

BIOLOGY

Date:05/July/2022

Period: 8H30'-11H30'



END OF TERM III EXAMINATIONS

LEVEL: Senior two

DURATION: 3 HOURS

MARKS: / 100

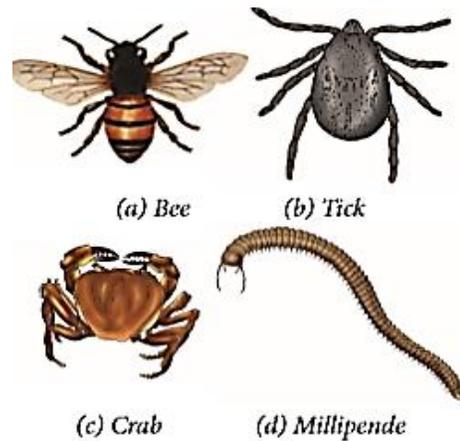
INSTRUCTIONS

1. All questions are compulsory
2. Don't open this question paper until you are told to do so`.
3. Read each question carefully before answering it.
4. Use only a **blue** or black **pen**

Answer all questions

(100 Marks)

1) Use the diagrams below to answer the following questions.



a) Which phylum do the above animals belong? **(2 Marks)**

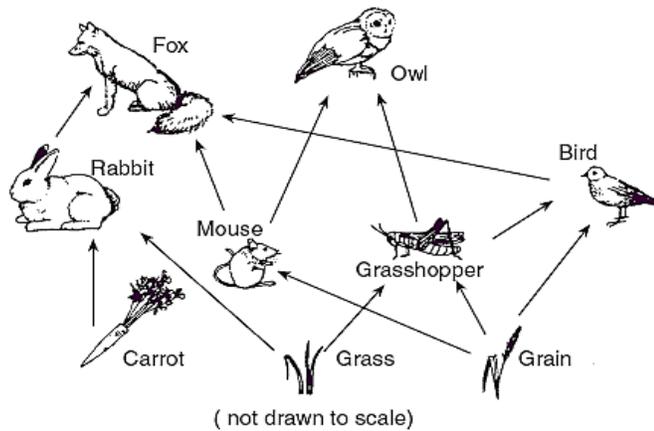
b) Suggest the classes of Bee, Tick, Crab, Millipede **(4 Marks)**

2) Complete the table below **(8 Marks)**

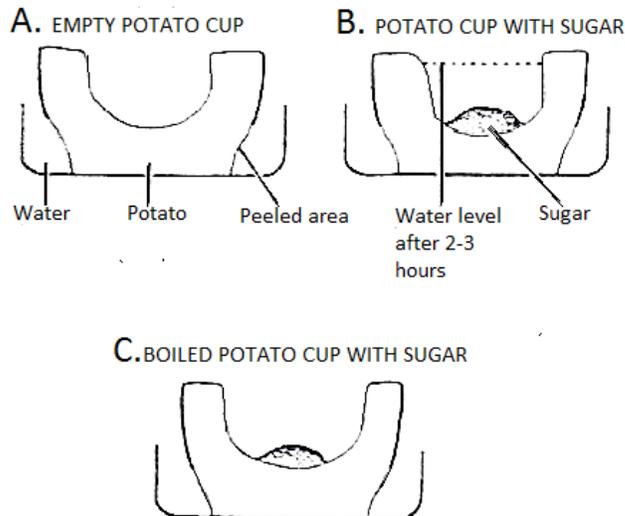
| Animal | Phylum | Class |
|---------------|---------------|--------------|
| Cockroach | | |
| Toad | | |
| Centipede | | |
| Elephant | | |

3) Give at least four examples of kingdom animalia **(4 Marks)**

4) Use the food web below to answer the following questions:



- a) Which trophic level do carrots, grass and grain belong? **(1 Marks)**
- b) What do the arrows on the diagram mean? **(1 Marks)**
- c) Write one food chain with three organisms. **(2 Marks)**
- d) Suggest two organisms, which exist in the same trophic level with mouse on the diagram above. **(2 Marks)**
- e) Using the food web give examples of **(4 Marks)**
- i) Autotroph
 - ii) Primary consumer
 - iii) Omnivore
 - iv) Carnivore
- 5) A senior two student in a certain school carried out an experiment to investigate a certain process that occurs in living tissues. The set up of his/her experiment is arranged as shown below. Interpret the diagrams and use them to answer the questions that follow.



- a) Explain in detail why water gathers in the hollowed portion of potato B **(4 Marks)**
- b) Why is potato A necessary in this experiment? **(2 Marks)**
- c) Explain why water does not gather in the hollowed portion of potato A and C. **(4 Marks)**

What does sugar solution in this experiment correspond to in a cell?

(1 Marks)

- 6) State how each of the following affects the rate of diffusion **(8 Marks)**
- Surface area to volume ratio
 - Diffusion gradient
 - Temperature
 - Thickness of the membrane
- 7) Explain the advantages of active transport over diffusion. **(2 Marks)**
- 8) A given food substance is suspected to contain protein.
- What chemical would you use to confirm the presence of proteins in that food substance **(2 Marks)**
 - Describe the procedure you would use and give expected observation **(3 Marks)**

- 9) Identify the colour of the following reagents **(4 Marks)**
- i) Iodine
 - ii) Benedict's reagent
 - iii) Copper sulphate
 - iv) Dichlorophenol indolephenol (DCPIP)
- 10) a) Define the term enzyme **(1 Marks)**
- b) Give at least five characteristics of enzymes **(5 Marks)**
- c) Explain why only very little amount of enzymes are used. **(4 Marks)**
- d) Photosynthesis is an essential process on earth.
- a) Where does a plant get carbon dioxide, water and light that it needs for photosynthesis? **(3 Marks)**
 - b) What factors limit the rate of photosynthesis in green plants? **(3 Marks)**
- 13) a) Write down a balanced chemical equation for photosynthesis **(2 Marks)**
- b) Explain four conditions necessary for photosynthesis. **(4 Marks)**
 - c) Explain why photosynthesis mainly occur in plant leaves? **(2 Marks)**
- 14) a) Distinguish between transpiration and evaporation **(2 Marks)**
- b) Explain four environmental factors that affect the rate of transpiration. **(4 Marks)**
- 15) What are biological processes that allow plant roots to absorb water and mineral salt? **(3 Marks)**
- 16) How does exercise affect the breathing rate? **(2 Marks)**
- 17) Complete the table to summarise what happens during breathing in humans. **(4 Marks)**

| Part of respiratory system. | Breathing in | Breathing out |
|-------------------------------|--------------|---------------|
| External intercostals muscles | | |

| | | |
|-------------------|--|--|
| Diaphragm muscle | | |
| Volume of thorax | | |
| Pressure in lungs | | |

18) Explain why elimination of water from your body is referred to as excretion **(3 Marks)**

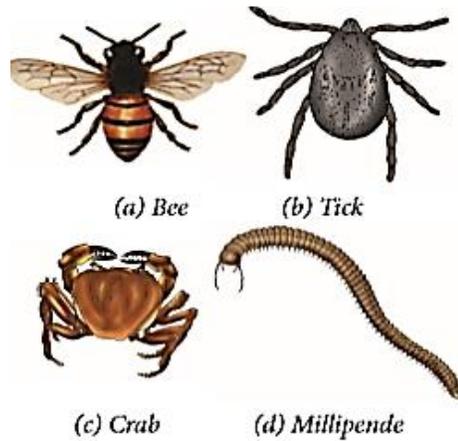
End !!!!

Biology senior two marking schemes

Answer all questions

(100 Marks)

1) Use the diagrams below to answer the following questions.



- a) Which phylum do the above animals belong? **(2 Marks)**
- b) Suggest the classes of Bee, Tick, Crab, Millipede **(4 Marks)**

Answer

- 1. a) Phylum arthropoda **[2 marks]**
- b) Class of each organism is shown in the table below.

| Organism | Class |
|---------------|-----------|
| (a) Bee | Insecta |
| (b) Tick | Arachnida |
| (c) Crab | Crustacea |
| (d) Millipede | Diplopoda |

2) Complete the table below **(8 Marks)**

| Animal | Phylum | Class |
|-----------|--------|-------|
| Cockroach | | |
| Toad | | |
| Centipede | | |
| Elephant | | |

Answer

| Animal | Phylum/division | Class |
|-----------|-----------------|-----------|
| Cockroach | Arthropoda | Insecta |
| Toad | Chordata | Amphibia |
| Centipede | Arthropoda | Chilopoda |
| Elephant | Chordata | Mammalia |

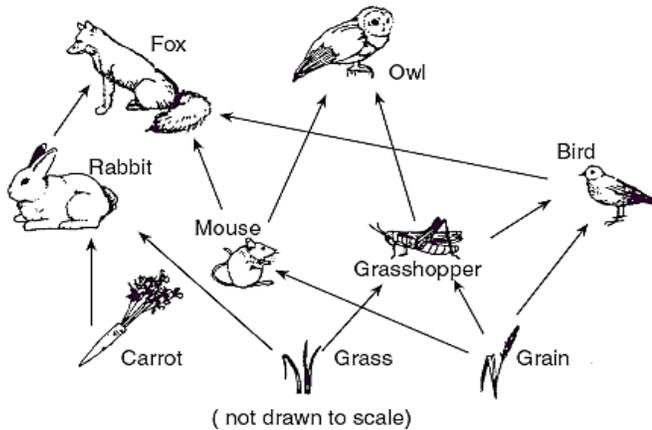
3) Give at least four examples of kingdom animalia

(4 Marks)

Answer

Human
 Cow
 Lizard
 Frog
 Monkey
 Rats
 Etc...

4) Use the food web below to answer the following questions:



a) Which trophic level do carrots, grass and grain belong?

(1 Marks)

b) What do the arrows on the diagram mean?

(1 Marks)

c) Write one food chain with three organisms.

(2 Marks)

d) Suggest two organisms, which exist in the same trophic level with mouse on the diagram above. **(2 Marks)**

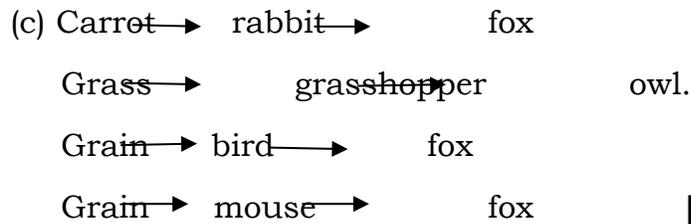
e) Using the food web give examples of **(4 Marks)**

- i) Autotroph
- ii) Primary consumer
- iii) Omnivore
- iv) Carnivore

Answer

(a) First trophic level (producers). **[1 marks]**

(b) Arrows mean eaten by/ transfer of energy /energy flow/fed on by. **[1 mark]**

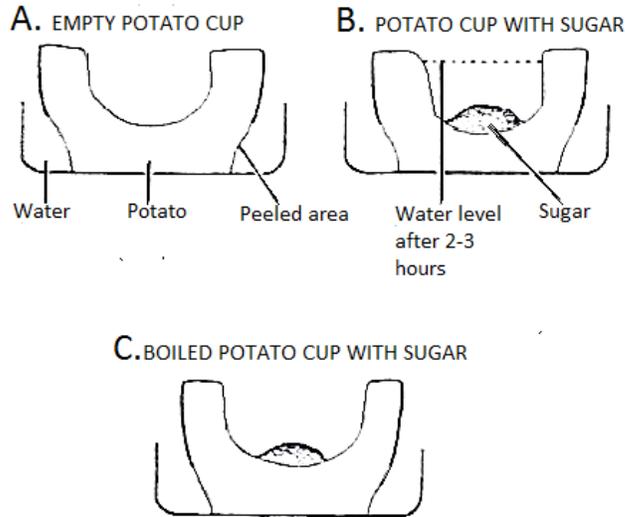


(d) Rabbit, grasshopper and bird **[2 marks]**

(e) **[4 marks]**

| TROPHIC LEVEL | ORGANISMS |
|----------------------|----------------------------------|
| Autotroph | Carrots, grass and grain |
| Primary consumer | Rabbit ,mouse ,grasshopper, bird |
| Omnivore | Bird |
| Carnivore | Bird, fox and owl |

5) A senior two student in a certain school carried out an experiment to investigate a certain process that occurs in living tissues. The set up of his/her experiment is arranged as shown below. Interpret the diagrams and use them to answer the questions that



- Explain in detail why water gathers in the hollowed portion of potato B **(4 Marks)**
- Why is potato A necessary in this experiment? **(2 Marks)**
- Explain why water does not gather in the hollowed portion of potato A and C. **(4 Marks)**

What does sugar solution in this experiment correspond to in a cell?

(1 Marks)

Answer

(a) Water molecules in a petridish move from a region of a high water potential through living cell membrane of potato cube (not boiled) to the region of low water potential in a potato cup containing sugar.

This water dissolves the sugar in the cavity and from a sugar solution in the hollowed/potato cup B. This movement of water molecules is called osmosis. **[4marks]**

(b) Potato cup A serves as a control experiment. **[2marks]**

(c) In hollowed portion of potato A; water does not gather because there is no sugar solution. The cup in potato is empty thus no movement of water molecules to it. **[4marks]**

In potato cup C; water does not gather because the potato cup C was boiled to kill the protoplasm thus no free movement of water molecules. Osmosis occurs in living plant tissues but not dead tissues or cells.

(d) cell sap

[1mark]

6) State how each of the following affects the rate of diffusion (8 Marks)

- (i) Surface area to volume ratio
- (ii) Diffusion gradient
- (iii) Temperature
- (iv) Thickness of the membrane

Answer

i. **Surface area to volume ratio** :The larger the surface area to volume ratio, the faster the rate of diffusion and vice versa. E.g in amoeba, the rate of diffusion is faster because it has a larger surface area to volume ratio.

ii. **Diffusion gradient**: The higher or steeper the concentration difference between the two solutions, the faster the rate of diffusion. Diffusion rate is faster if the diffusion gradient is high. If the two solutions are isotonic, the rate of diffusion is low.

iii. **Temperature**: Temperature (heat) increases random movement of molecules. If temperature increases, the rate of diffusion increases fast due to movement of molecules and when temperature decreases, the rate of diffusing molecules also decreases.

iv. **Thickness of the membrane**: Thin membranes facilitate faster rate of diffusion of molecules than thick molecules. The thin the membrane the faster the rate of diffusion and vice versa.

7) Explain the advantages of active transport over diffusion. (2 Marks)

Answer

Diffusion carry molecules following their concentration gradient and active transport do not. In that way, when their concentration is equal on both side of the membrane (diffusion transport molecules up to 50 %) E.g In the body there are some molecules that can't be lost out in a health individual. So active transport helps to absorb them and none is lost in wastes.

8) A given food substance is suspected to contain protein.

- a) What chemical would you use to confirm the presence of proteins in that food substance (2 Marks)

Describe the procedure you would use and give expected observation
(3 Marks)

Answer

a) **Biuret reagent** ($\text{CuSO}_4 + \text{NaOH}$)

b) **Procedure:**

Put 1cm^3 of a mixture containing egg albumen in a test tube.

Add 1cm^3 of NaOH in the test tube.

Add 4- 5 drops of 1% CuSO_4 in the test tube.

Observation: A purple colouration is observed.

Procedure = **3 marks**

9) Identify the colour of the following reagents **(4 Marks)**

- i) Iodine
- ii) Benedict's reagent
- iii) Copper sulphate
- iv) Dichlorophenol indolephenol (DCPIP)

Answer

- i) Iodine = Brown
- ii) Benedict's reagent = Blue
- iii) Copper sulphate = Blue
- iv) Dichlorophenol indolephenol (DCPIP) = Deep blue

10) a) Define the term enzyme **(1 Marks)**

Answer

Enzymes are organic substance, protein in nature, that speed up the rate of reaction in organic.

b) Give at least five characteristics of enzymes **(5 Marks)**

Answer

- They are protein in nature
- They are inactivated by heat ie de natured
- They require specific PH
- They are catalysts
- They are specific in nature
- They are required in small amounts
- They work very rapidly

- They are not used up in reaction
- The catalysed reaction is revisable

11) Explain why only very little amount of enzymes are used. **(4 Marks)**

Answer

Enzymes are not used up in the reactions they catalyse. They can be reused again and again in other reactions of the same nature.

12) Photosynthesis is an essential process on earth.

- Where does a plant get carbon dioxide, water and light that it needs for photosynthesis? **(3 Marks)**
- What factors limit the rate of photosynthesis in green plants? **(3 Marks)**

Answer

a)

| Substance needed by the plant | Source |
|-------------------------------|-------------------|
| Carbon dioxide | Air in atmosphere |
| Water | From the soil |
| Light | From the sun |

b) Limiting factors for photosynthesis are:

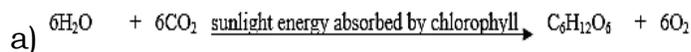
- Light intensity
- Carbon dioxide
- Chlorophyll
- temperature

13) a) Write down a balanced chemical equation for photosynthesis **(2 Marks)**

b) Explain four conditions necessary for photosynthesis. **(4 Marks)**

c) Explain why photosynthesis mainly occur in plant leaves? **(2 Marks)**

Answer



b) Conditions necessary for photosynthesis include:

- **Sun light:** It provides energy needed for photosynthesis to split a water molecule to hydrogen and oxygen
- **Chlorophyll:** It absorbs sun light energy for photosynthesis. In absence of it, photosynthesis does not take place.
- **Carbon dioxide concentration:** It is a raw material for photosynthesis and increase in concentration also increases the rate of photosynthesis.

- **Water:** is a raw material in this process. When it is absent, photosynthesis does not occur.

c) Because leaves contain chlorophyll which absorbs sun light for photosynthesis.

14) a) Distinguish between transpiration and evaporation **(2 Marks)**

c) Explain four environmental **factors** that affect the rate of transpiration. **(4 Marks)**

Answer

a) Transpiration is a process through which plants lose water in form of water vapour to the atmosphere whereas **evaporation** is loss of water in form vapour from any surface to the atmosphere

b) Environmental factors that affect transpiration include:

- **Temperature:** High temperature increase latent heat of vaporization, leading to a higher rate of transpiration.
- **Humidity:** Low humidity leads to increased rate of transpiration. High humidity increases the saturation of air with water vapour hence reducing the rate of transpiration.
- **Wind:** It carries away water vapour, reducing the saturation hence increasing rate of transpiration.
Transpiration rate decreases in still air.
- **Light intensity:** Higher light increases stomatal opening leading to higher rate of transpiration and vice versa.
- **Atmospheric pressure:** The lower the atmospheric pressure, the higher the rate of transpiration and vice versa.
- **Availability of water:** Less water in the soil means less reaches the leaves. This reduces the rate of transpiration.

15) What are biological processes that allow plants roots to absorb water and mineral salt? **(3 Marks)**

Answer

Roots of plants absorb water and dissolved mineral salts by using their root hair cells. Osmosis allows plant roots to absorb water. Active transport allows plant roots to absorb mineral salts.

16) How does exercise affect the breathing rate?

(2 Marks)

Answer

Exercise Increases breathing rate due to increased demand of oxygen in tissues

17) Complete the table to summarise what happens during breathing in humans. **(4 Marks)**

| Part of respiratory system. | Breathing in | Breathing out |
|-------------------------------|--------------|---------------|
| External intercostals muscles | | |
| Diaphragm muscle | | |
| Volume of thorax | | |
| Pressure in lungs | | |

Answer

Changes during breathing in and out in humans:

| Part of respiratory system. | Breathing in | Breathing out |
|-------------------------------|---|--|
| External intercostals muscles | Contracts | Relaxes |
| Diaphragm muscle | Contracts causing it to straighten or flatten | Relaxes causing it to become dome - shaped |
| Volume of thorax | volume the thoracic cavity increases | volume in the thoracic cavity decreases |
| Pressure in lungs | Pressure inside decreases | Pressure increases |

- 18) Explain why elimination of water from your body is referred to as excretion **(3 Marks)**

Answer

Water is lost from the as a waste product of intracellular metabolism any waste product from cells is a excretion product.

End !!!!

BIOLOGY

Alternative to practical

Date: 30/June/2022

Period: 8H30' - 9H30'



END OF TERM III EXAMINATIONS

LEVEL: Senior two

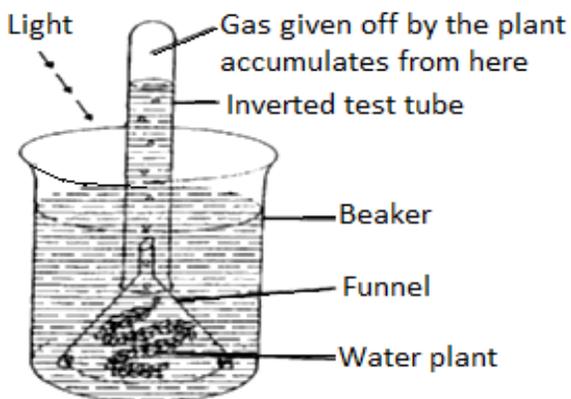
DURATION: 1 Hour

MARKS: /15

INSTRUCTIONS

1. This questions is compulsory
2. Don't open this question paper until you are told to do so`.
3. Read each question carefully before answering it.
4. Use only a **blue** or black **pen**

The figure represents a diagram of an apparatus of an experiments carried out by a S2 students to investigate a gas produced during photosynthesis.



- Name a gas given off by the plant that accumulates on top of inverted test tube. **(1 mark)**
- Briefly explain how you would test for the gas you have named in (a) above **(4 mark)**
- Water in the beaker was mixed with Sodium Hydrogen carbonate. What was the use of Sodium Hydrogen carbonate mixed with water? **(2 mark)**
- Name the raw materials for this experiment and their source **(4 mark)**
- If the experiment was set up in darkness, what result /observation would you expect? **(2 mark)**
- Apart from light, state other two factors that can affect the number of bubbles of a gas produced by the water plant. **(2 mark)**

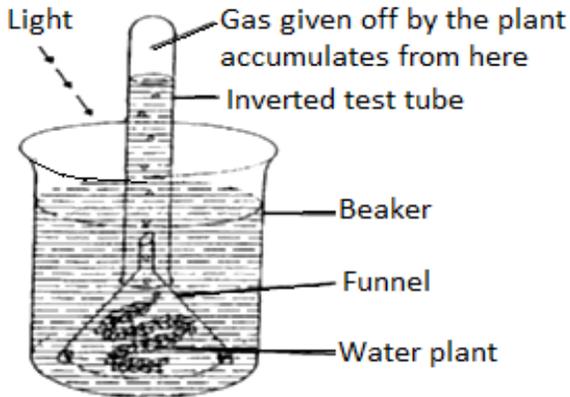
End !!!!

Biology senior two marking schemes

Alternative to practical

Time: 1 hour

The figure represents a diagram of an apparatus of an experiments carried out by a S2 students to investigate a gas produced during photosynthesis.



- Name a gas given off by the plant that accumulates on top of inverted test tube. **(1 mark)**
- Briefly explain how you would test for the gas you have named in (a) above **(4 mark)**
- Water in the beaker was mixed with Sodium Hydrogen carbonate. What was the use of Sodium Hydrogen carbonate mixed with water? **(2 mark)**
- Name the raw materials for this experiment and their source **(4 mark)**
- If the experiment was set up in darkness, what result /observation would you expect? **(2 mark)**
- Apart from light, state other two factors that can affect the number of bubbles of a gas produced by the water plant. **(2 mark)**

Answer

- a) Oxygen gas **[1 mark]**

b) Carefully, remove an inverted test tube containing a gas from the beaker. Insert a glowing splint. It relights a glowing splint. This proves that the gas is oxygen.

[4 marks]

c) To produce Carbon dioxide

[2 marks]

d)

[2x2=4 marks]

| Raw material | Source from this experimental set up |
|----------------|---------------------------------------|
| Carbon dioxide | Produced by Sodium hydrogen Carbonate |
| Water | From the beaker |

e) No bubbles of a gas would be evolved.

[2 marks]

f) Temperature and carbon dioxide concentration

[2marks]

END