THE UNINTED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION AND CULTURE

FORM TWO SECONDARY EDUCATION EXAMINATIONS, 2010

0033 **BIOLOGY**

TIME: 2 ½ HOURS **ANSWERS** .

INSTRUCTIONS

1. This paper consists of sections; A, B and C
2. Answer **ALL** questions from section A and B and **one** question from section C.
3. Write your Examination number at the top right corner of every page.
4. **ALL** writing must be in black or blue ink.
5. Cellphones are note allowed in the examination room.

FOR EXAMINER'S ONLY		
QUESTION NUMBER	SCORE	INITIALS OF EXAMINER
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
TOTAL		

This paper consists of 10 printed pages.

SECTION A (30 Marks)

1. For each of the following items choose the correct answer from the given alternatives and write the letter of the correct answer in the box provided.

(i) Which structure differentiates Euglena from other members of the Kingdom Protista?
A. Possession of flagellum
B. Possession of chloroplast
C. Possession of antennae
D. Possession of cell wall
Correct Answer: B. Possession of chloroplast
Reason:
While other protists like certain protozoans may have a flagellum for movement, Euglena is unique because it can photosynthesize like a plant due to the presence of **chloroplasts**, allowing it to make its own food — a feature not common in many protists.

(ii) The feeding relationship represented by the sequences of organisms "Green Plants → Grasshopper → Frog" is called:
A. Food web
B. Interaction
C. Food chain
D. Pyramid
Correct Answer: C. Food chain
Reason:
A **food chain** is a linear sequence showing how energy and nutrients flow from one organism to another, starting with producers (plants) and moving through a series of consumers. In this case: **plants → grasshopper → frog**.

(iii) Which of the following blood groups is considered a universal donor?
A. Group A
B. Group AB
C. Group B
D. Group O
Correct Answer: D. Group O
Reason:
Blood group O (specifically O negative) is considered a **universal donor** because its red blood cells have no A, B, or Rh antigens on their surface, meaning it won't cause an immune reaction when transfused to individuals of other blood groups.

(iv) Which part of the human brain controls body posture and balance?
A. Medulla oblongata
B. Cerebellum
C. Cerebrum
D. Spinal cord
Correct Answer: B. Cerebellum
Reason:
The cerebellum is responsible for coordinating voluntary movements, maintaining body balance, and posture. It ensures smooth, balanced muscular activity.

(iv) When a solution is mixed with Benedicts solution, the food substances that change in colour from blue to green to yellow and finally orange colouration after boiling is called:
A. Starch
B. Protein
C. Reducing sugar
D. Lipids
Correct Answer: C. Reducing sugar
Reason:
Reducing sugars like glucose react with Benedict's solution when heated, changing color from blue → green → yellow → orange depending on sugar concentration.

(v) Insufficient food rich in protein to children especially infants result into nutritional deficiency disease called:
A. Marasmus
B. Obesity
C. Kwashiorkor
D. Rickets
Correct Answer: C. Kwashiorkor
Reason:
Kwashiorkor is caused by a severe deficiency of proteins in a child's diet, especially after weaning. It leads to swelling, irritability, and growth failure.

(vi) The structure of a leaf that allows oxygen and carbon dioxide to diffuse into and out of the leaf during gaseous exchange is known as:
A. Xylem
B. Phloem
C. Stomata
D. Vein
Correct Answer: C. Stomata
Reason:
Stomata are tiny pores on the leaf surface that regulate the exchange of gases (O_2 and CO_2) and water vapor between the leaf and the atmosphere.

(vii) The blood vessel which carries blood from the lungs to the heart is called:
A. Pulmonary artery
B. Vena cava
C. Pulmonary vein
D. Renal vein
Correct Answer: C. Pulmonary vein
Reason:
The pulmonary vein is the only vein in the body that carries oxygenated blood, it transports oxygen-rich blood from the lungs to the left atrium of the heart.

(viii) Which one of the following are examples of animal tissues?
A. Muscle, blood and bone
B. Brain, bone and liver
C. Skin, heart and brain
D. Muscle, liver and skin
Correct Answer: A. Muscle, blood and bone
Reason:
Animal tissues are groups of similar cells performing the same function. Muscle, blood, and bone are all types of animal tissues, while organs like liver, heart, and skin are made up of tissues but are not tissues themselves.

(ix) What does the concept of good health imply?
A. A state of physical, sexual and mental fitness
B. Being physically, mentally and socially fit
C. A state of physical, spiritual and economic fitness
D. Being wealthy and physically fit
Correct Answer: B. Being physically, mentally and socially fit
Reason:
Good health is not just the absence of disease, it involves overall well-being in physical, mental, and social aspects, according to the World Health Organization (WHO).

(x) First Aid given to a victim of electric shock is meant to:
A. Keep the victim moving
B. Send the patient to the hospital
C. Provide the victim with fluids
D. Lie down with his/her feet higher than head
Correct Answer: D. Lie down with his/her feet higher than head
Reason:
In cases of electric shock, placing the victim in a lying position with their feet elevated helps improve blood flow to vital organs like the heart and brain, preventing shock (circulatory failure) while awaiting further medical help.

2. The following statements are either correct or not correct. Write T if the statement is correct or F if the statement is not correct in the space provided.

(i) A brick red precipitate is formed when a bean seed extract is boiled with iodine. F

(ii) Artificial classification is based on few observable features. T

(iii) Air, water and soil are examples of abiotic components of the environment. T

(iv) A structure which prevents the entrance of food and water into the trachea is called villus. F

(v) Fermentation is a form of aerobic respiration in plants. F

(vi) Heart, liver and leaves are examples of organs. F

(vii) Hugging and holding hands leads to HIV transmission. F

(viii) Mosses and liverworts have true roots, stems and leaves. F

(ix) The process of sorting living things into groups is called classification. T

(x) Tuberculosis is a communicable disease. T

3. Match the phrase or term in **List A** with that in **List B** by writing its letter against the number of the item in **List A**.

LIST A	LIST B
(i) Ability of the body to resist disease	A. Bilharzia
(ii) A protein deficiency disease found in children	B. Cholera
(iii) Is a common disorder of the human digestive system	C. Cilia
(iv) Is an epidemic disease	D. Constipation
(v) Is caused by flatworms called schistosomes	E. Experiments
(vi) Is caused by lack of vitamin D	F. First aid
(vii) It results from taking too little or too much food	G. First aid kit
(viii) Locomotory structures of amoeba	H. Hypothesis
(ix) Series of investigation intended to discover certain facts	I. Immunity
(x) Services rendered to an accident victim before being taken to hospital	J. Kwashiorkor
	K. Malnutrition
	L. Night blindness
	M. Pseudopodia
	N. Rickets
	O. Vaccination

Answers:

LIST A	i	ii	iii	iv	v	vi	vii	viii	ix	x
LIST B	I	J	D	B	A	N	K	M	E	F

SECTION B (50 Marks)

4. (a) What is a microscope?

A **microscope** is an instrument used to magnify and view objects that are too small to be seen clearly with the naked eye.

(c) What is the function of:

(i) Microscope slide.

It is a thin, flat piece of glass used to hold the specimen in place for viewing under the microscope.

(ii) Mirror.

It reflects light from an external source up through the stage opening to illuminate the specimen for clearer viewing.

5. (a) A bread was put in a wet cupboard. After a few days the bread was covered by thread-like structures which ended in club-shaped structures.

(i) Write the common name of the organisms grown on the bread.

Answer: Mould

(ii) Name the kingdom to which the organisms belong.

Answer: Fungi

(iii) Name the phylum/division to which the organisms belong.

Answer: Zygomycota (or Zygomycetes)

(iv) Outline five points of economic importance of the kingdom you mentioned in part (a)(ii) above.

- **Production of antibiotics** — e.g. *Penicillium* used to make penicillin.
- **Food production** — used in making bread, beer, wine, and cheese.
- **Decomposition** — helps decompose dead organic matter and recycle nutrients.
- **Cause of diseases** — some fungi cause plant, animal, and human diseases (like athlete's foot, ringworm, and crop blights).
- **Production of enzymes and organic acids** — certain fungi are used in industrial fermentation processes to produce products like citric acid.

6. (a) Explain the uses of the following First Aid kit components:

(i) Scissors

Used to cut bandages, gauze, clothes, or tape to access wounds or clean the injured area.

(ii) Gauze

Used to cover wounds to absorb blood and prevent infection by keeping the area clean.

(iii) Adhesive plaster

Used to cover small cuts or wounds to protect them from dirt and bacteria, helping to speed up

healing.

(iv) Iodine tincture

Used as an antiseptic to disinfect wounds and kill bacteria, preventing infection.

(b) Outline the procedure of giving First Aid to a victim of nose bleeding**:**

1. Sit the victim down and have them lean slightly forward to prevent blood from flowing down the throat.
2. Pinch the soft part of the nose firmly using thumb and index finger for about 10-15 minutes continuously.
3. Encourage the victim to breathe through the mouth during this time.
4. Apply a cold compress or ice pack on the bridge of the nose to reduce bleeding.
5. Avoid letting the victim pick or blow their nose immediately after the bleeding stops.

(c) Explain the importance of giving First Aid:

- It helps to preserve life by preventing the condition from worsening before professional medical help arrives.
- It reduces pain and suffering by providing immediate care.
- It prevents further injury or infection by stabilizing wounds and injuries.
- It promotes faster recovery and minimizes complications from accidents or illness.

7. (a) Define the term "blood transfusion".

Blood transfusion is the process of transferring blood or blood components from a healthy donor into the bloodstream of a recipient to replace lost blood or treat medical conditions.

(b) Outline the precautions to be taken during blood transfusion.

- Ensure blood type compatibility between donor and recipient to prevent reactions.
- Use sterile equipment to avoid infections.
- Cross-match blood samples before transfusion.
- Monitor the patient closely during transfusion for any allergic or adverse reactions.
- Transfuse blood slowly at first, then increase rate if no complications arise.
- Check the expiry date and storage conditions of the blood.

(c) Explain why the wall of the left ventricle of the mammalian heart is thicker than the wall of the right.

The left ventricle pumps blood to the entire body through the systemic circulation, requiring more force and pressure. Therefore, its wall is thicker to generate this high pressure. The right ventricle only pumps blood to the lungs, which is a shorter distance and requires less force, so its wall is thinner.

8. (a) What is a community?
A community is a group of different populations of organisms living together and interacting in a common environment.

(b) (i) Distinguish a food chain from a food web.

- A **food chain** is a linear sequence showing how energy and nutrients flow from one organism to another through feeding relationships.
- A **food web** is a complex network of interconnected food chains showing multiple feeding relationships among different organisms in an ecosystem.

(ii) Explain the significance of food chains and food webs in real life situation.

- They help in understanding the flow of energy and nutrients in ecosystems.
- They show the dependence of organisms on each other for survival.
- They help predict the effects of removing or adding species in an ecosystem.
- They assist in conservation efforts by showing critical relationships among species.

(c) Outline three points of importance of care and support to People living with HIV/AIDS (PLWHA).

- Improves their quality of life by providing physical, emotional, and social support.
- Helps prevent the spread of HIV through education and counseling.
- Encourages adherence to treatment, improving their health outcomes and reducing complications.

SECTION C (20 Marks)

Choose **one** question

9. Write an essay on malaria using the following guidelines:
   Cause
- Transmission
- Symptoms
- Effects
- Preventive measures

Malaria

Malaria is a serious and sometimes fatal disease caused by a parasite called *Plasmodium*. This parasite infects human red blood cells and is transmitted through the bite of an infected female *Anopheles* mosquito.

Cause:

Malaria is caused by the *Plasmodium* parasite. There are several species of this parasite, but the most common ones affecting humans are *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, and *Plasmodium malariae*. When an infected mosquito bites a person, the parasite enters the

bloodstream and invades red blood cells, multiplying inside them and causing the symptoms of malaria.

Transmission:
The main way malaria spreads is through the bite of an infected female *Anopheles* mosquito. This mosquito becomes infected when it bites a person who already has the parasite in their blood. After about 10-14 days, the parasite develops inside the mosquito, and when the mosquito bites another person, it passes the parasite into their bloodstream. Malaria can also be transmitted through blood transfusions, organ transplants, or from mother to child during pregnancy, but these are less common routes.

Symptoms:
Malaria symptoms typically appear 7 to 30 days after infection. Early symptoms include high fever, chills, sweating, headaches, muscle aches, and fatigue. The fever often follows a cyclical pattern with episodes of coldness, shivering, and sweating. If untreated, malaria can cause severe symptoms such as anemia, jaundice (yellowing of the skin and eyes), seizures, coma, and even death. The severity depends on the *Plasmodium* species and the person's immune system.

Effects:
Malaria has severe health, social, and economic effects, especially in tropical regions. It causes loss of productivity due to illness, leading to missed work and school days. Children under five and pregnant women are most vulnerable, often suffering from severe anemia and low birth weight babies, respectively. Malaria also places a heavy burden on healthcare systems due to the need for diagnosis and treatment. In the worst cases, it leads to death, particularly in young children.

Preventive Measures:
Preventing malaria involves controlling mosquito populations and protecting people from mosquito bites. Some key preventive measures include:

- **Using insecticide-treated mosquito nets (ITNs):** Sleeping under these nets at night creates a protective barrier that kills or repels mosquitoes.
- **Indoor residual spraying (IRS):** Spraying insecticides inside homes kills mosquitoes that rest on walls.
- **Eliminating mosquito breeding sites:** Removing stagnant water around homes prevents mosquitoes from laying eggs.
- **Wearing protective clothing:** Wearing long sleeves and trousers, especially in the evening when mosquitoes are most active, reduces exposure.
- **Taking antimalarial drugs:** In high-risk areas, some people take prophylactic medications to prevent infection.
- **Health education:** Raising awareness about malaria transmission and prevention helps communities take action to reduce risk.

In conclusion, malaria remains a major public health challenge, especially in tropical and subtropical regions. Understanding its cause, transmission, symptoms, effects, and preventive measures is crucial in fighting this disease and saving lives.

10. Write an essay on transpiration, using the following guidelines:

- Meaning of transpiration:
- External factors affecting the rate of transpiration:

Transpiration

Transpiration is the process by which water vapor is lost from plants into the atmosphere, mainly through small openings called stomata found on the surfaces of leaves. It is essentially the evaporation of water from the plant's aerial parts, especially the leaves. This process helps in the movement of water and nutrients from the roots to the leaves and also cools the plant.

External Factors Affecting the Rate of Transpiration:

1. **Temperature:**
   Higher temperatures increase the rate of transpiration because heat provides energy for water to evaporate faster from the leaf surfaces. On hot days, plants tend to lose more water vapor compared to cooler days.
2. **Humidity:**
   Humidity refers to the amount of water vapor present in the air. When the air is humid (high moisture content), the rate of transpiration decreases because the air is already saturated with water vapor, reducing the difference in concentration between the inside of the leaf and the atmosphere. Conversely, dry air increases transpiration as it encourages more evaporation.
3. **Wind:**
   Windy conditions increase the rate of transpiration by removing the layer of saturated air around the leaf surface, maintaining a high concentration gradient for water vapor to diffuse out of the leaves.
4. **Light Intensity:**
   Light causes stomata to open for photosynthesis, which also allows water vapor to escape. Therefore, during bright daylight, transpiration rates are higher compared to nighttime or shaded conditions when stomata close.
5. **Soil Water Availability:**
   If the soil lacks sufficient water, the plant may close its stomata to reduce water loss, lowering the rate of transpiration. Adequate water supply in the soil supports continuous transpiration.

In summary, transpiration is a vital process for plants, helping with water movement, nutrient transport, and temperature regulation. Its rate is influenced by environmental conditions such as temperature, humidity, wind, light, and soil water availability, which affect how much water plants lose to the atmosphere.