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Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2024

LIFE SCIENCES P1

MARKS: 150

TIME: 2½ hours

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ILFSCE1

This question paper consists of 14 pages.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK provided.
3. Start the answer to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and labelled them in blue or black ink.
7. Draw diagrams, tables or flow charts ONLY when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You may use a non-programmable calculator, protractor and a compass, where necessary.
11. All calculations to be rounded off to TWO decimal spaces.
12. Write neatly and legibly.

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SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.9) in the ANSWER BOOK, for example 1.1.10 A.

Study the diagram below of an animal's skull and answer QUESTIONS 1.1.1 to 1.1.2.



1.1.1 The above skull is that of a …

A omnivore because of large canines and flat molars.
B carnivore because of reduced molar number.
C omnivore because of canines, incisors and molars are present.
D carnivore because of large canines and sharp molars.

1.1.2 A function of the incisors of such an animal would be to:

A Grind and crush food
B Catch and hold onto prey
C Bite and cut food
D Kill prey and tear-off flesh

1.1.3 Which ONE of the options listed below CORRECTLY summarises the waste product for each of the excretory organs?

	LUNGS	SKIN	LIVER	KIDNEY
A	CO_2	Water	Urine	Bile
B	CO_2	Water	Urea	Urine
C	Water vapour	Bile	Water	Salts
D	Urea	Water	Bile	CO_2

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1.1.4 It is recommended that athletes train at a higher altitude for at least two weeks before a major event to increase the number of red blood cells in their body. The number of red blood cells increase to …

A increase oxygen absorption because of the low oxygen levels in the atmosphere.
B allows the body time to remove excess carbon dioxide due to higher levels of carbon dioxide in the atmosphere.
C increase the amount of carbon dioxide exhaled due to high oxygen levels in the atmosphere.
D allows the body to absorb more oxygen due to high levels of oxygen in the atmosphere.

1.1.5 The reason for boiling the leaf in alcohol during a starch test is to …

A remove chlorophyll.
B show if starch is present.
C break cells walls making cells more permeable.
D kill the plant cells.

1.1.6 If the blood pH decreases, the kidneys will …

A increase the absorption of urea into the blood.
B decrease the secretion of hydrogen ions into the tubules.
C increase the re-absorption of bicarbonate ions into the blood.
D decrease the absorption of sodium ions into the blood.

1.1.7 Study the list below and answer the question.

(i) Water
(ii) CO_2
(iii) Hydrogen (H^+) ions
(iv) Radiant energy

Which of the above listed reactants are required for photosynthesis?

A (i); (ii) and (iv)
B (i); (iii) and (iv)
C (iv) only
D (i) and (iv)

1.1.8 A plant's stomata close when temperatures exceed 30 °C.

What is the most likely factor to limit the photosynthetic rate after this happens?

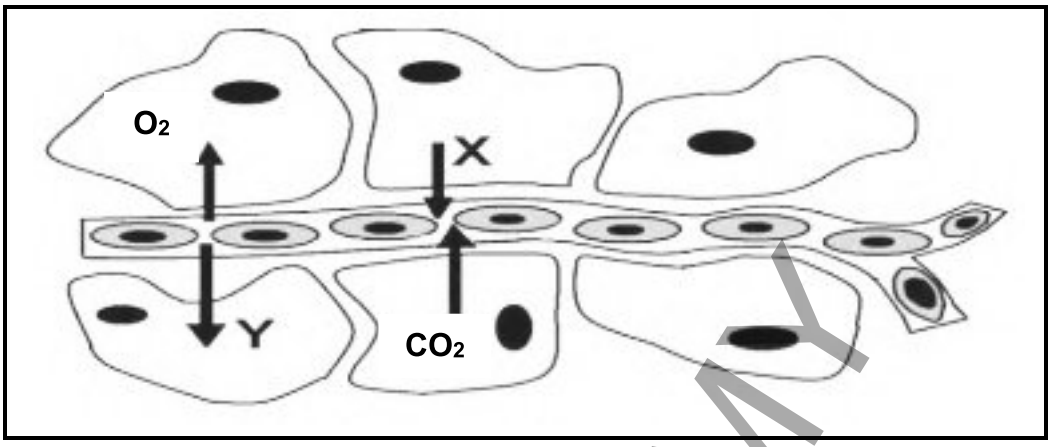
A Oxygen concentration
B Light intensity
C Temperature
D Carbon dioxide concentration

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1.1.9 In the diagram below, identify the process occurring at **X** and **Y** between bodily tissue cells and a capillary.



A Gaseous exchange, active process
B Cellular respiration, passive process
C Gaseous exchange, passive process
D Cellular respiration, active process (9 x 2) (18)

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question numbers (1.2.1 to 1.2.9) in the ANSWER BOOK.

1.2.1 Organelle in plant cells that contain chlorophyll

1.2.2 Breathing muscle responsible for raising the rib cage during inhalation

1.2.3 Tubule responsible for transporting urine from the kidney to the bladder

1.2.4 Structures in the lung where gaseous exchange occur

1.2.5 The main photosynthetic tissue of the leaf

1.2.6 The breakdown of a water molecule into hydrogen and oxygen atoms during photosynthesis

1.2.7 Protective double membrane enclosing the lungs

1.2.8 Gas required for aerobic respiration

1.2.9 Patches of cells in the pancreas that secrete insulin and glucagon

(9 x 1) (9)

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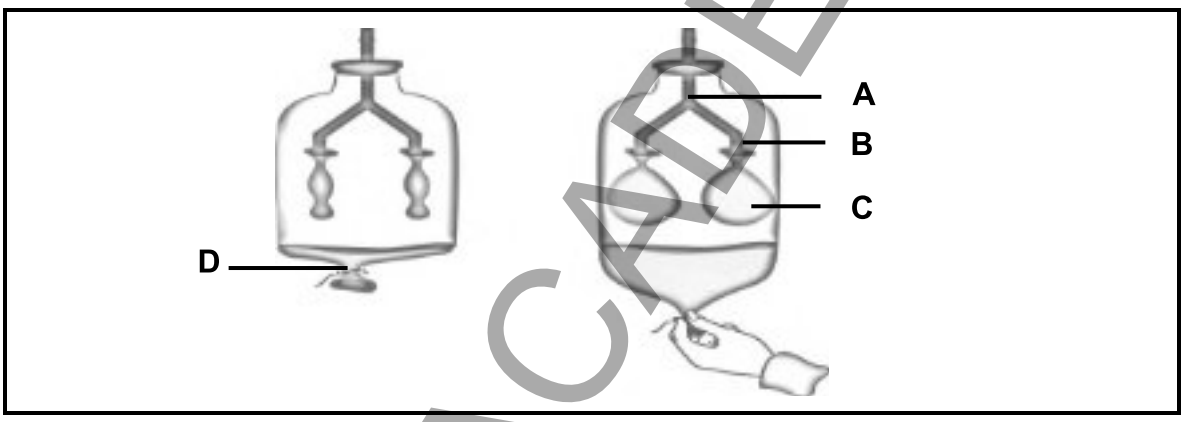
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1.3 Indicate whether each of the following description in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write A only, B only, both A and B or none next to the question numbers (1.3.1 to 1.3.4) in the ANSWER BOOK.

	COLUMN I		COLUMN II
1.3.1	Structure(s) which prevents food particles from entering the lungs	A: B:	Uvula Epiglottis
1.3.2	Region of the alimentary canal where most water is reabsorbed	A: B:	Proximal convoluted tubule Small intestine
1.3.3	Lined with ciliated epithelium	A: B:	Bronchi Trachea
1.3.4	Hormone(s) responsible for osmoregulation	A: B:	Aldosterone Antidiuretic hormone

(4 x 2) (8)

1.4 The model of the lungs below is used to demonstrate the mechanism of breathing.



1.4.1 What structure in the respiratory system is label **A** representing? (1)

1.4.2 Describe the role played by **D** during inhalation. (2)

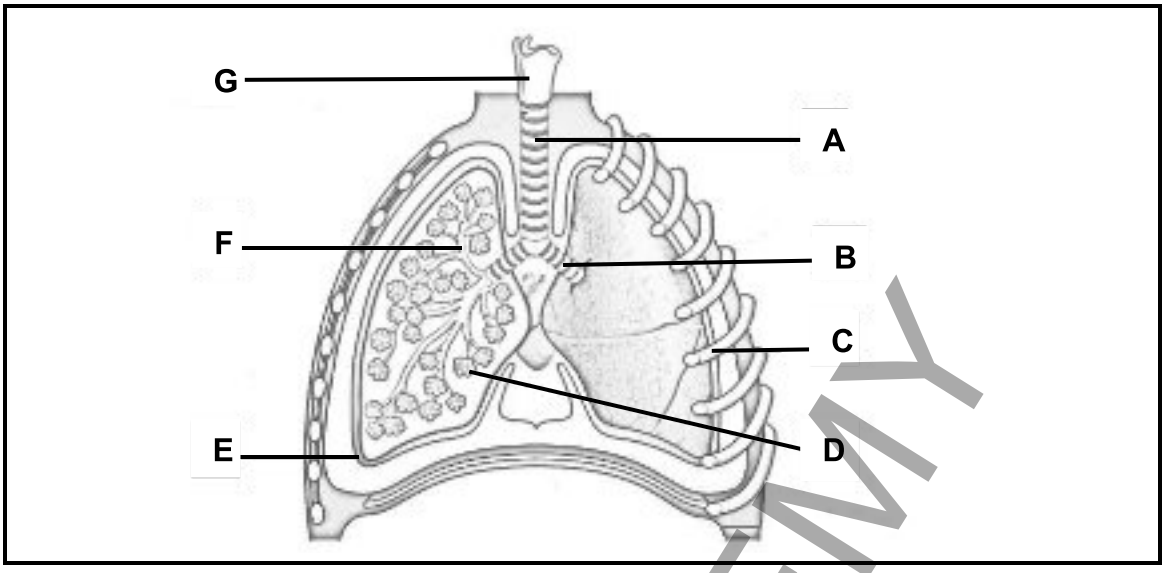
1.4.3 Give TWO reasons why the model does not truly represent the human gaseous exchange system. (2)

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1.5 The diagram below represents part of the human gaseous exchange system.



1.5.1 Supply suitable labels for the following structures:

(a) **B** (1)

(b) **C** (1)

1.5.2 Explain TWO VISIBLE reasons why the above structure could be considered an effective gaseous exchange surface. (4)

1.5.3 Give the LETTER and NAME of the structure that:

(a) Contains cartilaginous cords which vibrate for sound production (2)

(b) Contains C-shaped cartilaginous rings (2)

[50]

TOTAL SECTION A: 50

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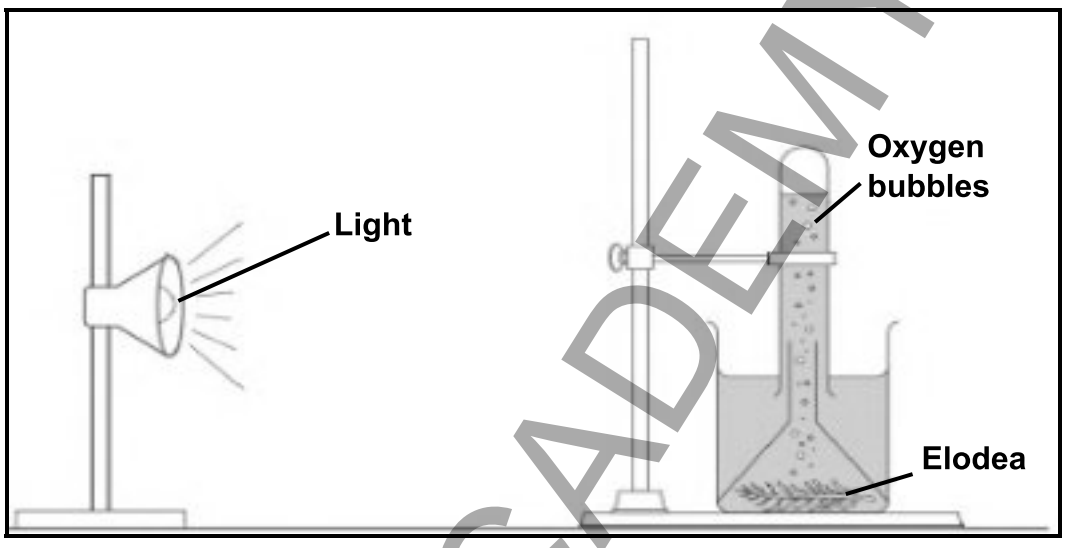
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SECTION B

QUESTION 2

2.1 Scientists conducted a study to determine under which colour of light Elodea (waterweed) grows best. The experiment was conducted as follows:

- The apparatus was set up as in the diagram below
- Three experiments were set-up, each, under a different colour of light (blue, green or red)
- The distance from the light source in each, remained 30 cm



The average time taken to produce 20 oxygen bubbles was recorded in the table below.

COLOUR OF LIGHT	TIME (IN SECONDS) TO RELEASE 20 OXYGEN BUBBLES
Blue	40
Green	160
Red	80

2.1.1 Draw a histogram to represent the above data in the table. (6)

2.1.2 Why did the scientists use oxygen bubble production to look at the growth of the plant? (2)

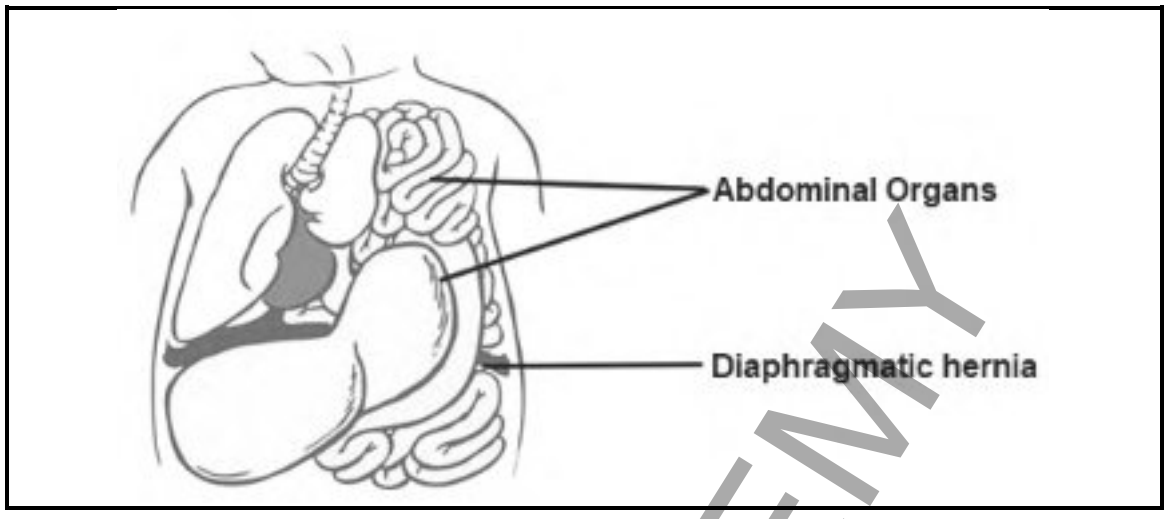
2.1.3 Write the ratio for number of bubbles under green light compared to red light. (2)

2.1.4 Which light source should be recommended to grow plants under? (1)

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2.2 A serious motor vehicle accident resulted in a child having a perforated diaphragm (diaphragmatic hernia). His abdominal organs were pushed into his thoracic cavity. Symptoms included difficulty in breathing and a rapid heart rate.



2.2.1 Discuss how the hole in the diaphragm, caused by diaphragmatic hernia, will affect inhalation. (3)

2.2.2 Describe why the symptom of a rapid heart rate would occur. (5)

2.3 Researchers wanted to determine if living organisms require oxygen for aerobic respiration. Oxygen uptake can be measured using a respirator as shown in the set-up below.

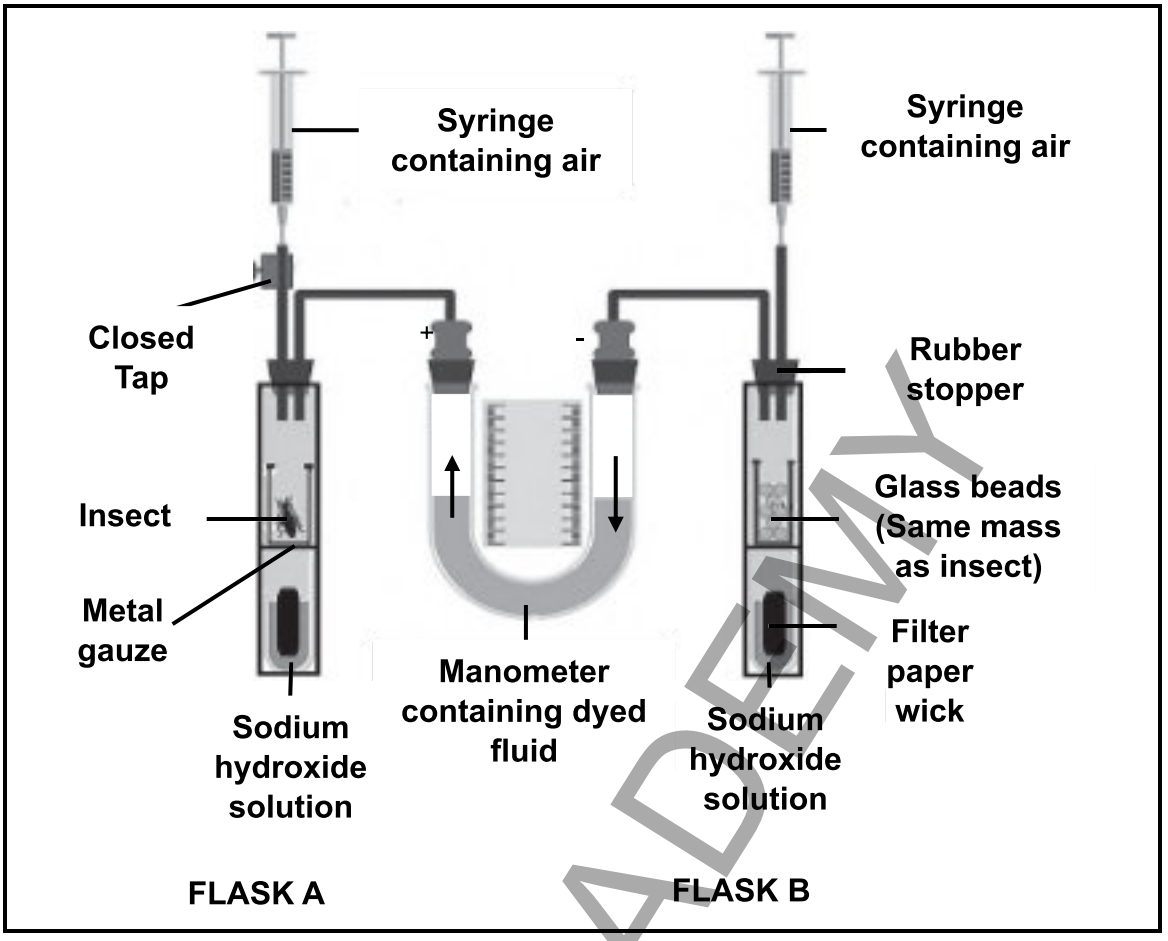
- The apparatus consists of two flasks, one containing the living organism and the other glass beads.
- Both tubes contain the same volume of sodium hydroxide.
- Once the apparatus has been set up, the movement of the coloured liquid in the manometer (U-shaped tube containing a dyed fluid) will indicate how much oxygen is used.
- The decrease in oxygen in one tube increases pressure causing the coloured liquid to move up that tube.

The distance moved by the liquid in the manometer over time was measured to indicate the volume of oxygen taken in by the insect per minute. The findings were recorded in the table below.

	MOVEMENT OF DYE IN MANOMETER OVER TIME (CM)				
	0 min	**15 min**	**30 min**	**45 min**	**60 min**
FLASK A	0	+7	+13	+20	+28
FLASK B	0	-7	-13	-20	-28

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2.3.1 State the aim for this investigation. (2)

2.3.2 Identify the:

(a) Dependent variable (1)

(b) Independent variable (1)

2.3.3 Calculate the percentage increase of oxygen consumption from 30 minutes to 60 minutes in FLASK A. (3)

2.3.4 Explain ONE way how validity was ensured in this investigation. (2)

2.4 Respiration occurs in both aerobic and anaerobic conditions. These processes differ in plant and animal cells. In plant cells anaerobic respiration has been shown to hold several key economic uses and benefits.

2.4.1 Describe the process of the Kreb's cycle. (3)

2.4.2 How does anaerobic respiration differ in plant cells compared animal cells? (4)

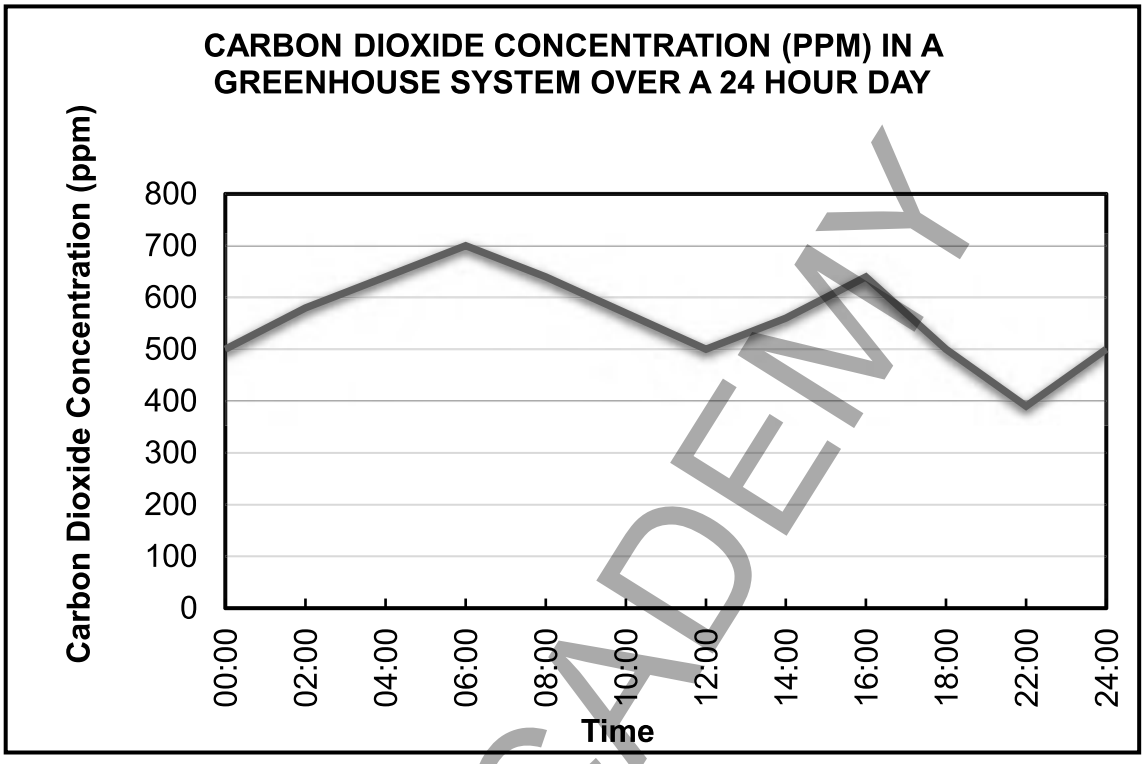
2.4.3 Discuss TWO economic benefits of the use of anaerobic respiration in yeast. (4)

2.4.4 List ONE symptom of prolonged anaerobic respiration in muscles. (1)

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2.5 Greenhouses are enclosed structures used to grow plants under controlled conditions. Carbon dioxide levels are kept high during the day light hours so optimal photosynthesis can take place. The graph below displays the CO_2 concentration in a greenhouse over a 24-hour period. From 12:00 until 16:00 carbon dioxide was pumped into the greenhouse.



2.5.1 Name TWO other environmental conditions that can be controlled in a greenhouse. (2)

2.5.2 What causes the drop in CO_2 concentration from 06:00 to 12:00. (2)

2.5.3 Why should a farmer not exceed the recommended dosage of CO_2. (2)

2.5.4 After 16:00 no further carbon dioxide was pumped into the greenhouse.

Explain what would have caused CO_2 levels to increase from 22:00 until 06:00. (4)

[50]

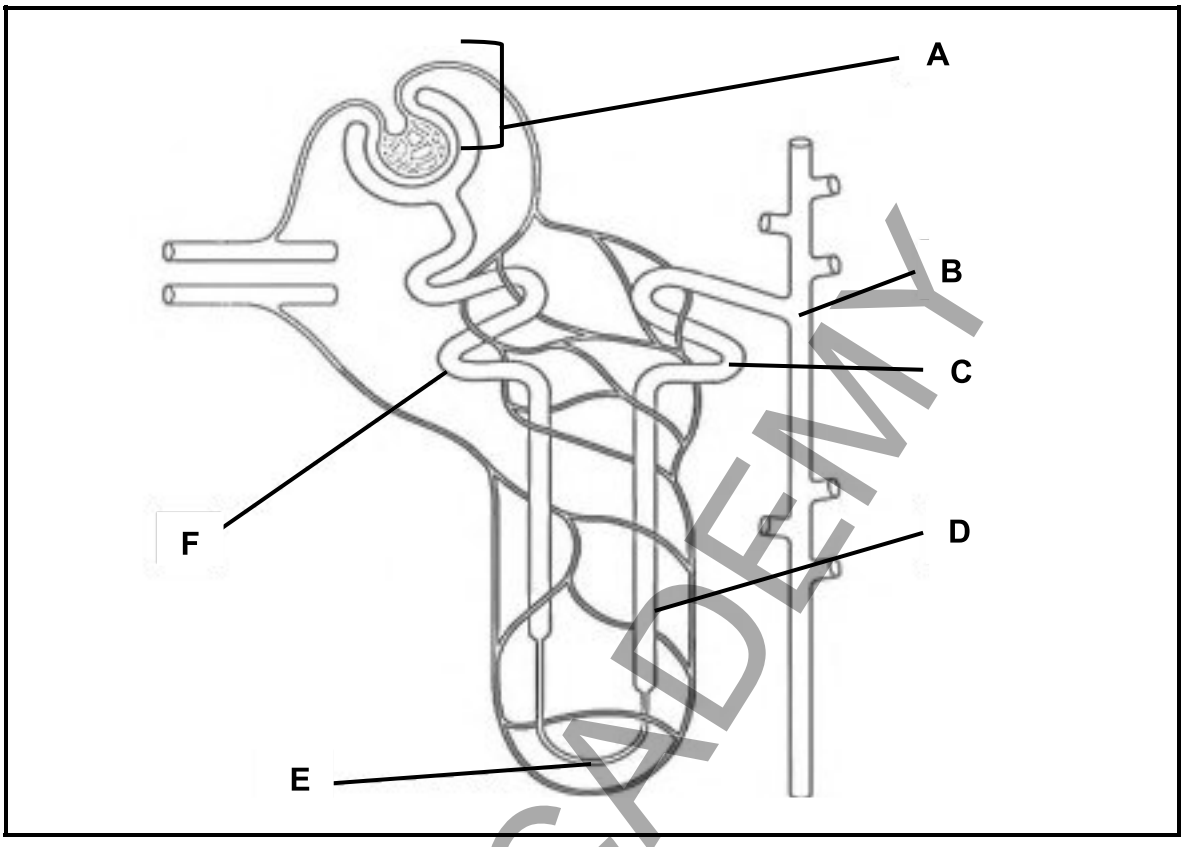
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QUESTION 3

3.1 A line diagram of the nephron is shown below.



3.1.1 Give the LETTER and NAME of the part of the nephron where:

(a) Tubular excretion occurs (2)

(b) Sodium (salt) is actively pumped out (2)

3.1.2 Explain THREE structural adaptations of structure **A** for efficient filtration. (6)

3.1.3 Describe how the reabsorption of the following substance takes place from part **F**:

(a) Glucose (2)

(b) Water (2)

3.1.4 Describe the role of ADH on structure **B** and **C** when the body is dehydrated. (3)

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3.2 The chart below shows the composition of various solutes found in blood plasma, glomerular filtrate, and urine of a patient that came to the hospital after collapsing into a coma.

	PLASMA	FILTRATE	URINE
Glucose	>120	>90	50
Proteins	740–750	0	0
Urea	30	30	>1 200
Sodium	287	262	276
Water	900	900	687
Amino acids	0,5	0,5	0,0

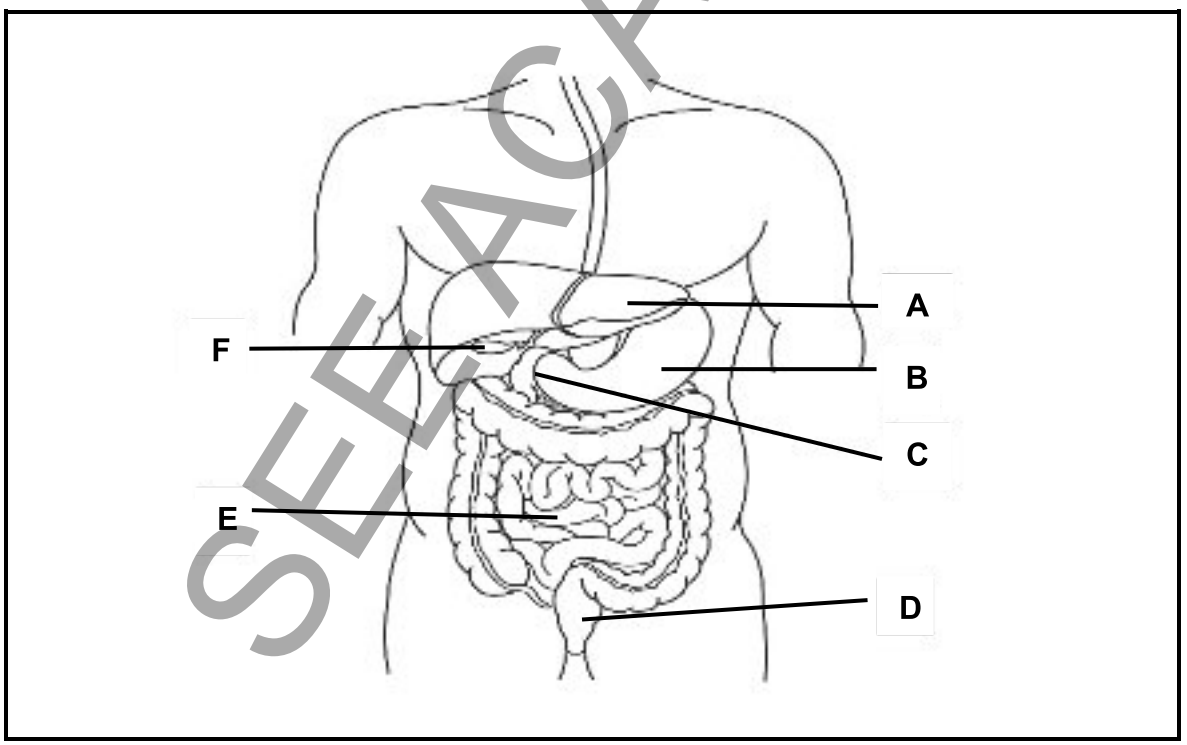
3.2.1 Identify the excretory product in the table above that is produced in the liver from deamination of amino acids. (1)

3.2.2 Explain ONE reason why no proteins are found in the filtrate. (2)

3.2.3 The table indicates that high levels sodium ions were excreted. Explain what causes the high sodium levels in the urine when levels are too high in the blood. (2)

3.2.4 Explain the condition that the patient most likely has, given the glucose levels in the table. (3)

3.3 The diagram below represents the human digestive system.



3.3.1 Provide a suitable label for parts:

(a) **A** (1)

(b) **D** (1)

(c) **F** (1)

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3.3.2 List TWO functions of the HCl produced in structure **B**. (2)

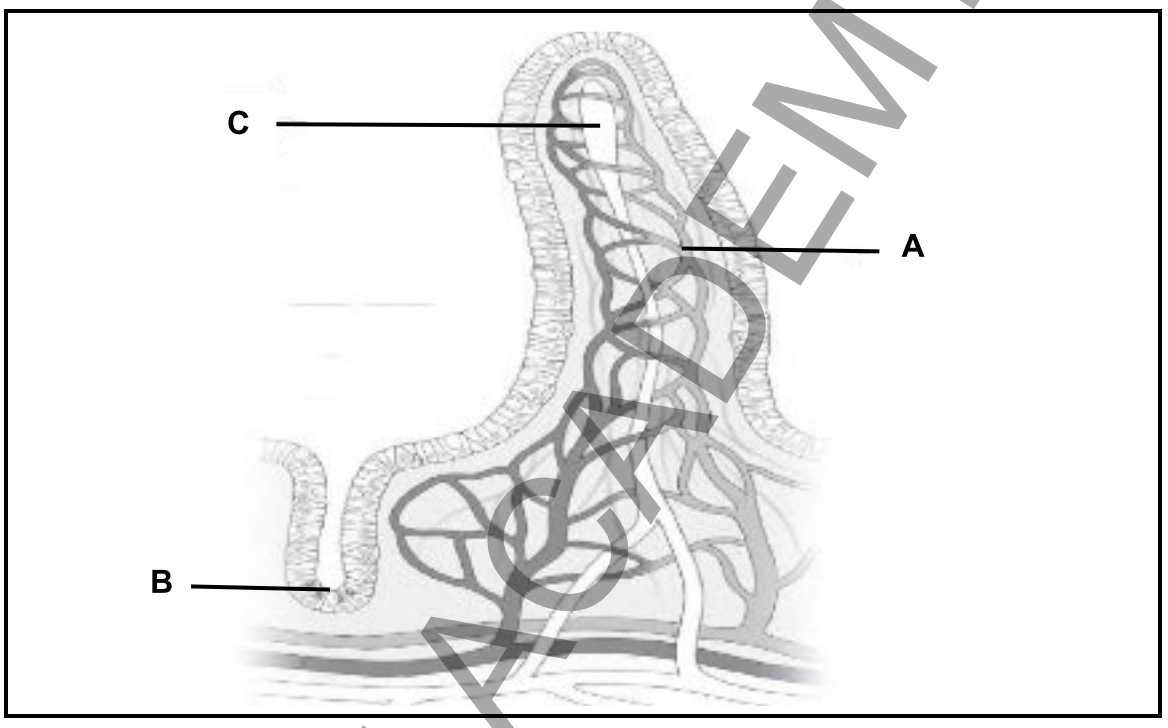
3.3.3 Explain TWO adaptations of part **E** for its effective functioning. (4)

3.3.4 Identify the structure that secretes bile. (1)

3.3.5 Describe ONE role bile serves as it enters the small intestine. (2)

3.3.6 Draw a line diagram of a cross-section through part **E**. (5)

3.4 The end products of digestion are monomers that are easily absorbed. Review the given line diagram of the villus and answer the questions that follow.



3.4.1 Give the NAME of the monomer(s) and give the LETTER where it is absorbed in the villus for each of the following macro-molecules:

(a) Lipids (2)

(b) Carbohydrate (2)

3.4.2 Due to Crohn's disease the villus in the small intestine becomes reduced in size and eventually flattened.

Briefly discuss how Crohn's disease will affect the nutrition and lifestyle of an individual. (4)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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