MARKING SCHEME

NAME_____ADMISSIONNO._____CLASS_____

231/1

BIOLOGY (Theory)

March/April 2024

2 Hours

KENYA CERTIFICATE OF SECONDARY EDUCATION

FORM FOUR BIOLOGY PAPER 1

Instructions to Candidates

- Write your Name and admission Number in the Spaces Provided.
- Sign and write date of examination in the spaces provided.
- You should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

Answer all the questions in the spaces provided.

1. State three importance of osmosis in plants. (3mks)
   -Absorption of water by root hairs from the soil;
   - Support in seedlings, leaves and herbaceous plants.
   -Opening and closing of Stomata
   -Distribution of water from cell to cell

2.Name the organelle that:

   (a) is the most abundant in skeletal muscle cell (1mk)
   Mitochondrion;
   (b) assist in the formation of spindle fibres during cell division. (1mk)
   Centriole(s);

3.(i) Identify the nuclei acid whose base sequence is shown below. (1mark)

G - A - C - U - A - G - C - G – U

Ribonucleic acid;

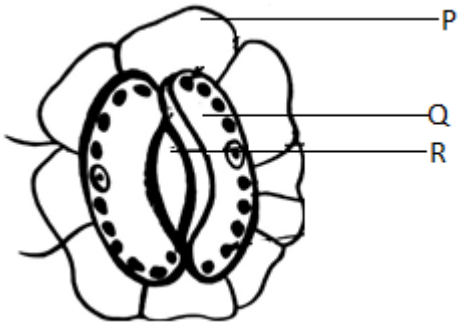
(ii) Give a reason for your answer in (i) above (1mark)

Has base uracil

(iii) If this nucleic acid was involved in protein synthesis, how many amino acids would be present in the protein synthesized. (2mks)

Three (3);
Reason – Has three codons;

4.The diagram below represents a structure found in plants.



(a) Name the parts labelled **P** and **R** (2mks)

P - Epidermal cell;

R - Stoma / stomatal pore;

(b) **State** how cell Q is adapted to its function (2mks)

Has thick inner wall and thin outer walls to control opening and closing of Stoma;

Has chloroplasts to carry out photosynthesis / manufacture of glucose that alter osmotic pressure bringing about opening and closing of stomata;

5.The diagram below represents a certain organism collected by a student on his way to school

a) State the class to which the organism belongs. (1mk)

ArachnidaRej. Arachnides

b) Give two reasons for your answer in (a) above. (2mks)

- Four pairs of legs
- Lack of antennae
- Two body parts/cephalothorax and abdomen. Rej. Cephalothorax alone

6. State three reasons why green plants are included in the fish aquarium. (3mks)

- To use carbon (IV) Oxide;

- provide oxygen;

- provide breeding sites;

7. State two adaptations of the alveolus to its functions. (2mks)

Thin epithelium for reduction of diffusion distance of respiratory gases;
Highly vascularized to transport gases/maintain a steep concentration gradient;
Moist surface to dissolve respiratory gases so that they diffuse in solution form;

8(a)Why may an asthmatic patient produce a wheezing sound during breathing? (1mk)

This is because muscles around the bronchioles contracts and so reduce their diameter.

(b) What is the significance of the cartilage found in the human trachea being incomplete (C-shaped rings) (1mk)

To permit swallowing in the oesophagus ;

9. a) State **three** characteristics of Monera that are not found in other kingdoms. (3mks)

Lack nuclear membrane/Prokaryotic;

- smaller in size;
- lack most organelles/has few organelles;

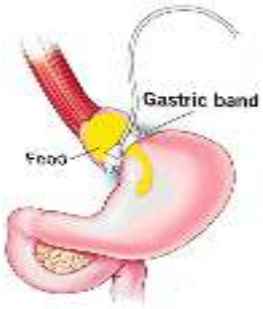
b) Name the class to which a dolphin belongs. (1mk)

Mammalia

10.a)**Obesity** increases the risk of a person developing cardiovascular disease and losing weight can reduce the risk of this disease occurring. Explain why exercise can cause weight loss (2mks)

fat stored in the body is oxidized; to provide the energy needed for exercise;

(b)The Figure below shows a gastric band fitted to a stomach.



Explain how a gastric band helps a person to lose weight. (2mks)

upper portion of stomach fill up quickly after eating small amount of food; making the person fill fuller quickly after eating little food;

11. a) What is genetic engineering? (1mk)

Genetic manipulation to produce desired offsprings/identify desired gene, alter it, isolate and transfer it to another organism

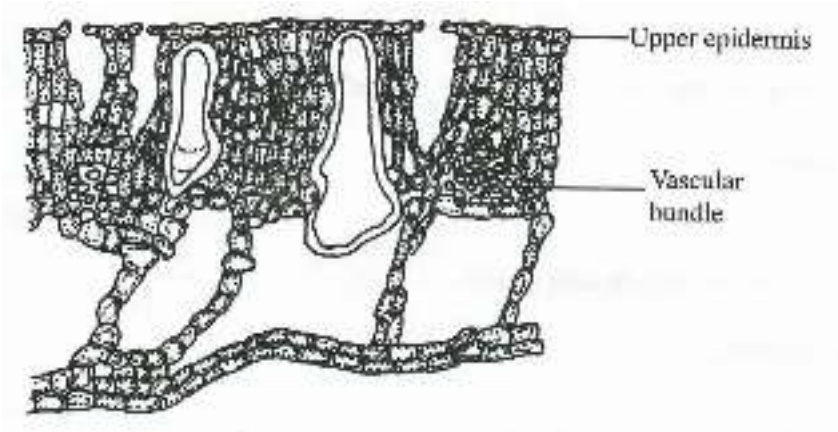
b) What is meant by hybrid vigour? (1mk)

Hybrid vigour – a situation where offsprings show characteristics which are superior to either of the parental stock;

12. How is the mammalian fallopian tube adapted to its function. (2mks)

- Has funnel-shaped end to channel/direct the released ovum towards the uterus; - Lined with cilia which aids in movement/waft the ovum/fertilized egg towards the uterus;

13. The diagram below shows a transverse section of a leaf.



(a) Name the habitat of the plant from which the leaf was obtained. (1mk)

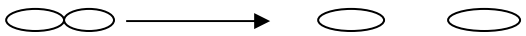
Aquatic/fresh water;

(b) Give two reasons for your answer in (a) above. (2mks)

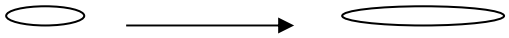
Large air spaces/aerenchyma; - sclereids;

- Stomata on upper epidermis/absence of stomata on lower epidermis;
- Absence of cuticle;
- Poorly developed vascular bundles. Any two correct

14. Identify the function of a light microscope as shown by the following diagrams. (2mks)

(a) 

Resolving power/Resolution;

(b) 

Magnification/magnifying power;

15.(a) State three structural differences between arteries and veins. (3mks)

Arteries	Veins
Have thick muscular walls	Have thin less muscular walls;
Have narrow lumen	Have wider lumen;
Have no valves except at the junction with heart base at aorta and pulmonary artery.	Have valves at regular intervals;

(b)Explain why phloem cells are not lignified like the xylems. (1mk)

Phloem cells are living; (Lignification would kill them)

16.What is meant by the term habitat. (1mk)

Place/environment in which(specified) organisms live;

17.State two ways through which flowering plants hinder self fertilization from occurring.(2mks)

Self- sterility/incompatibility.
Heterostyly/stigma higher than anthers.style longer than filaments.
Pollen grains maturing before stigma/protandry;
Stigma maturing before pollen grains/protogyny;

18.(a)The study of microorganisms is called microbiology. Name any two branches of microbiology. (2mks)

bacteriology; virology; mycology; parasitology; acc; any two;

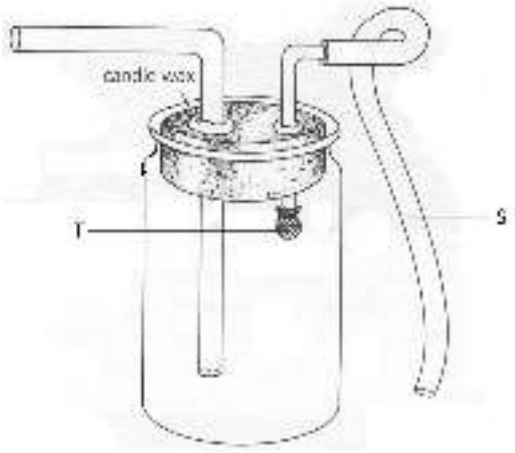
b)Name the branch of biology that deals with the study of the Phylogenetic relationship among organism (1mk)

Evolution;

19,Below is a drawing of an apparatus used during the study of biology.

a) Identify the apparatus. (1mk)

Pooter;



b) Name part labelled S and T. (2mks)

S – suction tube;

T – net/ gauze;

c) State the function of the apparatus. (1mk)

Suck small crawling animals from rock surfaces and barks o trees;

20. State **one** environmental problem that can be solved by studying biology (1mk)

- Environmental pollution;
- Pollution;
- Food shortage;

- Drought;
- Poor health;
- Conservation of natural resources;

21. During an experiment it was found out that germinating bean seeds released 9.0 cm^3 of carbon (IV) oxide while 8.8 cm^3 of oxygen was consumed.

a) Calculate the respiratory quotient (2mk)

$$\text{Respiratory Quotient (RQ)} = \frac{\text{Volume of Carbon (IV) oxide produced}}{\text{Volume of oxygen consumed}}$$

$$= \frac{9.0\ cm^3}{8.8\ cm^3} \quad ;$$

$$= 1.02 \quad ;$$

b) State the type of respiratory substrate. (1mk)

Carbohydrate

c) State two conditions necessary for maintaining respiration (2mks)

- Cells must be provided with food/glucose
- Oxygen must be taken in to react with the glucose
- Presence of respiratory enzymes to catalyze the reaction
- Optimum/Favorable temperature must be maintained for efficient enzyme functioning
- End products of the reaction i.e Carbon (IV) oxide, water and energy must be constantly removed

d) Explain the disadvantages of anaerobic respiration in plant roots. (2mks)

lower rate of ion uptake by active transport due to low energy output;// ethanol produced poison the tissue leading to their death;

22.(a) Name the excretory product removed through guttation (1mk)

Excess water;

(b) Name the structures in the skin that deals with (2mks)

(i) Temperature regulation

blood capillaries; erector pili muscles and hair; sweat glands;

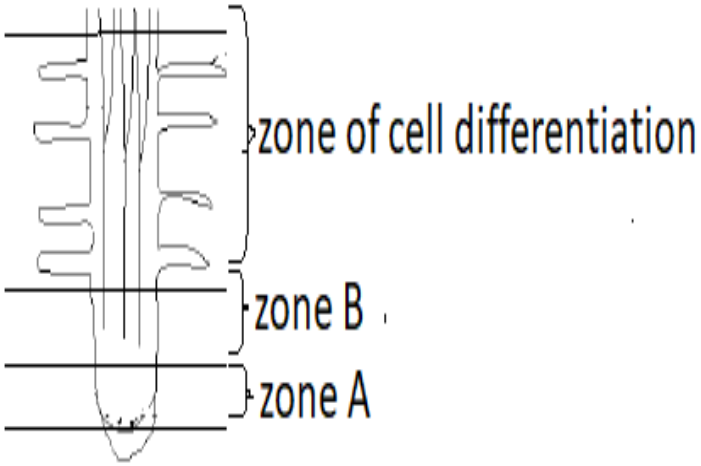
(ii) Excretion

Sweat glands; blood capillaries;

(c) Seals have very thick layer of fatty tissue under the skin. In what way is this useful to them? (2mks)

Seals live in cold environments. Fatty tissue act as an insulator; to prevent excessive heat loss from their bodies;

23.(a) The diagram below represents the apical growth in a root



(i) What happens to the cells at zone B (2mks)

The cells take in water; and expand;

(ii) Name the hormone produced at zone A that brings about a change in zone B (1mk)

Auxins

24.(a) Name the hormone that sustains the larval stage in insects and the structure that produce it. (2mks)

Hormone - juvenile hormone;

Structure - corpus allatum**; rej**; corpora allata

(b) State the type of growth which occurs in insects. (1mk)

Intermittent growth;

25.(a) What are vestigial structures? (1mk)

Structure that has ceased to be functional over long period of time and have therefore become reduced;

b) The paddles of whales and fins of fish adapt these two organisms to aquatic habitats.

i. Name the evolutionary process that may have given rise to such similar structures. (1mk)

Convergent

ii. What name is given to such structures. (1mk)

Analogous

26.Name three features that distinguish man from ape even though they are closely related in the evolutionary tree. (3mks)

- Bipedal gait;
- Enlarged brain size;
- Smaller lower jaw;
- Smaller canines;

27.Explain why fresh water protozoa like amoeba do not burst when placed in distilled water (2 marks)

Fresh water protozoa take in water by osmosis; the excess water is then actively pumped into the contractile vacuole which discharges the water to the outside.

28. State **Two** modifications of stomata which enable a plant to reduce the loss of water. (2mk)

Sunken stomata

Reversal of stomatal rhythm

Midday closure