Candidate's No.....

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION AND CULTURE

FORM TWO SECONDARY EDUCATION EXAMINATIONS, 2001

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.		
2.		
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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 process by which green plants make their own food using sunlight is called:
A. Respiration
B. Photosynthesis
C. Transpiration
D. Digestion
E. Excretion
Correct Answer: B
Reason: Photosynthesis is the process by which green plants use sunlight, carbon dioxide, and water to produce glucose and oxygen, unlike respiration (energy release) or transpiration (water loss).

(ii) Which part of the cell is responsible for controlling all cell activities?
A. Mitochondrion
B. Cytoplasm
C. Nucleus
D. Vacuole
E. Chloroplast
Correct Answer: C
Reason: The nucleus contains DNA and regulates cell activities by controlling gene expression and protein synthesis, unlike other organelles with specific roles like energy production (mitochondrion).

(iii) The disease caused by a deficiency of vitamin B1 is:
A. Scurvy
B. Beriberi
C. Rickets
D. Anaemia
E. Goitre
Correct Answer: B
Reason: Beriberi is caused by a deficiency of vitamin B1 (thiamine), affecting the nervous system, unlike scurvy (vitamin C) or rickets (vitamin D).

(iv) The structure that allows gaseous exchange in amphibians is:
A. Gills
B. Lungs
C. Skin
D. Tracheae
E. Spiracles
Correct Answer: C
Reason: Amphibians, like frogs, primarily use their moist skin for gaseous exchange, especially when on land, in addition to lungs, unlike gills (fish) or tracheae (insects).

(v) Which of the following is a characteristic of Kingdom Fungi?
A. Photosynthetic

B. Cell wall made of cellulose
C. Non-motile spores
D. Presence of chloroplasts
E. Unicellular only
Correct Answer: C
Reason: Fungi produce non-motile spores for reproduction, have a chitin cell wall (not cellulose), and are non-photosynthetic, distinguishing them from plants and other kingdoms.

(vi) The reagent used to test for starch in a food sample is:
A. Biuret solution
B. Benedict's solution
C. Iodine solution
D. Sudan III
E. Ethanol
Correct Answer: C
Reason: Iodine solution turns blue-black in the presence of starch, while other reagents test for proteins (Biuret), sugars (Benedict's), or lipids (Sudan III).

(vii) The blood component responsible for clotting is:
A. Erythrocytes
B. Leucocytes
C. Thrombocytes
D. Plasma
E. Haemoglobin
Correct Answer: C
Reason: Thrombocytes (platelets) initiate blood clotting to prevent bleeding, unlike erythrocytes (oxygen transport) or leucocytes (immune defense).

(viii) The part of a plant responsible for anchoring and water absorption is:
A. Stem
B. Leaf
C. Root
D. Flower
E. Fruit
Correct Answer: C
Reason: Roots anchor the plant in the soil and absorb water and minerals, while stems support and leaves photosynthesize.

(ix) Which of the following is an example of a reflex action?
A. Reading a book
B. Blinking when dust enters the eye
C. Eating food
D. Walking to school
E. Writing a letter
Correct Answer: B

Reason: Blinking when dust enters the eye is an involuntary reflex action to protect the eye, unlike voluntary actions like reading or walking.

(x) The primary function of the large intestine in humans is:
A. Digestion of proteins
B. Absorption of water
C. Secretion of enzymes
D. Absorption of nutrients
E. Storage of food
Correct Answer: B
Reason: The large intestine absorbs water from undigested food to form feces, while nutrient absorption occurs mainly in the small intestine.

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 viruses are harmful to living organisms. FALSE

(ii) The small intestine is the main site for digestion and absorption of nutrients. TRUE

(iii) Ferns belong to the Kingdom Plantae. TRUE

(iv) The heart pumps blood to the lungs through the pulmonary vein. FALSE

(v) Enzymes are proteins that speed up chemical reactions. TRUE

(vi) Malaria is caused by a virus. FALSE

(vii) The cell membrane is fully permeable to all substances. FALSE

(viii) Bryophytes have true roots and stems. FALSE

(ix) Blood group AB is a universal donor. FALSE

(x) The process of transpiration occurs mainly through stomata. 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) Organelle that produces energy	A. Mitochondrion
(ii) Disease caused by lack of vitamin C	B. Scurvy
(iii) Structure for locomotion in Euglena	C. Flagellum
(iv) Carries deoxygenated blood to the lungs	D. Pulmonary artery
(v) Process of breaking down glucose to release energy	E. Respiration
(vi) Deficiency disease due to lack of protein	F. Kwashiorkor
(vii) Enzyme that digests fats	G. Lipase
(viii) Increases surface area for water absorption in plants	H. Root hair
(ix) Organism that causes tuberculosis	I. Mycobacterium
(x) Gas produced during photosynthesis	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 "diffusion".
Answer: Diffusion is the passive movement of molecules from a region of higher concentration to a region of lower concentration until equilibrium is reached.

(b) List three factors that affect the rate of diffusion.
(i) Concentration gradient
(ii) Temperature
(iii) Surface area

(c) Give one example of diffusion in living organisms.
Answer: Oxygen diffusing into blood in the alveoli

5. (a) What is meant by the term "photosynthesis"?
Answer: Photosynthesis is the process by which green plants use sunlight, carbon dioxide, and water to produce glucose and oxygen.

(b) Write the word equation for photosynthesis.
Answer: Carbon dioxide + Water → Glucose + Oxygen

(c) Name two factors that affect the rate of photosynthesis.
(i) Light intensity
(ii) Carbon dioxide concentration

6. (a) Draw a labelled diagram of the human heart showing the four chambers and major blood vessels.

(b) State two differences between arteries and veins.

Arteries	Veins
(i) Thick, muscular walls	(i) Thin, less muscular walls
(ii) Carry blood away from the heart	(ii) Carry blood toward the heart

7. (a) Define the term "classification".
Answer: Classification is the process of grouping living organisms based on shared characteristics for study and identification.

(b) List three reasons why classification of living organisms is important.
(i) Organizes biodiversity for easier study
(ii) Helps understand evolutionary relationships
(iii) Facilitates identification and naming of organisms

(c) Name one organism from each of the following kingdoms:
(i) Monera: Escherichia coli
(ii) Protista: Amoeba

8. (a) What is meant by the term "First Aid"?
Answer: First Aid is the immediate care given to an injured or ill person to stabilize their condition before professional medical help arrives.

(b) Outline three steps to provide First Aid to a victim of a snake bite.
(i) Keep the victim calm and immobile to slow venom spread.
(ii) Apply a firm bandage above the bite to restrict venom flow.
(iii) Seek medical help immediately.

(c) Name two items in a First Aid kit used for wound care.
(i) Antiseptic wipes
(ii) Sterile gauze

9. Write an essay on malaria using the following guidelines:
• Causative agent
• Modes of transmission
• Symptoms
• Effects on the body
• Prevention and control measures

Essay on Malaria

Causative Agent

Malaria is a serious and sometimes life-threatening disease caused by **Plasmodium parasites**. There are several species of Plasmodium, but the most dangerous to humans is **Plasmodium falciparum**. Other species include *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae*, and *Plasmodium knowlesi*.

Modes of Transmission

Malaria is mainly transmitted through the **bite of an infected female Anopheles mosquito**. When this mosquito bites a person, it injects Plasmodium parasites into their bloodstream. The disease can also be spread through **blood transfusions**, **organ transplants**, or from an infected mother to her unborn child during pregnancy.

Symptoms

The symptoms of malaria usually appear **10 to 15 days after being bitten** by an infected mosquito. Common symptoms include:

- **High fever**
- **Chills and shivering**
- **Headache**
- **Nausea and vomiting**
- **Muscle and joint pains**
- **Fatigue**
- In severe cases, malaria can cause **seizures, confusion, and coma**.

Effects on the Body

Malaria primarily affects the **red blood cells and the liver**. The parasites multiply in the liver and then enter the red blood cells, causing them to burst. This leads to:

- **Anemia** due to the destruction of red blood cells
- **Weakening of the immune system**
- **Damage to vital organs** such as the brain, kidneys, and heart in severe cases
- **Death** if not treated promptly, especially with Plasmodium falciparum infections

Prevention and Control Measures

Several measures can help prevent and control the spread of malaria:

- **Use of insecticide-treated mosquito nets (ITNs)** while sleeping

- **Indoor spraying with insecticides** to kill mosquitoes
- **Wearing protective clothing** to reduce mosquito bites
- **Draining stagnant water** where mosquitoes breed
- **Taking antimalarial drugs** when traveling to areas where malaria is common
- **Early diagnosis and proper treatment** with effective antimalarial medicines

Conclusion

Malaria remains a serious health problem in many parts of the world, particularly in tropical and subtropical regions. With proper preventive measures, early diagnosis, and effective treatment, it is possible to control and reduce the number of malaria cases and save lives.

10. Write an essay on the importance of enzymes in living organisms using the following guidelines:
• Definition of enzymes
• Role of enzymes in digestion
• Role of enzymes in metabolism
• Factors affecting enzyme activity

Essay on the Importance of Enzymes in Living Organisms

Definition of Enzymes

Enzymes are biological substances, mostly proteins, that **speed up chemical reactions in living organisms without being used up in the process**. They act as **catalysts**, helping various biological processes occur faster and more efficiently under the mild conditions of temperature and pressure found in cells.

Role of Enzymes in Digestion

In digestion, enzymes break down large, complex food molecules into simpler, absorbable forms. Different enzymes target different nutrients:

- **Amylase** breaks down starch into sugars.
- **Protease** breaks down proteins into amino acids.
- **Lipase** breaks down fats into fatty acids and glycerol.

These reactions make it possible for the body to absorb nutrients and use them for energy, growth, and repair.

Role of Enzymes in Metabolism

Enzymes play a crucial role in **metabolism**, which includes all the chemical reactions taking place in the body. These reactions involve breaking down nutrients to release energy (catabolism) and using energy to build new materials (anabolism). Enzymes control these processes by speeding up reactions, ensuring they happen quickly enough to sustain life.

For example:

- **Respiratory enzymes** help in breaking down glucose to release energy.

- **Synthesizing enzymes** assist in building proteins and DNA.

Without enzymes, most of these reactions would occur too slowly to keep living organisms alive.

Factors Affecting Enzyme Activity

Several factors influence the efficiency and speed of enzyme activity, including:

- **Temperature**: Each enzyme works best at a specific temperature (optimum temperature). Too high or too low a temperature can slow down or stop enzyme activity.
- **pH Level**: Enzymes also have an optimum pH range. Extreme pH values can denature enzymes, making them ineffective.
- **Substrate Concentration**: Increasing the amount of substrate (the substance the enzyme acts upon) can speed up reactions to a certain limit.
- **Enzyme Concentration**: More enzymes can increase the reaction rate, provided there is enough substrate available.

Conclusion

In conclusion, enzymes are essential for life as they control and speed up vital biological reactions. They play key roles in **digestion**, **metabolism**, and many other processes that keep organisms functioning properly. Understanding how enzymes work and the factors that affect them is important in fields like medicine, agriculture, and food production.