**FORM THREE BIOLOGY**

**OPENER EXAMINATION TERM 3, 2022**

**MARKING SCHEME**

TIME 2$\frac{1}{2}$ hours

*Answer all questions in the spaces provided*

1. What is the role of the following to a germinating seed?

1. Endosperm (1mk)

Store food necessary for germination;

1. Water (3mks)
* Activate the (germination) enzymes;
* Hydrolyse the stored food;
* It’s a transport agent for hydrolysed food;
* It’s a solvent for hydrolysed food;
* It softens the seed coat/testa;

2(a) Name any two meristematic tissue/growing parts of a seedling. (2mks)

 Root tip;

 Shoot tip;

 Cambium;

(b) State two advantages of metamorphosis to the life of insects. (2mks)

* Different stages feed on different types of food;
* The adult and larvae exploit different (food) niches
* Do not compete for food;
* Pupa can survive adverse conditions /pupa is a non-feeding
* Stage/pupa enables organisms to undergo through adverse conditions;
* Dispersal phase prevents overcrowding;

3. Explain how birds of prey like vulture are adapted to obtaining food. (2mks)

* It has sharp/hooked/strong beaks for killing ripping off fresh from bones;
* It has curved/ strong/sharp claws for grabbing/holding the prey;

4. State two importances of classification of living organisms. (3marks)

Enable identification of living organisms into their correct groups for reference;

 To understand the evolutionary relationship between different organisms;

Biologists are able to arrange in an orderly and comprehensible manner the knowledge available on characteristics of organisms;

Biologists are able to predict traits of organisms they may not have seen;

To monitor and know the disappearing species;

5.Complete the table below, outlining the differences between members of Class Diplopoda and Chilopoda based on the characteristics given. (4 marks)

|  | Diplopoda | Chilopoda |
| --- | --- | --- |
| Characteristic |
| Body shape | cylindrical | Laterally flattened |
| Number of legs per segment | 4 | 2 |

6..a. State two reasons why the snake is classified as a reptile. (2 marks)

Has scales;

Lay eggs;

Its poikilothermic;

Move by creeping;

b. Name the structure which enables Paramecium to move. (1mark)

cilia;

7.a) How is the human stomach adapted for

i) Protein digestion (2mks)

Have gastric gland that secret gastric juice; which has pepsin enzyme for digestion of proteins; and rennin enzyme for curdling of protein in milk;

ii) Churning (2mks)

Thick muscular wall which contract and relax to bing about churning;

b) what happens to the glucose synthesized during photosynthesis. (2mks)

- used for plant respiration;

- excess converted to starch/cellulose and stored for future use;

8. state two ways in which the muscles of a mammalian heart are special.(2mks)

- myogenic;

- do not fatigue;

9. During a practical investigation on food tests, students were provided with the following reagents.

- Benedicts solution.

- Sodium hydrogen carbonate.

- dilute hydrochloric acid.

a) Identify the food substance the students were to test.(1mk)

 non – reducing sugar;

b) State the role of the following in the experiment.

i) Dilute hydrochloric acid.(1mk)

 hydrolyse/breaks down sucrose/reducing sugars into reducing sugars/glucose/fructose;

ii) Sodium hydrogen carbonate.(1mk)

 Neutralize acid;

10.. Explain the role of carbonic anhydrase in red blood cells.(3mks)

- converts carbon (IV) oxide to carbonic acid which easily dissociates into hydrogen ions(H+) and hydrogen carbonate ions; for easier transportation ; reducing acidity in the blood;

11.(a) How do animals use the energy produced during respiration? (4mks)

* Provide energy for movement/locomotion/contraction of muscles;
* For defense/flee from predator;
* Heat energy to provide optimum temperature for enzyme action;
* Energy for cell division;
* Energy for transmission of impulses in nerves/neurons;
* Absorption of mineral salts in alimentary canal;
* Reabsorption of salts/sodium ions in kidney tubules;
* Excretion of waste from body cells;

(b) Write down two characteristic features of mitochondria. (2mks)

* Its sausage – shaped;
* It has double membranes;
* Inner membranes is (greatly) folded to form cristae;
* It has fluid filled matrix;

12. Explain the effect of the factors listed below to the process of diffusion

1. Temperature below 00C (2MKS)

The rate of diffusion would decrease; since the molecules have low kinetic energy/less activated;

1. Smaller surfaces area to volume ratio (3mks)

The process would be slow/or stop altogether; since the distance covered by (diffusing) molecules would be more; therefore, require a transport system;

13. Some hydrophytes grow in fresh water habitat. List down three characteristics of fresh water Condition that influence plant growth. (3mks)

* Low concentration of dissolved gases;
* Light intensity decreases with increase in depth;
* Temperature decreases with increase in depth/temperatures are stable;
* Low concentration of mineral salts;
* waves and water currents influence plant growth/are usually common;

14.The diagram below illustrates the mechanism of blood glucose concentration

 Corrective mechanism A

 Excess

 Normal glucose level Normal glucose level

 Deficiency

 Corrective mechanism B

1. What principle of homeostasis is illustrated in the diagram? (1 mark)

 Feedback mechanism;

(b) Name the condition that may result from further excess (1 mark)

Diabetes mellitus;

(c) State how the corrective mechanism B restores blood glucose to normal level (2 marks)

 Pancreas is stimulated to secrete glucagon into bloodstream; on reaching the liver glucagon: Stimulates liver cells to convert glycogen into glucose; Stimulates liver cells to decrease oxidation of glucose into water, carbon (IV) oxide and energy;

15.The diagram below shows a portion of a lower epidermis of a sukuma wiki leaf.

Q

P

 (a) Name the parts labeled P and Q. (2mks)

P stomatal pore/opening / aperture/ stoma; rej. Stomata.

 Q Epidermal cell; Rj Epidermis

b)Briefly describe the photosynthetic theory of stomatal opening. (5mks)

Guard cells have chloroplasts; hence the presence of light during the day photosynthesis occurs in the guard cells; producing sugar in the guard cells that increases osmotic pressure; water from epidermal cells enters into guard cells causing turgidity of cells; the inner walls of the guard cells are thicker than outer walls; hence outer walls stretch more (during turgidity); causing guard cells to bulge outwards; (stomata open). guard cells have thicker inner wall than outer walls; hence outer walls stretch more (during turgidity); causing guard cells to bulge outwards; (stomata open).

c)State one modification in the stomata of xerophyte plant other than being sunken and

hairy (1mk)

Reversal / stomatal rhythm;

Small stomatal pore / aperture / opening;

16.The diagram below shows a section through the mammalian skin



 (a) Name the parts labelled W and X (2mks)

 W Sebaceous gland;

 X Erector pili muscles;

 (b) State the function of the parts labelled Y and Z (2mks)

 Y – Produces melanin which protects the body against U.V light/determines the skin colour;

Z – Secrets sweat which evaporates to bring about cooling or

Sweat also removes excretory products/excess salts/water ;

 (c) Explain the changes that occur in the skin when it is cold (4mks)

Vasoconstriction; hence less blood flows to the skin surface; reducing heat loss; no sweating; heat produced thought metabolisms/shivering; is retained in the body;

6 marks max 4 mks

17. Below is a cross section through a plant organ. Use it to answer the questions that follow



 a) Giving a reason, identify the figure shown above. (2mks) Dicotyledonous stem;

 Reason: Presence of vascular cambium ;or

 Arrangement of vascular bundles in concentric manner;

 b) State three characteristics of the tissue labeled H (3mks) Have actively dividing cells;

 Its cell lacks vacuoles;

 Its cells have thin cell wall;

 Its cells have dense cytoplasm;

 c) Name one substance transported by part labeled P (1mk) Amino acid/sucrose/fatty acid and glycerol; Rej.glucose

 d) State the function of part G. (1mk) Protection from mechanical injury/entry of micro-organism;

 e) Name the substance used to strengthen part labeled T (1mk)

 Lignin;

18.Study the diagram below which represents the nitrogen cycle to answer the questions that follow.



1. State the processes (3mks)

C Dentrification;

D Absorption;

A Nitrogen fixation;

1. Name the bacteria found in root nodules of plant T (1mk)

 Rhizobium;

1. Name the mechanism **S** that lead to production of ammonia from both plants and animals (1mk)

 Death & decay;

19.a) Describe the process of fertilization in a flowering plant (15mks)

After pollination the pollen grains adhere to the stigma; due to secretion of a sticky substance by the stigma cells; The pollen grain absorbs nutrients from the stigma; and develops a pollen tube; The pollen tube grows down the style; by digesting the tissues of the style; The pollen tube has two nuclei the tube nucleus; and the generative nucleus; The tube nucleus initiates and maintains the growth of the pollen tube; Generative nucleus divides by mitosis; into two male nuclei; which follow behind the tube nucleus; finally the pollen tube enters the embryo sac through the micropyle; it bursts open and tube nucleus degenerates/disintegrates. One of the male nucleus fuses with the egg to form a zygote; the other male nucleus fuses with the two polar nuclei to form triploid nucleus; (primary endosperm nucleus) The process involves double fertilization;

Maximum 15mks

b) State the changes that take place in a flower after fertilization (5mks)

b) Integument changes into seed coat /testa;

 Zygote into embryo;

 Ovary wall into pericarp;

 Ovary into fruit;

 Ovule into seed;

 Triploid nucleus into endosperm;

 Style dries up /falls off leaving a scar;

 Corolla dries up /falls off;

 Stamen dries up;

 Re: degenerates or distintegrates.

(Maximum 5marks)