Candidate's No……

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION AND CULTURE

FORM TWO SECONDARY EDUCATION EXAMINATIONS, 2000

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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TOTAL		

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) The study of interactions between living organisms and their environment is called:
A. Genetics
B. Ecology
C. Physiology
D. Cytology
E. Taxonomy
Correct Answer: B
Reason: Ecology is the branch of biology that studies the interactions between living organisms and their environment, including both biotic and abiotic factors, unlike genetics (heredity) or taxonomy (classification).

(ii) Which organelle is responsible for protein synthesis in a cell?
A. Ribosome
B. Golgi apparatus
C. Lysosome
D. Endoplasmic reticulum
E. Centriole
Correct Answer: A
Reason: Ribosomes are the sites where proteins are synthesized by translating mRNA into polypeptide chains, unlike the Golgi apparatus (packaging) or lysosomes (digestion).

(iii) The deficiency disease caused by lack of iodine is:
A. Goitre
B. Scurvy
C. Rickets
D. Beriberi
E. Pellagra
Correct Answer: A
Reason: Goitre is caused by iodine deficiency, leading to thyroid gland enlargement, while other diseases are linked to deficiencies of vitamins (e.g., scurvy for vitamin C, rickets for vitamin D).

(iv) The structure used for locomotion in Amoeba is:
A. Cilia
B. Flagella
C. Pseudopodia
D. Tentacles
E. Setae
Correct Answer: C

Reason: Amoeba moves using pseudopodia, temporary projections of its cell body, unlike cilia (Paramecium) or flagella (Euglena).

(v) Which of the following is a characteristic of chordates?
A. Exoskeleton
B. Notochord
C. Jointed legs
D. Antennae
E. Compound eyes
Correct Answer: B
Reason: Chordates are defined by the presence of a notochord at some stage of development, a flexible rod supporting the body, unlike features like exoskeletons (arthropods) or antennae (insects).

(vi) A positive test for reducing sugars results in:
A. Blue-black colour with iodine
B. Violet colour with Biuret
C. Orange precipitate with Benedict's solution
D. Red stain with Sudan III
E. Cloudy emulsion with ethanol
Correct Answer: C
Reason: Benedict's solution forms an orange precipitate when heated with reducing sugars like glucose, while iodine tests for starch and Biuret for proteins.

(vii) The blood vessel that supplies blood to the heart muscle is:
A. Pulmonary artery
B. Coronary artery
C. Aorta
D. Vena cava
E. Pulmonary vein
Correct Answer: B
Reason: The coronary arteries supply oxygenated blood to the heart muscle, ensuring its function, unlike the aorta (body) or pulmonary artery (lungs).

(viii) The main function of the stem in a plant is to:
A. Absorb water
B. Support leaves and transport materials
C. Carry out photosynthesis
D. Store food
E. Anchor the plant
Correct Answer: B
Reason: The stem supports leaves and transports water, minerals, and sugars between roots and leaves, while roots absorb water and leaves photosynthesize.

(ix) Which of the following is an example of a voluntary action?
A. Heartbeat
B. Sneezing
C. Writing
D. Digestion
E. Blinking
Correct Answer: C
Reason: Writing is a voluntary action controlled consciously, unlike involuntary actions like heartbeat, sneezing, or digestion.

(x) The primary role of the kidneys in the human body is:
A. Digestion
B. Excretion
C. Respiration
D. Circulation
E. Reproduction
Correct Answer: B
Reason: The kidneys filter blood to remove waste products like urea, maintaining homeostasis through excretion, unlike digestion or respiration roles.

2. The following statements are either TRUE or FALSE. In the spaces provided write TRUE if the statement is correct and FALSE if the statement is not correct.

(i) All animals have a backbone. FALSE

(ii) The stomach produces hydrochloric acid to aid digestion. TRUE

(iii) Algae belong to the Kingdom Protista. TRUE

(iv) The pulmonary artery carries oxygenated blood. FALSE

(v) Osmosis is the movement of water across a fully permeable membrane. FALSE

(vi) Cholera is caused by a bacterium. TRUE

(vii) The cell wall in fungi is made of chitin. TRUE

(viii) All plants have vascular tissues. FALSE

(ix) Blood group O can donate to all blood groups. TRUE

(x) Transpiration pull helps in the movement of water in plants. TRUE

3. The following are matching items. Match the phrase or term in List A with that in List B by writing its letter in the spaces provided in the table at the end of the question.

LIST A	LIST B
(i) Site of photosynthesis in plant cells	A. Chloroplast
(ii) Disease caused by lack of vitamin D	B. Rickets
(iii) Structure for gaseous exchange in leaves	C. Stomata
(iv) Carries blood from the heart to the body	D. Aorta
(v) Organism that causes amoebic dysentery	E. Entamoeba histolytica
(vi) Deficiency disease due to lack of vitamin A	F. Night blindness
(vii) Enzyme that digests carbohydrates	G. Amylase
(viii) Increases surface area for absorption in small intestine	H. Villi
(ix) Process of cell division for growth	I. Mitosis
(x) Gas required for respiration	J. Oxygen

Answers:

LIST A	i	ii	iii	iv	v	vi	vii	viii	ix	x
LIST B	A	B	C	D	E	F	G	H	I	J

SECTION B

4. (a) Define the term "organ".
Answer: An organ is a structure composed of different tissues working together to perform a specific function in an organism.

(b) Name three organs in the human digestive system and their functions.
(i) Stomach
Function: Digests proteins and mixes food with gastric juices
(ii) Small intestine
Function: Absorbs nutrients into the bloodstream
(iii) Liver
Function: Produces bile for fat digestion

(c) State one difference between an organ and an organ system.
Answer: An organ is a single structure with a specific function, while an organ system is a group of organs working together for a broader function.

5. (a) What is meant by the term "transpiration"?
Answer: Transpiration is the process by which plants lose water vapor through stomata, primarily in leaves, aiding in cooling and nutrient transport.

(b) Draw a labelled diagram of a stomata showing guard cells and epidermal cells.
Answer: [Note: As text-based, I describe the drawing.] The diagram shows a pair of kidney-shaped guard cells surrounding a stomatal pore, flanked by epidermal cells. Labels include: guard cells, stomatal pore, epidermal cells.

(c) List two factors that affect the rate of transpiration.
(i) Temperature
(ii) Humidity

6. (a) Define the term "ecosystem".
Answer: An ecosystem is a community of living organisms interacting with each other and their non-living environment.

(b) Construct a food chain with five organisms, including a producer and a tertiary consumer.
Answer: Grass → Grasshopper → Frog → Snake → Hawk

(c) Explain one role of producers in an ecosystem.
Answer: Producers, like plants, convert sunlight into energy through photosynthesis, forming the base of the food chain to support all other organisms.

7. (a) What is meant by the term "binomial nomenclature"?
Answer: Binomial nomenclature is the system of naming organisms using two names: the genus and species, for universal identification.

(b) List three rules of binomial nomenclature.
(i) The genus name is written first and capitalized.
(ii) The species name is written second and lowercase.
(iii) The name is italicized or underlined.

(c) Give the scientific name of one plant and one animal.
Plant: Zea mays
Animal: Panthera leo

8. (a) Define the term "immunity".

Answer: Immunity is the ability of an organism to resist infection or disease by producing antibodies or activating immune responses.

(b) Outline three ways the body defends itself against pathogens.

(i) Skin acts as a physical barrier to prevent entry.

(ii) White blood cells engulf and destroy pathogens.

(iii) Antibodies neutralize or mark pathogens for destruction.

(c) Name one disease that can be prevented by vaccination.

Answer: Measles

9. Write an essay on bilharzia using the following guidelines:

• Causative agent

• Modes of transmission

• Symptoms

• Effects on the body

• Prevention and control measures

Essay on Bilharzia

Causative Agent

Bilharzia, also known as **schistosomiasis**, is a parasitic disease caused by **Schistosoma worms**. The most common species affecting humans are *Schistosoma haematobium*, *Schistosoma mansoni*, and *Schistosoma japonicum*.

Modes of Transmission

Bilharzia is transmitted when people come into contact with **freshwater contaminated with the larvae of Schistosoma parasites**. These larvae are released by infected freshwater snails. They can penetrate human skin while swimming, bathing, or wading in infected water.

Symptoms

The symptoms of bilharzia include:

- Itchy skin or rash at the point of infection
- Fever and chills
- Muscle aches
- Abdominal pain and diarrhea
- Blood in urine (especially in cases caused by *Schistosoma haematobium*)
- Fatigue

Effects on the Body

If left untreated, bilharzia can cause:

- **Damage to the liver, intestines, bladder, and kidneys**

- **Internal bleeding** and anemia
- **Bladder cancer** in severe, long-term cases
- In children, it may lead to **stunted growth and learning difficulties**

Prevention and Control Measures

- Avoid swimming or wading in potentially contaminated freshwater
- Use clean and safe water for bathing and washing
- Control snail populations in water bodies
- Educate communities on the risks of bilharzia
- Mass treatment campaigns using **antiparasitic drugs like praziquantel**
- Improve sanitation and access to clean water

10. Write an essay on the importance of the circulatory system in mammals using the following guidelines:

• Structure of the circulatory system

• Functions of the circulatory system

• Importance of blood circulation

• Common disorders of the circulatory system

Essay on the Importance of the Circulatory System in Mammals

Structure of the Circulatory System

The circulatory system in mammals consists of:

- The **heart**, a muscular organ that pumps blood
- **Blood vessels**, which include arteries, veins, and capillaries
- **Blood**, a fluid tissue that carries oxygen, nutrients, and wastes

Mammals have a **double circulatory system**, where blood passes through the heart twice in each complete circuit — one through the lungs (pulmonary circulation) and the other through the rest of the body (systemic circulation).

Functions of the Circulatory System

The circulatory system performs several vital functions:

- **Transports oxygen** from the lungs to body tissues and **removes carbon dioxide**
- **Delivers nutrients** from the digestive system to cells
- **Carries hormones** from glands to target organs
- **Removes waste products** like urea to the kidneys
- **Regulates body temperature**
- Protects the body against disease through **white blood cells** and antibodies

Importance of Blood Circulation

Efficient blood circulation ensures:

- All body cells receive necessary **oxygen and nutrients**
- Wastes are **removed promptly**, keeping cells healthy
- Hormones and other essential chemicals reach their destinations
- Heat is evenly distributed, maintaining **stable body temperature**

Without proper blood circulation, tissues and organs cannot function properly and may die due to lack of oxygen and nutrients.

Common Disorders of the Circulatory System

Some common circulatory disorders in mammals include:

- **Hypertension (high blood pressure)**
- **Atherosclerosis (hardening of the arteries)**
- **Heart attack (myocardial infarction)**
- **Stroke**
- **Anemia (deficiency of red blood cells or hemoglobin)**

Regular exercise, a balanced diet, and routine medical checkups help maintain a healthy circulatory system.