and promotes social acceptance and better relationships.

Proper hygiene helps in maintaining a clean environment, reducing pollution and improving quality of life.
Good manners such as respect and politeness foster peace and cooperation within families and communities.
They encourage responsibility and discipline, helping individuals make better decisions and live orderly lives.

5. When doing experiment, accidentally Bahati touched hot water with her finger and she immediately withdrew it.

(a) Explain the process of impulse flow from touching the hot water to the moment she responded. Give five points.

The sensory receptors in the skin detect the hot temperature and generate a nerve impulse.
The impulse travels along the sensory neuron to the spinal cord.
In the spinal cord, the impulse is passed through a relay neuron.
The relay neuron transmits the impulse to a motor neuron.
The motor neuron sends the impulse to the muscles in the arm, which contract and cause the finger to withdraw quickly.

(b) Draw the sensory neurone that picked up the nerve impulses from the receptor when she touched the hot water and label any four parts.

- Dendrites - Cell body
- Axon
- Axon terminals

6. (a) How does irresponsible sexual behaviour differ from responsible sexual behaviour?

Irresponsible sexual behaviour involves actions such as having unprotected sex, engaging with multiple partners, or sexual activity at a young age, often resulting in STIs or unwanted pregnancies. Responsible sexual behaviour includes abstinence, using protection, being faithful to one partner, and making informed decisions that protect oneself and others from harm.

(b) Briefly explain four ways which can be used to eradicate irresponsible sexual behaviour.

Providing comprehensive sex education in schools to raise awareness about safe practices and consequences of risky behaviours.
Encouraging abstinence and self-control, especially among youths, through peer programs and community mentorship.
Promoting the use of contraceptives and condoms to prevent unwanted pregnancies and infections.
Creating youth-friendly health services where young people can get counseling and reproductive health information without fear or stigma.

7. (a) In three points, differentiate movement from locomotion.

Movement is a general term that refers to any change in position of a part or the whole body. Locomotion is a specific type of movement that results in displacement from one place to another.
Movement can occur within the body, such as heartbeat or blood flow, while locomotion involves external movement like walking or flying.
All living things show movement, but only animals typically exhibit locomotion by changing location.

(b) Explain the importance of movement to the living organisms. Give two points.

Movement enables animals to find food, escape predators, and seek shelter, which are essential for survival.
It also allows internal processes such as circulation and digestion to function, helping organisms maintain life.

8. When a red-flowered rose plant was crossed with a white-flowered rose plant all members of the F_1 generation were pink. Using genetic diagrams illustrate the cross made.

Let R = allele for red flower, r = allele for white flower.
Parents: RR (red) × rr (white)

	R	R
r	Rr	Rr
r	Rr	Rr

All offspring (Rr) show intermediate expression—pink flowers, indicating incomplete dominance.

9. The blood circulation is important for survival of human being. In six points, justify this statement.

Blood circulation is responsible for transporting oxygen from the lungs to all body cells. This oxygen is essential for cellular respiration, which produces energy needed for various body activities. For example, brain cells rely heavily on continuous oxygen supply to function effectively.

It delivers nutrients absorbed from digested food to different tissues in the body. These nutrients, such as glucose and amino acids, are used for growth, repair, and energy. For instance, glucose delivered to muscles supports physical activity.

Blood helps in the removal of metabolic waste products like carbon dioxide and urea from the cells to excretory organs. This process prevents accumulation of harmful substances in the body. For example, carbon dioxide is carried to the lungs for exhalation.

Circulation regulates body temperature by distributing heat evenly throughout the body. When the body is hot, blood vessels near the skin dilate to release heat. This helps maintain a stable internal environment, especially during physical exertion.

White blood cells and antibodies circulate in the blood to protect the body from infections. They detect and fight pathogens such as bacteria and viruses. For instance, when germs enter the body through a cut, white blood cells act to neutralize them.

Hormones produced by endocrine glands are distributed through the bloodstream to target organs. These hormones coordinate processes like growth, metabolism, and reproduction. For example, insulin from the pancreas regulates blood sugar levels.

10. Analyse five factors which affect the rate of respiration in living organisms.

Temperature influences the activity of enzymes involved in respiration. At optimum temperature, enzymes work efficiently, increasing respiration rate. However, high temperatures can denature enzymes, while low temperatures slow down reactions. For example, cold-blooded animals like lizards have slower respiration in cold environments.

The concentration of oxygen affects aerobic respiration. Higher oxygen availability supports efficient energy production, while limited oxygen leads to slower respiration or a shift to anaerobic respiration. For instance, during intense exercise, when oxygen is insufficient, muscle cells perform anaerobic respiration.

Glucose availability directly affects respiration since it is the primary fuel. Without enough glucose, cells cannot produce adequate ATP for cellular activities. For example, during fasting or starvation, energy levels drop due to low glucose intake.

The presence of toxic substances can inhibit enzymes responsible for respiration. Toxins or heavy metals like mercury can interfere with the respiratory chain in mitochondria, reducing ATP output. This is seen in some cases of poisoning.

Water is essential for enzymatic activities and transport of respiratory substrates. Dehydration hampers metabolic processes and slows down respiration. For instance, a plant suffering from drought will exhibit reduced cellular respiration due to lack of water.

11. You are invited by the ward leader in the nearby village to talk about cholera. Explain six preventive measures of the disease that you would address to the villagers.

Boiling or treating drinking water is crucial to kill the bacteria that cause cholera. This ensures the water is safe for consumption. For example, villagers should be taught to boil river water before drinking.

Encouraging proper handwashing with soap, especially before eating and after using the toilet, helps prevent the spread of germs. Hand hygiene is one of the most effective ways to stop transmission.

Proper disposal of human waste using clean and covered latrines reduces contamination of the environment. This prevents the bacteria from reaching water sources or food. For example, building pit latrines for every household is a good measure.

Promoting the consumption of properly cooked food and avoiding raw or uncovered food helps kill bacteria and reduces the risk of infection. For instance, street foods should be served hot and covered.

Covering food and water storage containers prevents flies from transmitting bacteria to what people eat and drink. Using clean, sealed utensils and containers is highly recommended.

Conducting community education campaigns to raise awareness about the causes, symptoms, and prevention of cholera empowers villagers to take responsibility. For example, health workers can hold public talks or use posters to share information.