THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

FORM TWO NATIONAL ASSESSMENT

033 **BIOLOGY**

Time: 2:30 Hours **ANSWERS** **YEAR: 2021**

Instructions

1. This paper consists of sections A, B and C with a total of **ten (10)** questions.
2. Answer **all** questions in the spaces provided.
3. Section A and C carry **fifteen (15)** marks each and section B carries **seventy (70)** mark s.
4. All writings must be in **blue** or **black** ink.
5. Communication devices and any unauthorized materials are **not** allowed in the assessment room.
6. Write your **Assessment Number** at the top right hand corner of every page.

1. For each of the items (i) - (x), choose the correct answer from among the given alternatives and write its letter in the box provided.
(i) Scurvy is a nutritional deficiency disease due to lack of _____.
(A) Vitamin A
(B) Vitamin B_{12}
(C) Vitamin C
(D) Vitamin D

Answer: (C) Vitamin C
Reason: Scurvy is caused by a deficiency of Vitamin C, which is essential for the synthesis of collagen in connective tissues.

(ii) Substances going in and out of the cell are controlled by _____.
(A) Nucleus
(B) Mitochondria
(C) Vacuole
(D) Cell membrane
Answer: (D) Cell membrane
Reason: The cell membrane regulates the movement of substances into and out of the cell, maintaining homeostasis.

(iii) A parasite that causes malaria is _____.
(A) Plasmodium
(B) Ascaris
(C) Schistosoma
(D) Amoeba

Answer: (A) Plasmodium
Reason: Malaria is caused by the Plasmodium parasite, transmitted through the bites of infected Anopheles mosquitoes.

(iv) Which of the following step is NOT involved in scientific investigations?
(A) Problem identification
(B) Asking questions
(C) Experimentation
(D) Making conclusions

Answer: (B) Asking questions
Reason: While asking questions can be part of the process, it is not typically listed as a formal step in scientific investigations, which generally include problem identification, experimentation, and making conclusions.

(v) The process whereby carbon dioxide passes from blood into alveoli of lungs is called _____.
(A) Diffusion
(B) Respiration
(C) Osmosis
(D) Transpiration

Answer: (A) Diffusion
Reason: Diffusion is the passive movement of gases like carbon dioxide from an area of higher concentration in the blood to a lower concentration in the alveoli.

(vi) A component of the blood which is responsible for blood clotting is known as _____.
(A) Albumin
(B) Haemoglobin
(C) Plasma
(D) Platelets

Answer: (D) Platelets
Reason: Platelets are cell fragments that play a crucial role in blood clotting by aggregating at the site of a wound.

(vii) Why are rabbits called primary consumers?
(A) They feed on animals
(B) They feed on plants
(C) They feed on fungi
(D) They feed on decomposers

Answer: (B) They feed on plants
Reason: Rabbits are herbivores that consume plants, placing them at the primary consumer level in the food chain.

(viii) If you are asked on a school trip to bring a first aid kit with its components, which of the following will not be included?
(A) Cotton wool
(B) Paracetamol
(C) Pair of scissors
(D) Medicine to cure diseases

Answer: (D) Medicine to cure diseases
Reason: A standard first aid kit includes items for immediate care, such as cotton wool, paracetamol, and scissors, but not medicines for curing diseases, which require professional medical supervision.

(ix) The following organisms belong to Kingdom Fungi:
(A) Euglena, Mushroom, Yeast
(B) Amoeba, Mushroom, Mucor
(C) Mucor, Mushroom, Yeast
(D) Bacteria, Mushroom, Mucor

Answer: (C) Mucor, Mushroom, Yeast
Reason: Mucor, mushrooms, and yeast are all fungi, whereas Euglena is a protist, Amoeba is a protozoan, and bacteria belong to the Monera kingdom.

(x) Which of the following is a risky behaviour?
(A) Being punctual at work
(B) Visiting infected individuals
(C) Having many sexual partners
(D) Shaking hands with HIV-AIDS patients

Answer: (C) Having many sexual partners
Reason: Engaging with multiple sexual partners increases the risk of contracting sexually transmitted infections, including HIV/AIDS.

2. For each of the items (i) - (x), write True if a statement is correct or False if a statement is incorrect.

(i) Sterile gauze is used for bandaging to allow enough air to get to the wound. True
(ii) Hydrochloric acid in the stomach is a natural defense against infections. True
(iii) Beard growth and breast enlargement are secondary sexual characteristics in males. False
(iv) Aorta carries deoxygenated blood from the heart to the lungs. False
(v) Bacteria can be distinguished from amoeba by possession of cell wall. True
(vi) Digestion of protein starts in the mouth. False
(vii) Organ and tissues that perform the same function. False
(viii) Alveoli are structures that increase surface area for gaseous exchange in the lungs of mammals. True
(ix) Muscles provide shelter for small organisms. False
(x) The pulmonary vein carries oxygenated blood from the lungs to the heart. True

3. Match the phrase in List A with items in List B by writing the letter of the correct response below the corresponding response in List B provided.

List A
(i) Organisms which can manufacture their own food.
(ii) Members of the same species living in the same area.
(iii) Organisms which rely on other organisms for food.
(iv) A group of interdependent organisms living in an environment.

(v) Organisms which kill other organisms and feed on them wholly or in parts.

List B
(A) Decomposers
(B) Community
(C) Predators
(D) Trophic level
(E) Population
(F) Producers
(G) Consumers

Answers:
(i) F - Producers
(ii) E - Population
(iii) G - Consumers
(iv) B - Community
(v) C - Predators

4. Complete each of the following statements by writing the correct answer in the spaces provided.
(i) A muscular sheet of tissue which separates the thorax from the abdomen is known as the diaphragm.
(ii) A process of taking air into the lungs of mammals is called inhalation.
(iii) A process by which air diffuses in and out of the body across the respiratory surfaces is called respiration.
(iv) The structure which is used to protect the lungs from injury is known as the rib cage.
(v) The structure which is used for gaseous exchange in spiders is known as book lungs.

5. (a) State the uses of each of the following laboratory apparatuses.
(i) Mortar and pestle
Used to grind and crush solid substances into powder or paste.
(ii) Petri dish
A shallow cylindrical glass or plastic lidded dish used to culture cells such as bacteria or small mosses.
(iii) Test tube rack
Used to hold, store, and organize multiple test tubes upright in a laboratory.
(iv) Bunsen burner
A common piece of laboratory equipment that produces a single open gas flame, used for heating, sterilization, and combustion.
(v) Thermometer
An instrument used to measure temperature.
(b) Differentiate the term zoology from botany.
Zoology is the branch of biology that studies animals, including their structure, function, behavior, and evolution. Botany, on the other hand, is the branch of biology that focuses on the study of plants, including their physiology, structure, genetics, ecology, distribution, classification, and economic importance.

(c) How is Biology related to the field of nutrition? Briefly explain.
Biology is closely related to the field of nutrition as it provides an understanding of how organisms use food to support their metabolic processes. It explains how nutrients are digested, absorbed, transported, and metabolized in the body. Additionally, biology helps in understanding the role of various nutrients in growth, development, and maintenance of health, as well as the consequences of nutrient deficiencies or excesses. This knowledge is essential for developing dietary guidelines and interventions to promote health and prevent diseases.

6. (a) Why is it healthy to be advised to eat a balanced diet?
A balanced diet provides all the essential nutrients—carbohydrates, proteins, fats, vitamins, and minerals—in appropriate proportions necessary for the body's proper functioning. It supports growth, repairs body tissues, boosts the immune system, and provides energy, thereby reducing the risk of malnutrition and chronic diseases.

(b) If a child is suffering from kwashiorkor, which symptoms can be observed? State three.
(i) Edema (swelling) in the legs, feet, and face
(ii) A distended or swollen abdomen
(iii) Fatigue and irritability

(c) Give two natural sources of food which must be fed to the child to treat kwashiorkor.
(i) Eggs
(ii) Fish

7. (a) How is infection different from disease?
An infection occurs when pathogens (bacteria, viruses, fungi, or parasites) enter and multiply in the body. A disease results when the infection leads to symptoms and impairs normal bodily functions. In essence, infection is the invasion and multiplication of pathogens, while disease is the manifestation of symptoms and signs due to the infection.

(b) The following are different ways through which communicable diseases are transmitted. Name two diseases transmitted by each way.
(i) Sexual intercourse: HIV/AIDS and gonorrhea
(ii) Contaminated food and water: Cholera and typhoid fever

(c) Why is it important to provide care and support to people living with HIV/AIDS? Give four points.
(i) Improves quality of life: Providing care and support helps individuals manage symptoms and maintain a better quality of life.
(ii) Reduces transmission risk: Support encourages adherence to treatment, reducing viral load and the risk of transmitting the virus to others.
(iii) Mental and emotional well-being: Emotional support helps combat stigma, depression, and anxiety associated with HIV/AIDS.
(iv) Promotes treatment adherence: Support systems encourage individuals to adhere to antiretroviral therapy, improving health outcomes.

8. (a) Give two examples of each of the following found in the human body.

S/n	Tissue	Organ	System
(i)	Muscle tissue	Heart	Circulatory system
(ii)	Nervous tissue	Liver	Digestive system

(b) Outline four characteristics of a cell.
(i) Reproduction: Cells have the ability to reproduce, creating new cells through processes like mitosis or meiosis.
(ii) Metabolism: Cells carry out metabolic activities, including energy production and synthesis of necessary compounds.
(iii) Response to stimuli: Cells can respond to environmental changes or signals.
(iv) Growth: Cells can grow in size and, in multicellular organisms, contribute to the growth of tissues and organs.

(c) What will happen if chloroplast is removed from a plant cell? Briefly explain.
If chloroplasts are removed from a plant cell, the cell loses its ability to perform photosynthesis, the process by which light energy is converted into chemical energy to produce glucose and oxygen. Without chloroplasts, the plant cannot produce its own food, leading to energy deficiency, stunted growth, and eventually, the plant may die due to lack of nourishment.

9. (a) What do you understand by the term "Transport of materials" as used in Biology?
Transport of materials in biology refers to the movement of essential substances such as nutrients, gases, hormones, and waste products into, out of, and within cells and organisms. This process is vital for maintaining homeostasis, supporting metabolism, and ensuring proper physiological functions.
(b) What will happen in the following scenarios? Briefly explain.
(i) A plant cell is immersed in a hypotonic solution.
When a plant cell is placed in a hypotonic solution (where the external solution has a lower solute concentration than the cell's interior), water enters the cell via osmosis. The cell swells, but the rigid cell wall prevents it from bursting. This turgid state is beneficial, providing structural support to the plant.
(ii) The cardiac muscles in the heart stop working.
If cardiac muscles cease functioning, the heart cannot pump blood effectively, leading to immediate cessation of blood circulation. This deprives organs and tissues of oxygen and nutrients, resulting in loss of consciousness and, without prompt medical intervention, can cause death.

(c) How is leukemia controlled? State three ways.
Leukaemia is a type of cancer that affects the blood and bone marrow, where blood cells are produced. It occurs when the bone marrow produces abnormal white blood cells that grow uncontrollably, interfering with the production and function of normal blood cells, including red blood cells, white blood cells, and platelets.
(i) Chemotherapy: This is the use of drugs to kill or slow the growth of leukemia cells. It is one of the most common treatments and can be used alone or in combination with other therapies.

(ii) **Radiation Therapy**: High-energy radiation is used to target and destroy leukemia cells or shrink tumors. This therapy is often combined with other treatments like chemotherapy or used before a bone marrow transplant.
(iii) Bone Marrow Transplant: This involves replacing damaged or destroyed bone marrow with healthy marrow from a donor. This procedure helps restore the body's ability to produce healthy blood cells and is a potential cure for certain types of leukemia.

10. Elaborate three advantages and three disadvantages of the members of Kingdom Monera.
Kingdom Monera comprises unicellular organisms known as prokaryotes, which lack a true nucleus and membrane-bound organelles. This kingdom primarily includes bacteria and cyanobacteria, organisms that play significant roles in various ecological and industrial processes.
Advantages:

i. Nutrient Cycling: Members of Kingdom Monera are essential in decomposing organic matter, facilitating the recycling of nutrients such as nitrogen and carbon. This decomposition enriches soil fertility, promoting plant growth and maintaining ecosystem balance.
ii. Industrial Applications: Certain bacteria are utilized in the production of antibiotics, fermentation processes for foods like yogurt and cheese, and bioremediation efforts to clean up environmental pollutants. Their metabolic versatility makes them invaluable in biotechnology and pharmaceuticals.
iii. Symbiotic Relationships: Many bacteria engage in mutualistic associations with plants and animals. For instance, gut microbiota in humans aid in digestion, synthesize vitamins, and inhibit pathogenic microbes, contributing to overall health.

Disadvantages:
(i) Pathogenicity: Some bacteria are pathogenic, causing diseases in humans, animals, and plants. In humans, bacterial infections can range from mild illnesses to severe conditions, posing significant public health challenges.
(ii) Food Spoilage: Bacterial contamination can lead to the spoilage of food products, resulting in economic losses and potential health risks due to foodborne illnesses.
(iii) Antibiotic Resistance: The misuse and overuse of antibiotics have led to the emergence of antibiotic-resistant bacterial strains, complicating treatment options and posing a serious threat to global health.
In summary, members of Kingdom Monera are indispensable to ecological balance and have been exploited for various beneficial applications. However, their potential to cause disease and other negative impacts necessitates careful management and ongoing research to mitigate associated risks.

11. Explain the effects of poor waste disposal on the environment. Give six points.
Improper waste disposal is a pressing environmental issue with far-reaching consequences that affect ecosystems, human health, and the planet's overall sustainability.
(i) Soil Contamination: When waste, particularly hazardous materials, is improperly discarded, toxic substances can leach into the soil. This contamination disrupts soil ecosystems, reduces fertility, and can lead to the uptake of harmful chemicals by plants, entering the food chain and posing health risks to animals and humans.

(ii) Water Pollution: Unregulated waste disposal can result in pollutants seeping into groundwater or being washed into rivers and oceans. This leads to the degradation of aquatic ecosystems, harming marine life, and contaminating drinking water sources, which can cause diseases in human populations.
(iii) Air Pollution: The open burning of waste releases harmful gases and particulate matter into the atmosphere, contributing to air pollution. This practice can lead to respiratory issues in humans and animals and contributes to the formation of smog and acid rain, further impacting environmental and public health.
(iv) Climate Change: Decomposing organic waste in landfills produces methane, a potent greenhouse gas that significantly contributes to global warming. Improper waste management exacerbates climate change by increasing greenhouse gas emissions, undermining efforts to mitigate environmental impacts.
(v) Harm to Wildlife: Animals, both terrestrial and marine, can mistake waste for food or become entangled in debris, leading to injury, suffocation, or death. This not only affects individual animals but can also lead to population declines and disrupt entire ecosystems.
(vi) Human Health Hazards: Improper waste disposal creates breeding grounds for pests and pathogens, increasing the risk of diseases such as cholera, dengue, and other infections. Communities near unmanaged waste sites are particularly vulnerable to health issues arising from environmental contamination.
Addressing the challenges posed by improper waste disposal requires comprehensive waste management strategies, including reducing waste generation, promoting recycling and reuse, and ensuring safe disposal methods. Public education and policy enforcement are crucial in mitigating the environmental and health impacts associated with poor waste disposal practices.