

**BIOLOGY**

**FORM 2**

**END TERM 1 2024**

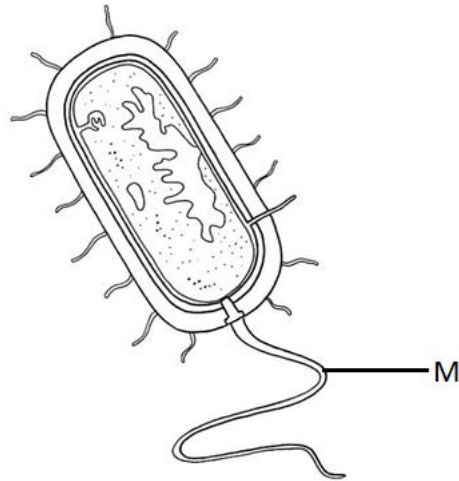
**TIME: 2 HRS 15 MINUTES**

**MARKING SCHEME.**

**Instructions: Answer all question in the spaces provided.**

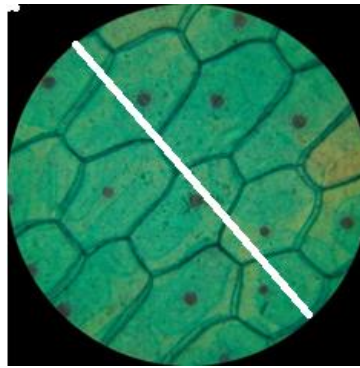
1. Suggest a biological tool that is most suitable for collecting each of the following organisms. (3mks)
- a) Scorpions.  
Pair of forceps;
  - b) Safari ants on a tree  
Pooter;
  - c) Butterfly in a coffee farm  
Sweep net;
  - d) State **two** precautions taken during collection of specimens (2mks)
    - Do not destroy the habitat of the organism;
    - Do not harm the organism;
    - For live specimens after study return to their habitats;
2. Identify the discipline of biology that deals with the following.
- i) The relationship between organisms and their environment. (1mk)  
Ecology;
  - ii) Study of development of living organisms. (1mk)  
Embryology;
  - iii) Study of body functions of living organisms. (1mk)  
Physiology;
  - iv) Study of chemical changes in an organism. (1mk)  
Biochemistry;
  - v) Study of microscopic organisms. (1mk)  
Micro biology;

3. Below is a simplified diagram of a bacteria. Study it and answer the questions.



- a) Name the kingdom into which it belongs. (1mk)  
 Monera;
- b) Name part labelled M and state its function. (2mks)  
 M- **Flagellum**;  
 Function – **movement**;
4. (a) How would you proof that a species of zebras in Tanzania belongs to the same species as a similar looking zebra in Kenya. (1mk)  
**If they can interbreed to produce a fertile offspring;**
- (b) State two principles of Binomial Nomenclature. (2mks)
- **The generic name is first written followed by the specific name;**
  - **The first letter in the generic name must be a capital letter and the rest are small letters;**
  - **The two parts of the name are underlined separately when typed or hand written. In printed manuscripts should be in italics;**
- c) What is meant by the term taxonomy? (1mk)  
**It is the science of classification;**
5. State three properties of the cell membrane. (3mks)
- **Semipermeable;**
  - **Possess electric charges/ polarized;**
  - **Sensitive to changes in temperature and pH;**

6. The following diagram shows onions cells captured in a field of view of a light microscope



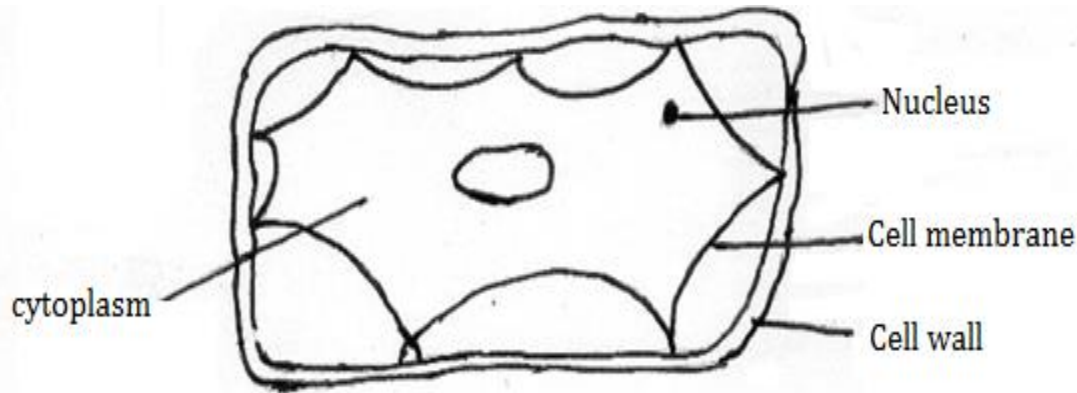
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- a) Measure the length of the white line to determine the diameter of the field of view in millimeters (1mk)  
**Xmm;**
- b) How many cells are found along the diameter represented by the white line? (1mk)  
**6 (cells);**
- c) Determine the actual diameter of one cell if a magnification of X1000 was used to observe the cells above (3mks)

$$\begin{aligned} \text{Diameter of Cell} &= \frac{\text{Diameter of Field of View}}{\text{Number of cells}} ; \\ &= \frac{X}{6 \text{ cells}} ; = Y \text{mm} ; \\ &= \text{Diameter of Observed cell} / \text{Total Magnification} \\ &= Y \text{mm} / 1000; \text{NB: Deny Mark if Units not shown here} \end{aligned}$$

- d) State a weakness of the process above of estimating cell size (1mk)  
**Cells are not linearly/uniformly arranged along the diameter of field of vies; Cells are of different Size; Cells are of different Shapes;**

7. A plant stem was put in a solution. After 30 minutes a cell from the stem looked like the one drawn below;



- i. State the type of solution the stem was put in. (1mk)

**Hypertonic solution;**

- ii. What term is used to describe the cell (1mk)

**Plasmolysed;**

- iii. Explain what happened. (3mks)

**Water molecules moved out of the cell by osmosis; due to hypertonic solution; therefore, the cell membrane detached from the cell wall;**

8. a) What is diffusion. (1mk)

**The movement of molecules from a region of high concentration to a region of low concentration; until the molecules are uniformly distributed in the medium)**

- b) How do the following factors affect the rate of diffusion?

- i) Diffusion gradient. (1mk)

**The higher diffusion gradient between (two points) the rate of diffusion; acc converse.**

- ii) Surface area volume ratio. (1mk)

**The higher the surface area: Volume ratio, the faster is the rate of diffusion; acc converse**

- iii) Temperature. (1mk)

**Increasing temperature increases the rate of diffusion; acc converse.**

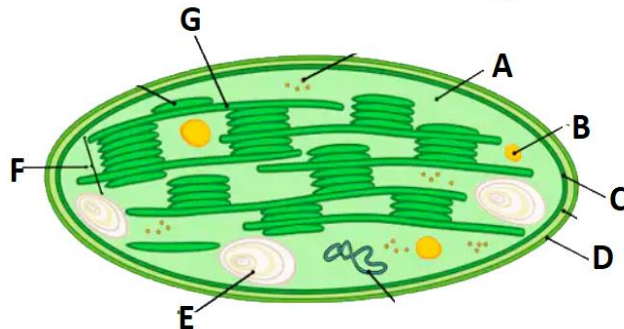
9. Outline three roles of active transport in the human body. (3mks)

- **Reabsorption of useful material /glucose/ some salts into the kidney/ by kidney tubules; from the blood stream.**
- **Absorption of some digested food/ from the alimentary canal;**
- **Accept sodium pump mechanism in the nervous system, the nerve cell**

10. State **two** adaptation of leaves that maximize efficiency in trapping sunlight for photosynthesis. (2mks)

- Flat and broad;
- Presence of transparent cuticle and epidermis;
- Thinness of the leaf;
- Arrangement of palisade layer beneath the upper epidermis;
- Numerous chloroplasts in the palisade layer; any 2

11. Below is a diagram of a cell organelle. Study it and answer the questions that follow.

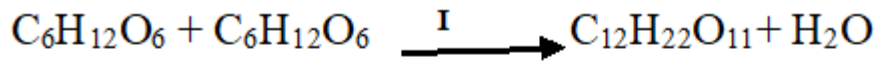


- i. Identify the organelle. (1mk)  
**Chloroplast;**
- ii. Name the part labelled A and C. (2mks)  
A – **Stroma;**  
C – **Inner membrane;**
- iii. State the letter that represent the part where light stage of photosynthesis occur. (1mk)  
**G;**
- iv. State two adaptations of the organelle to its function. (2mks)
  - It has lamellae/grana that contains chlorophyll that traps light energy;
  - The grana have a large surface area for accommodation or packing of the chlorophyll.
  - The stroma contains numerous enzymes that speed up/catalyze the process of photosynthesis; (any two)
- v. What happens to the end products of light stage? (2mks)
  - Hydrogen atoms enter the dark stage;
  - Oxygen atoms are released to the atmosphere as a gas or used for respiration;

12. Name the carbohydrate that is

- a) Stored in animal cells (1mk)  
**Glucose;**
- b) Makes up plant cell walls (1mk)  
**Cellulose;**

13. Study the bio-chemical reactions given below.



- a) Identify the process marked I and II (2mks)
- I – condensation;  
II – Hydrolysis;

- b) Explain how the process marked II can be carried out in a laboratory. (1mk)

Boiling (the solution) with a dilute acid;

- c) If glycerol is the same in all lipids, why is corn oil different from coconut oil. (1mk)

They have different fatty acids;

14. State two functions of proteins. (2mks)

- They are components of structures in living organisms; (e.g. plasma/ cell membranes, connective tissue, hair, hooves, nails, muscle fibre, skeletal materials).
- They are used for making, repair and replacement of worn-out tissues in plants and animals;
- They act as metabolic regulators; (e.g. enzymes which speed up metabolic reactions, hormones which regulate body processes like growth, reproduction, antibodies that provide immunity against diseases)
- They are broken down to give energy during starvation;

15. (a) State two functions of bile juice in digestion of food. (2mks)

- Emulsification;
- Neutralizes acidic chyme;
- Provides alkaline conditions for digestive enzymes;

(b) Why is pepsin secreted in its inactive form? (1mk)

So that it doesn't digest the cells that secrete it;

(c) Name one other enzyme that is also secreted in an inactive form. (1mk)

Trypsin; Rennin;

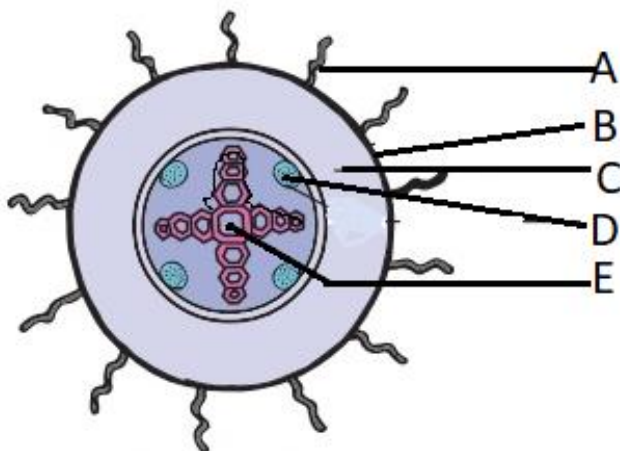
16. State two roles of hydrochloric acid produced by wall of human stomach. (2mks)

- Provide optimum pH/acidic medium for enzyme activity;
- Kill bacterial that may be present in food;
- Stimulate conversion of inactive pepsinogen to active pepsin;
- Unfold proteins molecules for action of pepsin (any two correct)

17. State two functions of the large intestine in humans.

- Absorption of water; accept absorption of salts / calcium / iron;
- Secretion of mucus;
- Synthesis of vitamin K

18. The diagram below is a transverse section of a certain part of a dicotyledonous plant.



a) Name the part labelled A, C and E. (3mks)

- A – Root hair;  
C – Cortex;  
E – Xylem;

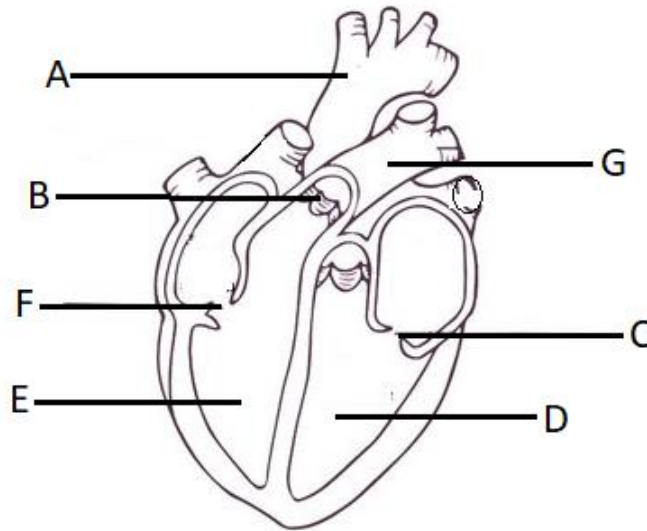
b) State the functions of the parts labeled B and D. (2mks)

- B – protect internal organs;  
D – translocation of food;

c) State three ways in which part A adapted to its function. (3mks)

- The walls are one cell thick to shorten diffusion distance of absorption of substances;
- They are numerous to increase surface area for absorption of water and mineral salts;
- They are elongated to provide a large surface area for absorption of water and mineral salts;

19. The diagram below shows the internal structure of a mammalian heart



a) Name the parts labeled. (3mks)

A – **Aorta;**

B – **Semi lunar valve;**

C - **Bicuspid valve;**

b) The muscular wall of chamber D is at least three times thicker than the wall of chamber E. Give a reason for this difference. (1mk)

**To generate high pressure required to pump blood to the furthest tissue;**

c) Name two special characteristics of heart muscles. (2mks)

- **Myogenic;**
- **Contract and relax without fatigue;**

d) In what way does the artery labeled G differ from other arteries in the body (2mks)

- **Carry deoxygenated blood;**
- **Have valves at the base;**

20. a) State and explain five factors that determine energy requirements in human beings. (10mks)

- **Basal metabolism;**

**This is the minimum amount of energy required to maintain life when body is at rest;**

- **Sex;**

**Males require more energy than females because males are more masculine than female;**

**Females have more fats males use more energy compared to females;**

- **Body size;**



Small bodies people have a large surface area to volume ratio; hence their bodies lose a lot of heat to the surrounding; They therefore require more energy than big bodied people who have small surface area to volume ratio;

- Occupation/activity;

Manual workers require more energy than for example an office worker (any correct explanation by use of an example);

- Age;

Young children have many actively dividing cells and they are physically active; Therefore, their Basal metabolic rate is higher than that of adults;

(Max 10mks.)

b) State and explain five environmental factors that **increase** the rate of transpiration. (10mks)

a) High Temperature;

High temperature increases the internal temperature of the leaf; which in turn increases kinetic energy of water molecules which increases evaporation; increasing the rate of transpiration; High temperatures dry the air around the leaf surface maintaining a high concentration gradient. More water vapour is therefore lost from the leaf to the air;

b) Low Humidity;

When humidity is low, (in dry atmosphere) the saturation deficit is high and hence transpiration rate is high;

c) Wind;

Wind carries away water vapour as fast as it diffuses out of the leaves. This prevents the air around the leaves from becoming saturated with vapour. On a windy day, therefore the rate of transpiration is high.

d) High Light intensity;

When light intensity is high; more stomata open and open fully hence high rate of transpiration;

e) Lower Atmospheric Pressure.

When the atmospheric pressure is low, the force acting on the leaf surface is low hence increasing the rate of transpiration