Candidate's No……

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION AND CULTURE

FORM TWO SECONDARY EDUCATION EXAMINATIONS, 2004

BIOLOGY

TIME: 2 HOURS. **ANSWERS**

INSTRUCTIONS

1. This paper consists of sections A, B and C.
2. Answer ALL questions from sections A and B and ONE question from section C.
3. All answers for sections A and B must be written in the space provided for each question.
4. Answers for section C should be written in the paper provided.
5. Write your examination number on the top right hand corner of every page.
6. All writing must be in blue/black ink or ball point pens.

FOR EXAMINER'S USE ONLY		
QUESTION NUMBER	**SCORE**	**INITIALS OF EXAMINER**
1.		
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Candidate's No……

SECTION A

1. Questions (i) - (x) are multiple choice items. Select the best answer in each case and write its letter in the box provided.

(i) Which of the following is a characteristic feature of Kingdom Monera?
A. Presence of chloroplasts
B. Multicellular structure
C. Lack of a distinct nucleus
D. Complex organ systems
E. Photosynthetic ability
Correct Answer: C
Reason: Kingdom Monera includes bacteria, which are prokaryotic organisms characterized by the absence of a distinct nucleus, with their genetic material not enclosed in a membrane, unlike eukaryotic organisms.

(ii) The part of a microscope that regulates the amount of light entering the stage is:
A. Diaphragm
B. Eyepiece
C. Objective lens
D. Coarse adjustment knob
E. Mirror
Correct Answer: A
Reason: The diaphragm controls the amount of light passing through the specimen on the stage, adjusting brightness for clear observation, while the mirror reflects light, and other parts serve different functions.

(iii) The process by which water moves through a semi-permeable membrane from a region of high concentration to low concentration is called:
A. Diffusion
B. Osmosis
C. Active transport
D. Transpiration
E. Filtration
Correct Answer: B
Reason: Osmosis is the passive movement of water molecules across a semi-permeable membrane from an area of higher water concentration to lower, specific to water, unlike diffusion which involves any molecule.

(iv) Which nutrient is primarily digested in the stomach?
A. Carbohydrates
B. Proteins
C. Fats
D. Vitamins
E. Minerals
Correct Answer: B
Reason: The stomach secretes pepsin and hydrochloric acid, which primarily break down proteins into peptides, while significant carbohydrate and fat digestion occurs in the mouth and small intestine.

(v) The following organisms belong to the same phylum:
A. Earthworm, tapeworm, leech
B. Cockroach, grasshopper, butterfly
C. Snail, slug, jellyfish
D. Starfish, sea urchin, crab
E. Spider, scorpion, centipede
Correct Answer: B
Reason: Cockroach, grasshopper, and butterfly are insects belonging to the phylum Arthropoda, characterized by jointed legs and an exoskeleton, while the other groups span different phyla.

(vi) Which of the following is a communicable disease?
A. Kwashiorkor
B. Tuberculosis
C. Rickets
D. Scurvy
E. Anaemia
Correct Answer: B
Reason: Tuberculosis is a communicable disease caused by Mycobacterium tuberculosis, spread through air, whereas the others are non-communicable, resulting from nutritional deficiencies or other non-infectious causes.

(vii) A food sample turns violet when mixed with Biuret solution. This indicates the presence of:
A. Starch
B. Protein
C. Reducing sugar
D. Lipid
E. Vitamin
Correct Answer: B
Reason: Biuret solution turns violet in the presence of proteins due to the reaction with peptide bonds, while other substances like starch or sugars require different tests (e.g., iodine or Benedict's).

(viii) The blood vessel that carries deoxygenated blood from the heart to the lungs is:
A. Pulmonary vein
B. Aorta
C. Pulmonary artery
D. Vena cava
E. Coronary artery
Correct Answer: C
Reason: The pulmonary artery carries deoxygenated blood from the right ventricle to the lungs for oxygenation, unlike the pulmonary vein, which carries oxygenated blood back to the heart.

(ix) Which of the following is not a component of the skeletal system?
A. Cartilage
B. Ligament
C. Tendon
D. Muscle

E. Bone
Correct Answer: D
Reason: The skeletal system includes bones, cartilage, and ligaments, which provide structure and support, while muscles, part of the muscular system, facilitate movement but are not skeletal components.

(x) The process of breaking down food into simpler substances is called:
A. Absorption
B. Assimilation
C. Digestion
D. Ingestion
E. Egestion
Correct Answer: C
Reason: Digestion is the process of breaking down complex food into simpler substances for absorption, distinct from ingestion (intake), absorption (uptake), assimilation (utilization), or egestion (waste removal).

2. The following statements are either TRUE or FALSE. In the space provided write TRUE if the statement is true and FALSE if the statement is false. The first one is done for you.
All living organisms require energy to survive TRUE

(i) Viruses are considered living organisms because they can reproduce independently. FALSE

(ii) The pancreas produces insulin to regulate blood sugar levels. TRUE

(iii) All fungi are parasitic and cause diseases in humans. FALSE

(iv) The xylem transports water and minerals in plants. TRUE

(v) Anaerobic respiration produces more energy than aerobic respiration. FALSE

(vi) The diaphragm contracts during exhalation. FALSE

(vii) Red blood cells contain a nucleus in mammals. FALSE

(viii) Photosynthesis occurs in the mitochondria of plant cells. FALSE

(ix) Malaria is transmitted by the bite of a female Anopheles mosquito. TRUE

(x) The large intestine is the primary site for nutrient absorption. FALSE

3. The following are matching items. Match the phrase or term in List A with that in List B by writing its letter against the appropriate position in the space provided alongside List A.

LIST A	LIST B
(i) Site of protein synthesis in a cell	A. Ribosome
(ii) Disease caused by lack of vitamin C	B. Scurvy
(iii) Structure that controls cell activities	C. Nucleus
(iv) Gas essential for aerobic respiration	D. Oxygen
(v) Organism that feeds on dead organic matter	E. Saprophyte
(vi) Process of taking in food into the mouth	F. Ingestion
(vii) Blood cells that fight infections	G. Leucocytes
(viii) Plant tissue responsible for sugar transport	H. Phloem
(ix) Deficiency disease due to lack of iron	I. Anaemia
(x) Organ for gaseous exchange in fish	J. Gills

Answers:

LIST A	LIST B
(i) Site of protein synthesis in a cell	A
(ii) Disease caused by lack of vitamin C	B
(iii) Structure that controls cell activities	C
(iv) Gas essential for aerobic respiration	D
(v) Organism that feeds on dead organic matter	E
(vi) Process of taking in food into the mouth	F
(vii) Blood cells that fight infections	G
(viii) Plant tissue responsible for sugar transport	H
(ix) Deficiency disease due to lack of iron	I
(x) Organ for gaseous exchange in fish	J

SECTION B

4. (a) Define the term "cell".

A cell is the basic structural and functional unit of all living organisms, capable of carrying out life processes.

(b) List four differences between a prokaryotic and eukaryotic cell.

PROKARYOTIC CELL	EUKARYOTIC CELL
(i) No distinct nucleus	(i) Distinct nucleus present
(ii) Smaller in size	(ii) Larger in size
(iii) Few organelles	(iii) Many organelles
(iv) Circular DNA	(iv) Linear DNA

(c) State two functions of the cell membrane.

(i) Controls movement of substances in and out of the cell

(ii) Provides structural support and protection

5. (a) What is meant by the term "balanced diet"?

A balanced diet is a diet containing all essential nutrients in the right proportions to meet the body's needs for growth, energy, and health.

(b) Name three components of a balanced diet and give one example of each.

(i) Carbohydrates
Example: Rice
(ii) Proteins
Example: Beans
(iii) Vitamins
Example: Oranges

(c) Mention two deficiency diseases caused by lack of vitamins.

(i) Scurvy
(ii) Night blindness

6. (a) Draw a labelled diagram of the human respiratory system from the trachea to the alveoli.

(b) Explain two adaptations of the alveoli for gaseous exchange.
(i) Thin walls allow rapid diffusion of gases.
(ii) Large surface area increases gas exchange efficiency.

7. (a) What is meant by the term "ecology"?

Ecology is the study of interactions between living organisms and their environment, including biotic and abiotic factors.

(b) List three abiotic factors that affect living organisms in an ecosystem.

(i) Temperature

(ii) Water

(iii) Light

(c) Name two types of ecological interactions between organisms.

(i) Predation

(ii) Mutualism

8. (a) Define the term "First Aid".

First Aid is the immediate care given to an injured or ill person before professional medical help arrives.

(b) Outline three steps to provide First Aid to a person with a minor burn.
(i) Cool the burn with running cold water for 10 minutes.
(ii) Cover the burn with a sterile, non-stick dressing.
(iii) Avoid applying creams or breaking blisters.

(c) List two items found in a First Aid kit.
(i) Bandages
(ii) Antiseptic wipes

SECTION C

9. Write an essay on HIV/AIDS using the following guidelines:

Essay on HIV/AIDS

Definition of HIV/AIDS

HIV stands for **Human Immunodeficiency Virus**, a virus that attacks the body's immune system, specifically the **CD4 cells (T cells)**, which help the immune system fight off infections. If left untreated, HIV reduces the number of these cells in the body, making the person more vulnerable to infections and certain types of cancers.

When the immune system becomes severely damaged and the number of CD4 cells drops below a critical level, or when certain serious illnesses occur, the person is considered to have **AIDS (Acquired Immunodeficiency Syndrome)**. AIDS is the final and most severe stage of HIV infection. Without treatment, HIV can progress to AIDS in about 10 to 15 years, but with proper medical care, it can be managed effectively, and individuals can live long and healthy lives.

Modes of Transmission

HIV can be transmitted from one person to another through specific body fluids, including:

- **Unprotected sexual contact** with an infected person (vaginal, anal, or oral sex).
- **Blood transfusion** with HIV-contaminated blood.
- **Sharing needles or syringes** with someone who is infected.
- **From mother to child** during pregnancy, childbirth, or breastfeeding.
- **Accidental exposure** to infected blood, especially among healthcare workers.

HIV is **not transmitted** through casual contact such as hugging, shaking hands, sharing food, or through insect bites.

Symptoms of AIDS

In the early stages of HIV infection, many people have no symptoms. Some may experience flu-like symptoms such as fever, sore throat, and fatigue, which usually disappear within a few weeks.

As the infection progresses and the immune system weakens, more severe symptoms develop, particularly when the infection reaches the AIDS stage. These include:

- Persistent fever
- Extreme and unexplained tiredness
- Rapid weight loss
- Prolonged swelling of lymph glands
- Chronic diarrhea
- Sores of the mouth, anus, or genitals
- Pneumonia
- Memory loss, depression, and other neurological disorders
- Frequent opportunistic infections such as tuberculosis and certain types of cancers

Effects on Individuals and Society

HIV/AIDS has profound effects on both individuals and society. For individuals, it leads to declining health, increased medical expenses, and often social stigma and discrimination. Those affected may face rejection

from their families and communities, emotional distress, and challenges in maintaining employment and education.

On a societal level, HIV/AIDS places a significant burden on healthcare systems due to the high costs of treatment and care. It reduces the workforce by affecting people in their most productive years, thereby impacting economic growth. The epidemic also increases the number of orphans and vulnerable children, placing additional strain on social support systems.

Preventive Measures

Preventing the spread of HIV is crucial and can be achieved through several measures:

- **Public education and awareness campaigns** about HIV transmission and prevention.
- **Practicing safe sex** by using condoms consistently and correctly.
- **Regular HIV testing and counseling** to know one's status and seek early treatment if necessary.
- **Avoiding sharing needles or sharp instruments**.
- **Ensuring safe blood transfusion practices**.
- **Providing antiretroviral treatment to HIV-positive pregnant women** to reduce the risk of mother-to-child transmission.
- **Pre-Exposure Prophylaxis (PrEP)** and **Post-Exposure Prophylaxis (PEP)** for individuals at high risk of infection.

Through these preventive measures and continued medical research, it is possible to control the spread of HIV/AIDS and improve the lives of those living with the virus.

Conclusion

HIV/AIDS remains a serious global health issue, affecting millions of people worldwide. Understanding its causes, symptoms, and modes of transmission is essential in preventing new infections. With increased awareness, early testing, and adherence to preventive measures, society can significantly reduce the impact of this disease. Moreover, compassion, care, and support for those affected are crucial in combating the social stigma associated with HIV/AIDS.

10. Write an essay on the importance of classification of living organisms using the following guidelines:

Essay on the Importance of Classification of Living Organisms

Classification is the process of **grouping living organisms based on shared characteristics**. It involves organizing the vast diversity of life on Earth into categories that reflect similarities and differences in their structures, functions, and evolutionary history. This system helps scientists and researchers identify, study, and understand organisms more easily and accurately.

Reasons for Classifying Living Organisms

There are several important reasons for classifying living organisms:

- **To Organize Biodiversity**: The natural world is home to millions of different species. Classification helps in organizing this biodiversity into manageable groups, making it easier to study and understand the living world.
- **To Simplify Study**: By grouping organisms based on shared features, classification allows scientists to study organisms in an organized manner, avoiding confusion caused by regional names or unrelated similarities.
- **To Understand Evolutionary Relationships**: Classification reveals how different organisms are related to each other through evolution. It helps scientists trace the evolutionary history and relationships among species, showing how life has developed and diversified over time.

Hierarchical Levels of Classification

Scientists classify living organisms using a **hierarchical system**. This system consists of different levels, starting from the broadest group and narrowing down to the most specific. The levels are:

1. **Kingdom**
2. **Phylum** (for animals) / **Division** (for plants)
3. **Class**
4. **Order**
5. **Family**
6. **Genus**
7. **Species**

Each level groups organisms based on increasingly specific shared characteristics. For example, all animals belong to the Kingdom Animalia, but only those that share certain features are placed into the same species.

Importance of Binomial Nomenclature

To avoid confusion caused by local or common names, scientists use **binomial nomenclature**, a universal system for naming organisms. This system, developed by **Carl Linnaeus**, gives each organism a two-part scientific name:

- The **genus name** (which is capitalized)
- The **species name** (which is not capitalized)

Both are usually written in italics or underlined when handwritten. For example, the scientific name for humans is **Homo sapiens**.

The importance of binomial nomenclature includes:

- Providing a **universal naming system** recognized across different languages and regions.
- Allowing for **clear identification and communication** about organisms.
- Reflecting the organism's classification and sometimes indicating its evolutionary relationships.

Conclusion

In conclusion, the classification of living organisms is a vital process in biology. It organizes the immense variety of life, simplifies the study of organisms, and clarifies their evolutionary connections. The use of hierarchical classification and binomial nomenclature ensures that scientists around the world can communicate clearly and effectively about the rich diversity of life on Earth.