SMZ

ZANZIBAR EXAMINATION COUNCIL

FORM THREE ENTRANCE EXAMINATION

044 **BIOLOGY**

Time: 2:30 Hours **ANSWERS** **Wednesday 3rd November2020**

Instructions

1. This paper consists of sections A, B and C.
2. Answer **all** questions in the spaces provided.
3. Section A and C carry **fifteen (15)** marks each and section B carries **seventy (70)** mark s.
4. All writings must be in **blue** or **black** ink.
5. Communication devices and any unauthorized materials are **not** allowed in the assessment room.
6. Write your **Assessment Number** at the top right hand corner of every page.

SECTION A: Multiple Choice

1. Choose the correct answer and write its letter in the table below.

i. The first step used in the scientific methods is
A. Experimentation
B. Asking questions
C. Identifying the problem
D. Formulating the hypothesis
Answer: C. Identifying the problem. Scientific methods start by pinpointing an issue to investigate.

ii. Which of the following does not emit gaseous waste
A. Car
B. Washbasin
C. Incinerator
D. Insecticide spray
Answer: B. Washbasin. It is not a source of gaseous emissions.

iii. One among the following diseases is not transmitted by sexual contact
A. HIV and AIDS
B. Syphilis
C. Gonorrhoea
D. Malaria
Answer: D. Malaria. It is transmitted by mosquitoes, not through sexual contact.

iv. Hepatitis B can be prevented by
A. Injecting vaccination
B. Using mosquito nets
C. Eating balanced diet
D. Staying under quarantine
Answer: A. Injecting vaccination. Vaccines are effective in preventing Hepatitis B.

v. One of the following pairs do not constitute macro-elements
A. Nitrogen and Potassium
B. Magnesium and Phosphorus
C. Zinc and Chlorine
D. Phosphorus and Potassium
Answer: C. Zinc and Chlorine. These are micro-elements, not macro-elements.

vi. Which one of the following secretes bile into the ileum and helps in the digestion of fats
A. Pancreas
B. Liver
C. Gall bladder

D. Stomach
Answer: B. Liver. The liver produces bile that aids in fat digestion.

vii. People with blood group O have
A. Antigen B
B. Antigen A and B
C. Antigen A
D. No antigen
Answer: D. No antigen. Blood group O lacks A and B antigens.

viii. The following are suspended in the plasma except
A. Red blood cell
B. Platelets
C. Capillaries
D. White blood cells
Answer: C. Capillaries. They are not suspended in plasma; they are part of blood vessels.

ix. Gaseous exchange takes place in the leaves through
A. Spongy mesophyll
B. Sieve tube elements
C. Epidermis
D. Stomata
Answer: D. Stomata. Stomata facilitate the exchange of gases in leaves.

x. Anaerobic respiration in plants leads to the production of
A. Ethanol
B. Lactic acid
C. Oxygen
D. Hydrogen
Answer: A. Ethanol. In plants, anaerobic respiration produces ethanol and carbon dioxide.

2. Match the processes and structures in LIST A with the related response of the digestive system in LIST B by writing the letter in the table below.

LIST A:
i. Enamel
ii. Mucus
iii. Peristalsis
iv. Cardiac sphincters
v. Villi
vi. Excretion
vii. Tongue
viii. Bile

ix. Dental caries
x. Pyloric sphincters

LIST B:
A. The lining of the ileum that has finger-like projection.
B. The hard whitish outer part of tooth made of minerals.
C. The process by which harmful by-products of metabolism are removed from the body of the organism.
D. The involuntary waves of contraction of smooth muscles that conveys food boluses.
E. The junctions between the stomach and oesophagus.
F. It breaks fats and oil into small droplets.
G. The disorder caused by increase intake of sugary, hot, and cold food.
H. The junctions between the stomach and the duodenum.
I. It rolls the food and pushes it into the pharynx.
J. A substance that lines the stomach to prevent it from corrosion by hydrochloric acid.
K. The process by which food is broken down into a form that can be absorbed.
L. The undigested food substances coming out from the body.

ANS:

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

3. Read the sentences below very carefully and then fill the blank spaces. Use one word for each space.

a. Organisms of the same species can _____ to produce fertile _____.
Answer: Mate, offspring

b. Human beings produce _____ which are biological catalysts.
Answer: Enzymes

c. Muscle needs _____ from respiration for movement.
Answer: Energy

d. During sports activity, lactic acid accumulated is converted by oxygen to harmless _____ and _____.
Answer: Carbon dioxide, water

e. The smallest blood vessels in the body are _____.
Answer: Capillaries

f. Fungi produce poisons called _____. The most common is _____.
Answer: Mycotoxins, aflatoxins

g. A quadrat is a square frame enclosing a known area to estimate the _____ of organisms.
Answer: Population

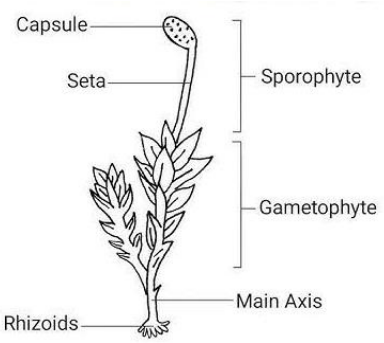
4. (a). Name three external features of the leaf that make it well adapted for photosynthesis.
i. Broad surface area for light absorption.
ii. Thin structure for easy gas exchange.
iii. Presence of stomata for gaseous exchange.

b. List down the main products of photosynthesis in both light and dark stages.
i. In the light stage, the main products are oxygen and ATP.
ii. In the dark stage, the main products are glucose and water.

c. Write down an important element for the formation of chlorophyll in plants.
Answer: Magnesium
d. Mention the cells in the mesophyll that have many chloroplasts.
Answer: Palisade cells
e. Write the forms of glucose that can be converted after it has been manufactured in the process of photosynthesis.
Answer: Starch, cellulose, sucrose

5. a. Outline four general characteristics of Kingdom Plantae.
i. Plants are multicellular organisms.
ii. They perform photosynthesis to produce food.
iii. Their cells have rigid cell walls made of cellulose.
iv. They have a life cycle with alternation of generations.

b. Draw a well-labeled diagram of the Moss plant.



c. Mention the reproductive parts of a moss plant.
Answer: Archegonia and antheridia

6. a. i. What do you understand by the term “muscle cramps”?
Answer: Muscle cramps are involuntary and painful contractions of a muscle or group of muscles.

ii. Outline three causes of muscle cramps.
- Dehydration
- Lack of essential minerals like potassium or calcium
- Overuse or strain of muscles

iii. Mention the two types of muscle cramps that are likely to occur.
Answer: Skeletal cramps and smooth muscle cramps

b. List any three situations that require First Aid.
i. Severe bleeding
ii. Fractures or broken bones
iii. Poisoning

7. a. Briefly explain four ways of spreading communicable diseases.

i. Direct contact: Diseases like ringworm and scabies can spread through physical contact with an infected person.
ii. Contaminated water or food: Diseases like cholera spread through the consumption of water or food contaminated with pathogens.
iii. Airborne transmission: Diseases like tuberculosis spread through droplets when an infected person sneezes or coughs.
iv. Insect vectors: Malaria and dengue are transmitted by insects like mosquitoes carrying disease-causing organisms.

b. Explain in short the following diseases.

i. Cholera: Cholera is an infectious disease caused by the bacterium *Vibrio cholerae*. It spreads through contaminated water or food and causes severe diarrhea and dehydration. Proper sanitation and clean water are essential for prevention.

ii. HIV and AIDS: HIV (Human Immunodeficiency Virus) is a virus that attacks the immune system, leading to AIDS (Acquired Immunodeficiency Syndrome). It is transmitted through unprotected sexual contact, sharing needles, or from mother to child during childbirth. Prevention includes safe practices and antiretroviral therapy.

8. (a). Mention two main types of nutrition in organisms.

i. Autotrophic nutrition: Organisms like plants produce their food using sunlight and inorganic substances through photosynthesis.
ii. Heterotrophic nutrition: Organisms like animals and fungi depend on others for their food by consuming organic substances.
b. Briefly explain the following terms.

i. Commensalism: Commensalism is a type of symbiotic relationship where one organism benefits, and the other is neither harmed nor benefited. For example, barnacles on a whale use the whale for transport without affecting it.

ii. Mutualism: Mutualism is a symbiotic relationship where both organisms benefit. For example, bees pollinate flowers while feeding on nectar.

iii. Parasitism: Parasitism is a relationship where one organism (the parasite) benefits at the expense of the other (the host). For example, tapeworms live in the intestines of their hosts, deriving nutrients while harming the host.

c. Name two main groups of vitamins.

i. Fat-soluble vitamins: These vitamins, such as A, D, E, and K, are stored in the body's fat tissues and liver.
ii. Water-soluble vitamins: These vitamins, such as B-complex and C, dissolve in water and need to be replenished regularly.

9. (a). A potato was cut into half, peeled, and a hole was made at the center. The half piece of potato was placed in a beaker containing water, and at the center, a strong sugar solution was placed. The setup was observed for several hours.

i. The aim of this experiment was
To demonstrate osmosis by observing water movement through a semi-permeable membrane.

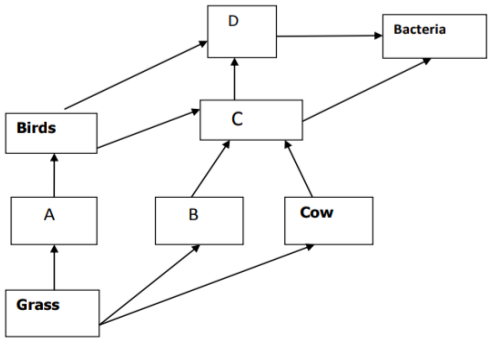
ii. What do you observe on the levels of water after the experiment in the beaker and that in the sugar solution on the piece of potato?
- Level of water in the beaker: Decreases as water moves into the sugar solution.
- Level of sugar solution in the potato: Increases as water enters the solution.

iii. What will happen if the experiment is repeated with a potato that has been boiled?
The process will not occur because boiling destroys the semi-permeable membrane of the potato cells.

iv. What is the importance of this experiment in plants?
It demonstrates how water moves through cell membranes, which is essential for nutrient uptake and transport in plants.

v. If the two solutions have the same water potential, they are said to be
Isotonic.

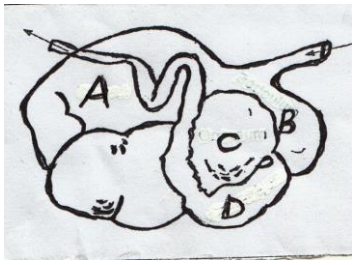
b. You are given a flow energy chart of a food web with four missing organisms: Lion, Hawks, Insects, and Zebra.



i. Identify the missed organisms named by the letters with their correct place from the chart.
A: Zebra
B: Lion
C: Hawks
D: Insects
ii. Name the organisms which are herbivores.
Zebra

iii. Name the organisms which are carnivores.
Lion and Hawks
iv. Identify primary consumers.
Zebra
v. Identify secondary consumers.
Hawks
vi. Name an organism which is a producer.
Grass
vii. Name an organism which is a decomposer.
Bacteria

10. Study the figure X below and answer the questions that follow.



i. Identify the figure X.
Answer: The figure represents the digestive system of a ruminant animal, such as a cow. Ruminants have a unique digestive system that allows them to break down fibrous plant material.

ii. Name the parts labeled A to D.
A: Rumen
B: Reticulum
C: Omasum
D: Abomasum

iii. What is the meaning of the term 'chewing cud?'
Answer: Chewing cud refers to the process where ruminants regurgitate partially digested food from their stomach back into their mouth to chew it again. This process aids in breaking down tough plant material for easier digestion.

iv. The gap in a lower jaw in the cow is known as a
Answer: **Diastema**. It helps the cow manipulate food while chewing.

11. Write short notes on how pathogenic bacteria spread diseases and infections. Use the following guidelines.

a. Fimbriae/pili
Fimbriae or pili are hair-like structures on the surface of bacteria that help them attach to host cells. This attachment is a crucial step for colonization and infection.
b. Toxins
Pathogenic bacteria produce toxins that damage host tissues and interfere with physiological processes. For example, Clostridium botulinum produces botulinum toxin, which causes muscle paralysis.
c. Transformation
Transformation involves bacteria acquiring genetic material from their environment, including resistance genes. This process can enhance their ability to survive in hostile conditions or evade the immune system.
d. Resistance
Bacteria can develop resistance to antibiotics through genetic mutations or acquiring resistance genes. This makes infections harder to treat and increases the risk of disease spread.
e. Flagella
Flagella are whip-like structures that enable bacteria to move. This mobility allows them to reach specific tissues or escape unfavorable environments, contributing to the spread of infections.