

EXAM: Biology and Health Sciences I (Theory)

Date: 24th June 2024

Period: 08:30 AM – 11:30 AM



END OF TERM III EXAMINATION, SCHOOL YEAR: 2023-2024

QUESTION PAPER

GRADE: SENIOR TWO (S2)

LEVEL: ORDINARY LEVEL

OTION: ORDINARY LEVEL

DURATION: 3 HOURS

MARKS:

CAMIS (Theory + Practical):

INSTRUCTIONS:

- 1) Do not open this question paper until you are told to do so.
- 2) This paper consists of **THREE** sections: **A, B** and **C**.
Section A: Attempt **all** questions. **(55 marks)**
Section B: Attempt any **three** questions. **(30 marks)**
Section C: Attempt any **one** question. **(15 marks)**
- 3) The total marks on school report will be the results of adding Theory's and Practical Examination's marks then converted to **40 marks**.
- 4) Use only a **blue** or **black** pen.

Section A: Attempt all questions. (55 marks)

- 1) Which of the following forms a pair of homoeothermic (warm blooded) animals? **(1 mark)**
- a) Mammals and birds.
 - b) Amphibians and fish.
 - c) Reptiles and mammals.
 - d) Amphibians and reptiles.
- 2) Which one of the following describes osmosis? **(1 mark)**
- a) Movement of sugar molecules.
 - b) Movement of water molecules.
 - c) Movement of sugar and salt molecules.
 - d) Evaporation of water.
- 3) Glucose is known as a reducing sugar because: **(1 mark)**
- a) It is a monosaccharide sugar.
 - b) It is a hexose sugar.
 - c) It reduces copper (II) sulphate to copper (I) oxide.
 - d) It is a disaccharide.
- 4) Enzymes are in nature. **(1 mark)**
- a) Starch.
 - b) Protein.
 - c) Carbohydrate.
 - d) Lipid.
- 5) In which part of the respiratory system, gaseous exchange takes place? **(1 mark)**
- a) Alveoli.
 - b) Pharynx.
 - c) Larynx.
 - d) Trachea.
- 6) Amylase is a digestive enzyme found in the saliva. Which of the following food substances does it breakdown? **(1 mark)**
- a) Glucose.
 - b) Starch.
 - c) Protein.
 - d) Carbohydrate.
- 7) Which one of the following form a pair of decomposers? **(1 mark)**
- a) Mucor and amoeba.
 - b) Protozoa and bacteria.
 - c) Bacteria and fungi.
 - d) Tape worm and earthworm.

- 8) A food sample was tested by boiling it in Benedict's solution. It gave an orange precipitate. This showed that the food sample contained: **(1 mark)**
- Reducing sugars.
 - Fats.
 - Proteins.
 - Sucrose.
- 9) Which of the following substances is the most abundant compound in a living cell? **(1 mark)**
- Fats.
 - Water.
 - Proteins.
 - Carbohydrates.
- 10) Why is breast milk a form of immunity for a baby? **(1 mark)**
- Because it has proteins.
 - Because it has vitamins.
 - Because it has antibodies.
 - Because it has carbohydrates.
- 11) Match each food substance listed with the food nutrient it is rich in. **(6 marks)**

Food substance	Chemical nutrient
(a) Cassava	(i) Proteins
(b) Lean meat	(ii) Vitamins
(c) Sugar canes	(iii) Starch
(d) Cabbage	(iv) Lipids
(e) Bones	(v) Sucrose
(f) Butter	(vi) Calcium

- 12) Write **true** or **false** on each statement. **(5 marks)**
- Active transport occurs against a concentration gradient.
 - Active transport does not need energy.
 - During active transport, materials move from high concentration to low concentration.
 - Active transport involves protein carriers.
 - Energy used during active transport is produced in the mitochondria.
- 13) Copy and complete using the words below: **Concentration, active transport, osmosis, against, mitochondria, diffusion, energy, respiration.** **(4 marks)**
-(a)..... and(b)..... depend on a(c).....gradient in the right direction to work. Substances are moved(d)..... a gradient by(e)..... which uses ...(f).....produced by(g).....this process involving the release of energy in a cell is called(h).....

- 14) Complete the following table with the corresponding type of contraceptive method: hormonal or non-hormonal or barrier. (5 marks)**

Method	Type
Spermicide	
Condom	
Implant	
IUD	
Pills	

- 15) For each of the named infections in the table below. Name the causative agent and prevention measures. (6 marks)**

Name of the disease	Causative agent	Preventive measure
Gonorrhoea		
Syphilis		
Chlamydia		

- 16) Marine animals such as reptiles and birds live in extreme salt concentrations hence drink water with a lot of salt. How do they survive in such conditions? (2 marks)**

- 17) Read the following passage and answer to the questions:**

John and Jelly are good friends! They have the same lifestyles, but John does not like sport at all! Jelly goes for every morning marathon of at least 30 minutes a day, they share the same breakfast and go to work by car. John is always complaining of having a problem with his knees!

- a) Why? (1 mark)**
- b) What advice can you give to him? (1 mark)**
- 18) What is the simplest thing you can do to protect yourself from infectious diseases? (2 marks)**
- 19) Explain the key and lock mechanism in antibody-antigen reaction? (3 marks)**
- 20) What would happen if osmosis was not available in plants? (3 marks)**
- 21) Normally, our internal body temperature is kept constant at around 37°C. What could happen in your body if internal body temperatures increase above 40°C? (3 marks)**
- 22) Explain the role of vascular bundles in plants. (2 marks)**
- 23) Differentiate between a source and a sink and give one example for each. (2 marks)**

Section B: Attempt any three questions. (30 marks)

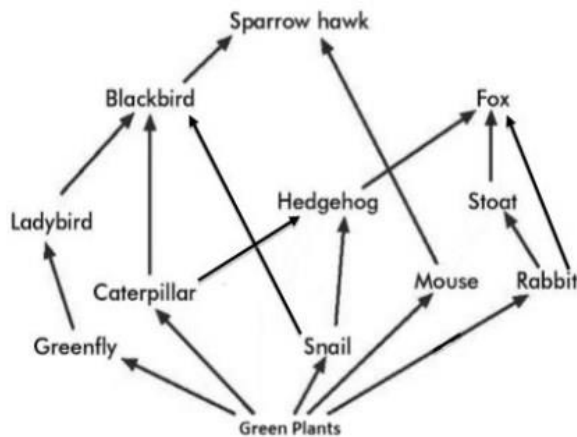
24) A group of senior two students discovered an unknown animal in their study trip with the following features: skin covered with scales, homodont dentition (uniform teeth), 2 pairs of limbs, no external earlap and use lungs for gaseous exchange.

- a)** To which phylum could students classify the above animal? **(1 mark)**
- b)** To which class does it belong? Give a reason to support your answer. **(2 marks)**
- c)** Do you think the above animal has mammary glands? Why? **(3 marks)**
- d)** Suggest other four classes that belong to the same phylum with the discovered animal. **(4 marks)**

25) a) “Without photosynthesis life on earth can stop”. Do you agree or disagree? Give reasons. **(7 marks)**

b) Photosynthesis occurs in leaves more than in roots and stem. Defend this. **(3 marks)**

26) The figure below represents a feeding relationship in a terrestrial ecosystem.



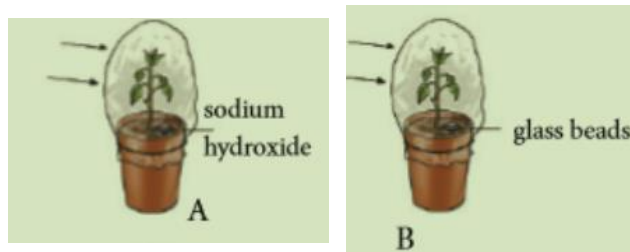
- a)** What name is given to the above diagram? **(2 marks)**
- b)** What do the arrows on the diagram mean? **(1 mark)**
- c)** Green plants are producers. What does this mean? **(2 marks)**
- d)** Name two primary consumers from the above diagram. **(2 marks)**
- e)** Name any two carnivores from the above diagram. **(2 mark)**
- f)** To which trophic level does the hedgehog belong? **(1 mark)**

27) Using a table differentiate inhalation and exhalation phases of gaseous exchange in humans. **(10 marks)**

28) Invertebrates are both useful and harmful to humans. Justify. **(10 marks)**

Section C: Attempt any one question. (15 marks)

29) An experiment was carried out to find out if carbon dioxide is necessary for photosynthesis. Two plants of the same species were de-starched. The plants were then placed in sealed glass containers for 24 hours as shown in figures below and exposed to sunlight. Sodium hydroxide pellets were placed in glass container of plant **A** while glass beads were placed in the glass container of plant **B**. After 24 hours, starch test was carried out on plants **A** and **B**.



- a)** Explain why the plants were de-starched before beginning the experiment. **(1 mark)**
- b)** Why is chlorophyll removed from the leaves before carrying out a starch test? **(2 marks)**
- c)** What is the role of sodium hydroxide in the experiment? **(2 marks)**
- d)** State the expected results of the starch test. **(2 marks)**
- e)** Account for the results stated in (d). **(2 marks)**
- f)** Why was plant **B** included in the experiment? **(2 marks)**
- g)** What role is played by magnesium and nitrate ions in plants? **(4 marks)**

30) The table below shows tests for proteins using Biurets test on different food samples. Analyse the table and complete the observation and deduction. **(15 marks)**

Procedure	Observation	
	Deduction	Milk+ 1cm ³ of
1% copper sulphate solution + sodium hydroxide.		
Lemon juice+1cm ³ of 1% copper sulphate solution + sodium hydroxide.		
Egg albumen + 1cm ³ of 1% copper sulphate solution + sodium hydroxide.		
Suspension of maize +1cm ³ of 1% copper sulphate solution + sodium hydroxide.		
Sugar cane juice +1cm ³ of 1% copper sulphate solution + sodium hydroxide.		

-END-

EXAM: Biology and Health Sciences I (Theory)

Date: 24th June 2024

Period: 08:30 AM – 11:30 AM



END OF TERM III EXAMINATION, SCHOOL YEAR: 2023-2024

MARKING GUIDE

GRADE: SENIOR TWO (S2)
LEVEL: ORDINARY LEVEL
OTION: ORDINARY LEVEL

DURATION: 3 HOURS

MARKS:

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SENIOR TWO END OF TERM (3) EXAMINATIONS 2024 (MARKING GUIDE)

SUBJECT: BIOLOGY AND HEALTH SCIENCES

SECTION A

- 1) Answer: **a)** Mammals and birds. (1 mark)
2) Answer: **b)** Movement of water molecules. (1 mark)
3) Answer: **c)** It reduces copper (II) sulphate to copper (I) oxide. (1 mark)
4) Answer: **b)** Protein. (1 mark)
5) Answer: **a)** Alveoli. (1 mark)
6) Answer: **b)** Starch. (1 mark)
7) Answer: **c)** Bacteria and fungi. (1 mark)
8) Answer: **a)** Reducing sugars. (1 mark)
9) Answer: **b)** Water. (1 mark)
10) Answer: **c)** Because it has antibodies. (1 mark)
11) Matching (6 marks)

Food substance	Chemical nutrient
a)	(iii)
b)	(i)
c)	(v)
d)	(ii)
e)	(vi)
f)	(iv)

- 12) **Answers**
- a)** True. (1 mark)
b) False. (1 mark)
c) False. (1 mark)
d) True. (1 mark)
e) True. (1 mark)
- 13) Correct answers are:
- (a)** Osmosis. (0.5 marks)
(b) Diffusion. (0.5 marks)
(c) Concentration. (0.5 marks)
(d) Against. (0.5 marks)
(e) Active transport. (0.5 marks)
(f) Energy. (0.5 marks)
(g) Mitochondria. (0.5 marks)
(h) Respiration. (0.5 marks)

14) Completion of the table:

Method	Type
Spermicide	Barrier. (1 mark)
Condom	Barrier. (1 mark)
Implant	Barrier. (1 mark)
IUD	No-hormonal. (1 mark)
Pills	Hormonal. (1 mark)

15) Answer: 1 mark*6= (6 marks)

Name of the disease	Causative agent	Preventive measure
Gonorrhoea.	Neisseria gonorrhoea.	Abstinence and safe(protected) sex practice.
Syphilis.	Treponema pallidum.	Abstinence and safe(protected) sex practice.
Chlamydia.	Chlamydia trachomatis.	Abstinence and safe(protected) sex practice.

16) They have developed special salt glands usually on eyes and nostrils. This helps to pass out salt from their bodies by active transport. As a result, excess salt taken in is excreted by active transport to ensure their survival in salty sea water. **(2 marks)**

17) a) This pain can result from: **(any one= 1 mark).**

- Joint muscles relaxation and contraction failure.
- deposit of lipids which are not used in energy production.
- lack of physical exercises.

b) To do physical sport. **(any one= 1 mark).**

To eat healthy.

18) Protection / keeping proper hygiene. **(2 marks)**

19) The antibody has an active site which binds the antigen molecule. The active site is thought to have a fixed structure (the lock), which exactly matches the structure of a specific antigen. **(3 marks)**

20) Answer

- Plants won't be able to take up water from the soil.
- There would not be opening and closing of stomata. This would interfere with transpiration process.
- Movement of water from one cell to another would not be possible. This would cause drying up of plants.

(Any 2 x 1.5 = 3 marks)

21) When temperatures increase above normal i.e above 40°C, enzymes will be denatured. This will slow down rate of metabolism hence life maintaining processes will eventually stop. **(3 marks)**

22) Vascular bundles are two, namely: xylem and phloem vessels which transport different substances as follows:

- **Phloem vessel:** transports manufactured food. **(1 mark)**
- **Xylem vessel:** transports water and minerals. **(1 mark)**

23) Answer:

Source: - Where food is manufactured in a plant (leaves). **(1 mark)**

Sink: - Where food is utilised or stored in a plant (can be stem, leaves, roots, flowers, fruits). **(1 mark)**

SECTION B (30 marks)

24) Answer:

- a) Phylum: Chordata/ vertebrate. (1 mark)
- b) Class: Reptilia. (1 mark)
Reason:
because of 2 pairs of limbs and homodont dentition with scales. (1 mark)
- c) No. (1 mark)
Reason:
because the above animal does not have hair or fur, it does not have external ear flap. It does not belong to class of Mammalia. (2 marks)
- d) Other classes of vertebrates:
- (i) Aves (birds). (1 mark)
 - (ii) Mammalia. (1 mark)
 - (iii) Amphibians. (1 mark)
 - (iv) Pisces. (1 mark)
- 25) a) I agree. (1 mark)

Because:

Photosynthesis is essential for life in the following ways: **any 3 x 2 = 6 marks**

- (i) Conversion of light energy to chemical energy.
 - (ii) Make organic food from simple inorganic raw materials hence avails food to all forms of life.
 - (iii) It releases oxygen as a by-product which is needed by all organisms for respiration.
 - (iv) Prevents accumulation of carbon dioxide hence reduces air pollution.
- b) Because leaves contain a greater number of chloroplasts that contain chlorophyll which absorb sunlight energy and acts as sites for photosynthesis. This takes place in mesophyll cells located in leaves. Stem and roots on the other hand have very few or no chloroplasts hence limited or no photosynthesis. (3 marks)

26) ANSWERS:

- a) Food web. (2 marks)
- b) "Eaten by" or energy flow or food chains. (1 mark)
- c) Make their own food or carry out photosynthesis. (2 marks)
- d) Greenfly/caterpillar/snail/mouse/rabbit. (2 marks)
- e) Ladybird or blackbird or hedgehog or stoat or fox or sparrow hawk. (2 marks)
- f) 3rd or secondary consumer. (1 mark)

27) Differences between **inhalation** and **exhalation** in humans:

Inhalation	Exhalation
External intercostal muscles contract. Internal intercostal muscles relax.	External intercostal muscles relax. Internal intercostal muscles contract.
External intercostal muscles contract. Internal intercostal muscles relax.	Rib cage moves downwards and inwards.
Diaphragm muscles contract and diaphragm flattens.	Diaphragm muscles relax and diaphragm forms a dome shape.
Volume of the thoracic cavity increases.	Volume of the thoracic cavity decreases.
Air pressure in the lungs and thoracic cavity decreases compared to external atmospheric pressure.	Air pressure in the lungs and thoracic cavity increases compared to external atmospheric pressure.
External air is driven into the lungs due to the pressure difference between the inside and the outside.	Air in the lungs is compressed and forced out.
Lungs inflate	Lungs deflate

28) Invertebrates are useful to humans in the following ways:

- (i) Butterflies and bees act as pollinators of flowering plants.
- (ii) Bees make honey.
- (iii) Lobsters, grasshoppers, ants and prawns are used as food.
- (iv) Biological agents in pest control.
- (v) Molluscs such as snails make shells for decoration.
- (vi) Biological research in study of anatomy **e.g.** cockroach.
- (vii) Manufacture of animal feeds **e.g.** poultry feed.
- (viii) Invertebrates such as earthworms and ants aerate the soil.

(any 6 x 1 = 6 marks)

However, most invertebrates are harmful to humans as follows:

- (i) Aphids destroy crops such as maize, coffee and cassava in the fields while weevils destroy stored grains.
- (ii) Some arthropods cause harm and injury to human beings **e.g.** some are poisonous if they bite, for example, spiders, wasps, centipede and crabs.
- (iii) They parasites like tape worms, round worms, hook worms etc.
- (iv) They are vectors of diseases such as houseflies, tsetse flies, snails and ticks.
- (v) Ticks transmit diseases in animals; for **e.g.** East Coast Fever
- (vi) Mosquitos transmit malaria.
- (vii) Tsetse flies transmit trypanosomiasis in human beings and Nagana in cattle.

(any 4 x 1 = 4 marks)

SECTION C: (15 marks)

29) Answer:

- a) To remove traces of starch before the experiment. **(1 mark)**
- b) To observe changes clearly. **(2 marks)**
- c) Absorb carbon dioxide. **(2 marks)**
- d) Positive for starch. **(2 marks)**
- e) Photosynthesis took place. **(2 marks)**
- f) Control experiment. **(2 marks)**
- g) Role of:
 - (i) magnesium ions: synthesis of chlorophyll. **(2 marks)**
 - (ii) nitrate ions: synthesis of plant proteins. **(2 marks)**

30) Answers:

Observation	Deduction
The solution changes from blue to purple.	Proteins are present.
The solution remains blue.	Proteins are absent.
The solution changes from blue to purple.	Proteins are present.
The solution remains blue.	Proteins are absent.
The solution remains blue.	Proteins are absent.

On each test: award 2 for observation and 1 mark for deduction.

Total: 3x 5 = 15 marks

**EXAM: Biology and Health Sciences I
(Alternative to Practical Examination)**

Date: 25th June 2024

Period: 08:30 AM – 10:00 AM



END OF TERM III EXAMINATION, SCHOOL YEAR: 2023-2024

QUESTION PAPER

GRADE: SENIOR TWO (S2)
LEVEL: ORDINARY LEVEL
OTION: ORDINARY LEVEL

DURATION: 1:30 MINUTES

MARKS:

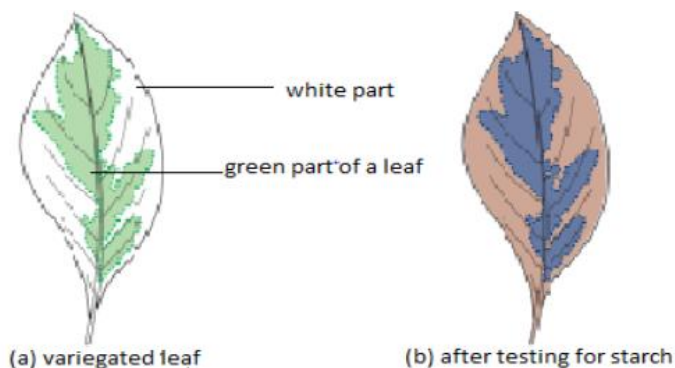
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INSTRUCTIONS:

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- 5) Rules for biological drawings must be respected.

Question: The figure below represents a leaf before and after a certain experiment to investigate a condition necessary for photosynthesis.

Before a variegated leaf was removed from the potted plant to test for starch, the potted plant was destarched for 48 hours by keeping it in darkness and later exposed to sunlight for 6 hours.



- a) What do you understand by the term Variegated leaf? **(2 marks)**
- b) Which condition of photosynthesis was being investigated in the experiment above? **(2 marks)**
- c) Why was the potted plant kept in darkness for 48 hours before the experiment? **(4 marks)**
- d) Why is a variegated leaf suitable to use in this experimental set up? **(4 marks)**
- e) Why was the potted plant exposed to light before removing a variegated leaf for starch test? **(4 marks)**
- f) What conclusion can you draw from the above observation after testing for starch? **(4 marks)**

-END-

**EXAM: Biology and Health Sciences I
(Alternative to Practical Examination)**

Date: 25th June 2024

Period: 08:30 AM – 10:00 AM



END OF TERM III EXAMINATION, SCHOOL YEAR: 2023-2024

MARKING GUIDE

GRADE: SENIOR TWO (S2)
LEVEL: ORDINARY LEVEL
OTION: ORDINARY LEVEL

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S.2 BIOL MARKING SCHEME FOR END OF TERM 3 EXAMINATION 2024

SUBJECT: BIOLOGY AND HEALTH SCIENCES (ALTERNATIVE TO PRACTICAL)

- a) Variegated leaf is a plant leaf with patches i.e a leaf with green parts containing chlorophyll and non-green parts without chlorophyll. **(2 marks)**
- b) Chlorophyll is necessary for photosynthesis. **(2 marks)**
- c) To remove starch from the plant. **(4 marks)**
- d) Because a variegated leaf has the white part (with no chlorophyll) which serves as the experiment and a green part (with chlorophyll) serves as a control experiment. **(4 marks)**
- e) To allow a potted plant carry out photosynthesis for 6 hours. **(4 marks)**
- f) Chlorophyll is necessary for photosynthesis because green parts of the plant that contains chlorophyll showed a positive test for starch and a white part showed a negative test for starch. **(4 marks)**