Candidate's No……

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION AND CULTURE

FORM TWO SECONDARY EDUCATION EXAMINATIONS, 2002

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 item and write its letter in the box provided.

(i) The branch of biology that deals with the study of heredity is:
A. Ecology
B. Genetics
C. Physiology
D. Taxonomy
E. Cytology
Correct Answer: B
Reason: Genetics is the branch of biology that studies heredity and variation in organisms, focusing on how traits are passed from parents to offspring, unlike other fields like ecology (environment) or taxonomy (classification).

(ii) The structure in a plant cell that contains chlorophyll is:
A. Nucleus
B. Mitochondrion
C. Chloroplast
D. Vacuole
E. Ribosome
Correct Answer: C
Reason: Chloroplasts contain chlorophyll, the pigment responsible for photosynthesis, enabling plants to capture sunlight, unlike other organelles with different functions.

(iii) Which of the following is a function of the large intestine?
A. Digestion of proteins
B. Absorption of water
C. Secretion of digestive enzymes
D. Breakdown of carbohydrates
E. Production of bile
Correct Answer: B
Reason: The large intestine primarily absorbs water from undigested food, forming feces, while digestion and enzyme secretion occur mainly in the stomach and small intestine, and bile is produced by the liver.

(iv) The organism that causes amoebic dysentery is:
A. Plasmodium
B. Entamoeba histolytica
C. Trypanosoma
D. Vibrio cholerae
E. Mycobacterium tuberculosis
Correct Answer: B

Reason: Amoebic dysentery is caused by the protozoan Entamoeba histolytica, which infects the intestines, unlike Plasmodium (malaria) or Vibrio cholerae (cholera).

(v) Which of the following is a feature of mammals?
A. Lay eggs
B. Have scales
C. Produce milk for their young
D. Breathe through gills
E. Cold-blooded
Correct Answer: C
Reason: Mammals are characterized by producing milk to nourish their young, a feature of mammary glands, distinguishing them from egg-laying or cold-blooded animals.

(vi) The reagent used to test for proteins in a food sample is:
A. Benedict's solution
B. Iodine solution
C. Biuret solution
D. Sudan III
E. Ethanol
Correct Answer: C
Reason: Biuret solution turns violet in the presence of proteins due to reaction with peptide bonds, while other reagents test for different substances (e.g., Benedict's for reducing sugars, Sudan III for lipids).

(vii) The part of the heart that prevents backflow of blood from the ventricles to the atria is:
A. Semilunar valve
B. Tricuspid valve
C. Aortic valve
D. Pulmonary valve
E. Mitral valve
Correct Answer: B
Reason: The tricuspid valve (right side) and mitral valve (left side) prevent backflow from ventricles to atria; the tricuspid is specifically named here, while semilunar valves prevent backflow from arteries.

(viii) The process by which organisms maintain a stable internal environment is called:
A. Excretion
B. Homeostasis
C. Respiration
D. Nutrition
E. Reproduction
Correct Answer: B
Reason: Homeostasis is the process of maintaining a stable internal environment, such as temperature or pH, unlike excretion (waste removal) or respiration (energy production).

(ix) Which of the following belongs to the Kingdom Protista?
A. Yeast
B. Amoeba
C. Mushroom
D. Fern
E. Bacteria
Correct Answer: B
Reason: Amoeba is a unicellular organism in the Kingdom Protista, characterized by diverse, often single-celled organisms, while yeast (Fungi), fern (Plantae), and bacteria (Monera) belong to other kingdoms.

(x) The primary source of energy in an ecosystem is:
A. Consumers
B. Decomposers
C. Producers
D. Sunlight
E. Herbivores
Correct Answer: D
Reason: Sunlight is the primary energy source, captured by producers (plants) through photosynthesis, which then supports consumers and decomposers in the ecosystem.

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 plants carry out photosynthesis. FALSE

(ii) The kidneys are responsible for filtering blood. TRUE

(iii) Viruses can only reproduce inside a host cell. TRUE

(iv) The oesophagus is the site of nutrient absorption. FALSE

(v) Haemoglobin in red blood cells transports oxygen. TRUE

(vi) All insects have three pairs of legs. TRUE

(vii) The stomata are found only on the upper surface of leaves. FALSE

(viii) Scurvy is caused by a deficiency of vitamin B1. FALSE

(ix) The spinal cord is part of the central nervous system. TRUE

(x) Fungi reproduce by forming seeds. FALSE

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 space provided in the table at the end of the question.

LIST A	LIST B
(i) Storage of genetic material	A. Nucleus
(ii) Disease caused by deficiency of iodine	B. Goitre
(iii) Structure for gaseous exchange in insects	C. Tracheae
(iv) Transports water in plants	D. Xylem
(v) Hormone that regulates blood sugar	E. Insulin
(vi) Caused by lack of vitamin B3	F. Pellagra
(vii) Blood cells that carry oxygen	G. Erythrocytes
(viii) Process of cell division in body cells	H. Mitosis
(ix) Organism that lives on or in another organism	I. Parasite
(x) Enzyme that digests proteins in the stomach	J. Pepsin

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 "enzyme".
Answer: An enzyme is a biological catalyst that speeds up chemical reactions in living organisms without being consumed in the process.

(b) Name three digestive enzymes and their functions.
(i) Amylase
Function: Digests starch into sugars in the mouth and small intestine
(ii) Pepsin
Function: Digests proteins into peptides in the stomach
(iii) Lipase
Function: Digests fats into fatty acids and glycerol in the small intestine

(c) State one factor that affects enzyme activity.
Answer: Temperature

5. (a) What is meant by the term "excretion"?
Answer: Excretion is the process by which organisms remove metabolic waste products from their bodies to maintain homeostasis.

(b) Draw a labelled diagram of the human urinary system.
Answer: [Note: As text-based, I describe the drawing.] The diagram shows two kidneys, each connected to a ureter, leading to the bladder, which empties via the urethra. Labels include: kidney, ureter, bladder, urethra.

(c) Name two waste products excreted by the kidneys.
(i) Urea
(ii) Excess salts

6. (a) Define the term "food web".
Answer: A food web is a complex network of interconnected food chains showing the feeding relationships and energy transfer among organisms in an ecosystem.

(b) Construct a food web with at least five organisms, including a producer, primary consumer, and secondary consumer.
Answer: Grass (producer) → Grasshopper (primary consumer) → Frog (secondary consumer) → Snake (tertiary consumer) ← Bird (secondary consumer)

(c) Explain one significance of food webs in ecosystems.
Answer: Food webs illustrate energy flow and interdependence, helping maintain ecological balance by showing how organisms rely on each other.

7. (a) What is meant by the term "microorganism"?
Answer: A microorganism is a microscopic organism, such as bacteria, viruses, or fungi, invisible to the naked eye, that can be beneficial or harmful.

(b) List three beneficial uses of microorganisms.
(i) Production of antibiotics
(ii) Fermentation in food production
(iii) Decomposition of organic matter

(c) Name one harmful effect of microorganisms.
Answer: Causing diseases like cholera

8. (a) Define the term "respiration".
Answer: Respiration is the process by which organisms break down glucose to release energy for cellular activities.

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

(c) List two differences between aerobic and anaerobic respiration.
(i) Aerobic requires oxygen; anaerobic does not.
(ii) Aerobic produces more energy; anaerobic produces less.

SECTION C

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

• Causative agent

• Modes of transmission

• Symptoms

• Effects on the body

• Prevention and control measures

Essay on Cholera

Causative Agent.

Cholera is an **infectious disease** caused by a bacterium called **Vibrio cholerae**. This bacterium affects the intestines and can lead to severe diarrheal illness if not treated quickly.

Modes of Transmission.

Cholera is mainly transmitted through **contaminated food and water**. It spreads when a person consumes water or food that has been contaminated with the feces of an infected person. Poor sanitation, lack of clean drinking water, and improper food handling practices increase the risk of cholera outbreaks, especially in overcrowded and disaster-affected areas.

Symptoms

The common symptoms of cholera include:

- Severe watery diarrhea

- Vomiting
- Dehydration
- Muscle cramps
- Low blood pressure
- Rapid heartbeat

In severe cases, dehydration can occur quickly, leading to shock and, if untreated, death.

Effects on the Body

Cholera affects the body by causing **rapid loss of fluids and salts** through diarrhea and vomiting. This leads to **dehydration**, which can result in weakness, dizziness, muscle cramps, and organ failure if not addressed quickly. In extreme cases, severe dehydration can cause death within hours.

Prevention and Control Measures

Cholera can be prevented and controlled through several measures:

- **Ensuring safe drinking water** by boiling or treating it.
- **Practicing good hygiene** by washing hands with soap, especially before eating and after using the toilet.
- **Proper sanitation** and disposal of human waste.
- **Eating properly cooked food** and avoiding raw or unwashed fruits and vegetables.
- **Vaccination** in high-risk areas to provide temporary protection.
- **Early diagnosis and prompt treatment** with oral rehydration salts (ORS) and antibiotics for severe cases.

Conclusion

Cholera remains a serious health threat, particularly in areas with poor sanitation and limited access to clean water. However, with proper preventive measures, public health awareness, and timely treatment, it can be effectively controlled and lives can be saved.

10. Write an essay on the importance of personal hygiene using the following guidelines:

• Definition of personal hygiene

• Practices of personal hygiene

• Importance of personal hygiene

• Consequences of poor hygiene

Essay on the Importance of Personal Hygiene

Definition of Personal Hygiene

Personal hygiene refers to the daily practices and habits that individuals follow to keep their bodies clean and maintain good health. It involves actions taken to prevent the spread of diseases and infections by keeping oneself and the surrounding environment clean.

Practices of Personal Hygiene

There are several important practices of personal hygiene, including:

- **Regular bathing** to keep the skin clean and remove sweat and dirt.
- **Brushing teeth twice a day** to prevent tooth decay and bad breath.
- **Washing hands with soap and water** before eating and after using the toilet.
- **Keeping hair clean and neat** to avoid scalp infections.
- **Wearing clean clothes** to stay fresh and free from germs.
- **Keeping nails trimmed and clean** to prevent the spread of germs.

Importance of Personal Hygiene

Maintaining good personal hygiene is essential for several reasons:

- It **prevents the spread of infectious diseases** such as cholera, typhoid, and the flu.
- It **promotes good health** by keeping harmful germs away from the body.
- It helps in **building self-confidence and self-respect** by maintaining a neat and pleasant appearance.
- Good hygiene practices also **protect others** in the community from illnesses caused by poor hygiene habits.

Consequences of Poor Hygiene

Neglecting personal hygiene can lead to various health problems and social issues, such as:

- **Infections and diseases** like skin infections, dental problems, and stomach illnesses.
- **Bad odor and an unkempt appearance**, which may result in low self-esteem and social rejection.
- It can also contribute to the **spread of contagious diseases** within families and communities, especially in crowded areas.

Conclusion

In conclusion, personal hygiene plays a vital role in promoting good health, preventing diseases, and ensuring social well-being. Everyone should practice proper personal hygiene daily to live a healthy, comfortable, and dignified life while protecting others from the risk of infection.