education

Department:
Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATION - 2006

BIOLOGY P2

STANDARD GRADE

FEBRUARY/MARCH 2006

306-2/2 E

Marks: 150

2 Hours

This question paper consists of 15 pages.

BIOLOGY SG: Paper 2

306 2 2E SG

X05

INSTRUCTIONS AND INFORMATION TO CANDIDATES

Read the following carefully before answering the questions:

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answer to each question at the top of a new page.
4. Number the answers exactly as the questions are numbered.
5. Write neatly and legibly.
6. If answers are not presented according to the instructions of each question, candidates will lose marks.
7. ALL drawings should be done in pencil and labelled in ink.
8. Only draw diagrams and flow charts when requested to do so.
9. The diagrams in the question paper may not necessarily be drawn to scale.
10. The use of graph paper is NOT permitted.
11. Non-programmable calculators, protractors and compasses may be used.

SECTION A

QUESTION 1

1.1 Various possible answers are provided for each question. Indicate the correct answer by writing only the **letter** of your choice next to the relevant question number.

1.1.1 A potometer is used to measure the …

A rate of photosynthesis.
B rate of plant growth.
C rate of water uptake by a plant.
D root pressure of a plant.

1.1.2 Diffusion is the movement of molecules from a region of higher concentration to one of lower concentration. This is applicable to …

A gases only.
B liquids only.
C solutes only.
D gases, liquids and solutes.

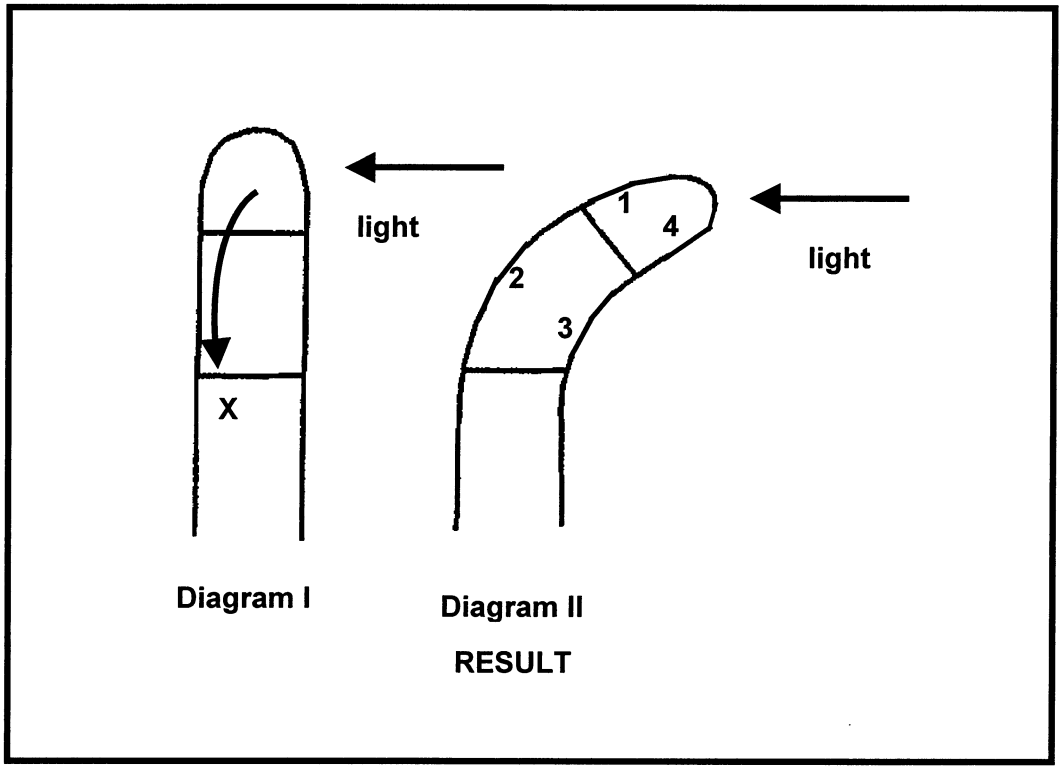
1.1.3 If a plant is repeatedly watered with a salt solution, it is likely to die because …

A water will enter the cell sap of the roots because the water potential of the soil solution is increased.
B water will leave the cell sap of the roots because the water potential of the soil solution is reduced.
C the cell membrane becomes impermeable to water.
D the pores in the cell membrane become blocked.

1.1.4 Water passing into the root travels along the following path:

A Epidermis → cortex → xylem → pericycle
B Epidermis → pericycle → cortex → xylem
C Epidermis → cortex → pericycle → xylem
D Epidermis → xylem → cortex → pericycle

QUESTIONS 1.1.5 and 1.1.6 are based on Diagrams I and II which illustrate the response of the tip of a young shoot to a light stimulus.



1.1.5 The arrow **X** represents the unequal distribution of ...

A water.
B mineral salts.
C chlorophyll.
D auxins.

1.1.6 The curving of the shoot in Diagram II is due to more rapid cell elongation in region(s) ...

A 1.
B 2.
C 1 and 4.
D 3 and 4.

1.1.7 Which of the following is the correct set of functions of auxins?

A Cell plasmolysis and abscission of leaves and fruit
B Cell turgidity and fruit development
C Cell division and cell differentiation
D Cell plasmolysis and cell differentiation (7 x 2) **(14)**

1.2 Give the correct **biological term** for each of the following descriptions. Write only the **term** next to the relevant question number.

1.2.1 Small pores on the leaf edges through which drops of water are released

1.2.2 A state of dormancy in some animals during cold seasons

1.2.3 The system informing the human body of the changes in its internal and external environment

1.2.4 Organic substances transported by blood to target organs

1.2.5 The region in the kidney where renal pyramids are found

1.2.6 The movement of protein-free plasma into the Bowman's capsule as a result of a pressure gradient

1.2.7 The layer in the human eye in which rods and cones are present

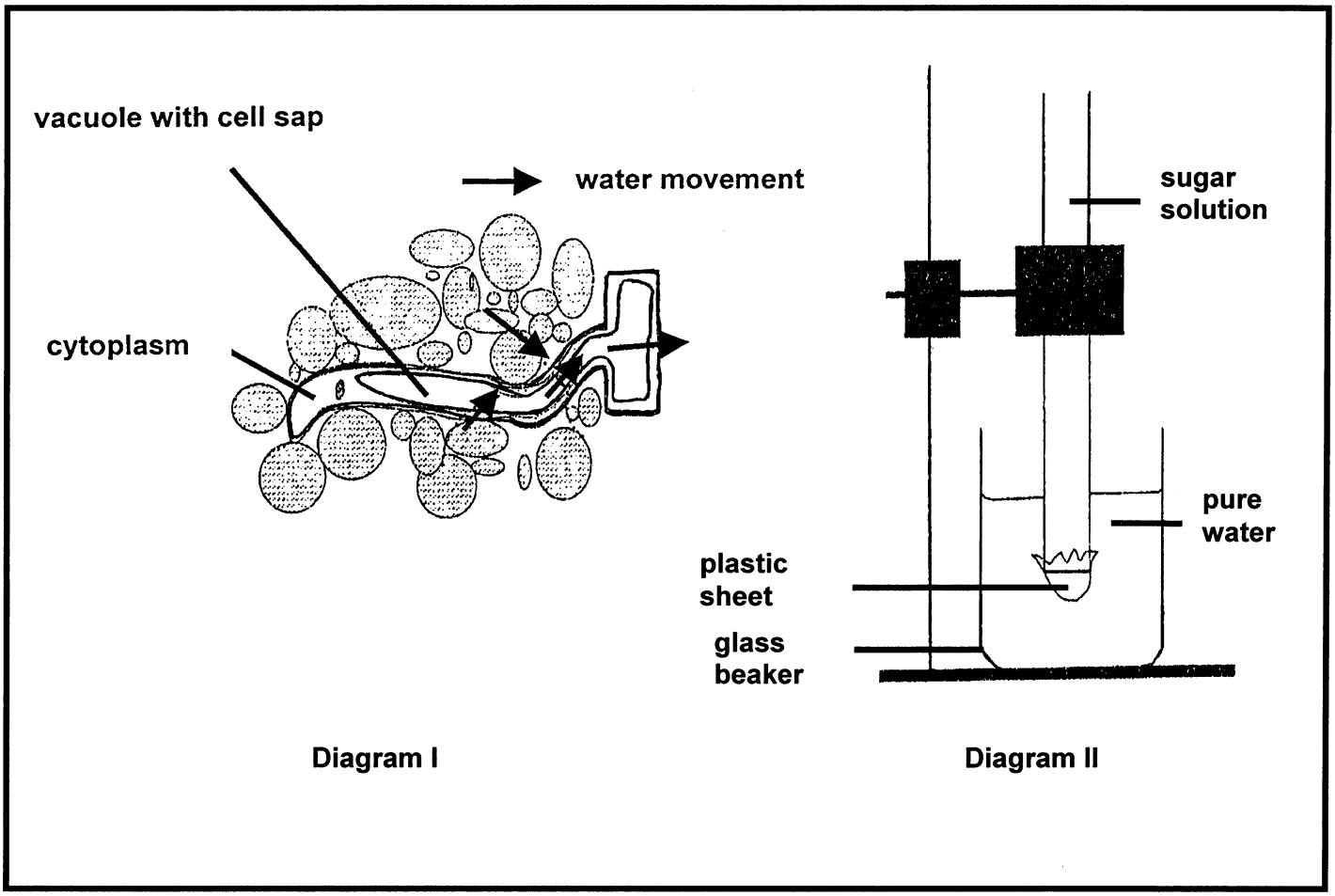
1.2.8 The iris muscles that contract in dim light **(8)**

1.3 Match the description in COLUMN I with the term in COLUMN II. Write only the correct **letter** next to the relevant question number.

COLUMN I	COLUMN II
1.3.1 Liquid surrounding the cells of animal tissue	A Horny layer
1.3.2 Body temperature is maintained by homeostatic mechanism	B Erector muscle
1.3.3 Functional unit of the kidney	C Renal vein
1.3.4 Contracts in cold weather	D Endothermic
1.3.5 Contains a higher level of carbon dioxide than oxygen	E Nephron
	F Ciliary muscle
	G Tissue fluid
	H Ectothermic
	I Malpighian body
	J Gular flutter
	K Pulmonary vein

(5 x 2) **(10)**

1.4 Study the following diagrams and answer the questions that follow.



1.4.1 The apparatus in Diagram II was designed to demonstrate the way water moves into a root-hair as shown in Diagram I. Which liquid in the apparatus represents the cell sap of the root hair? (1)

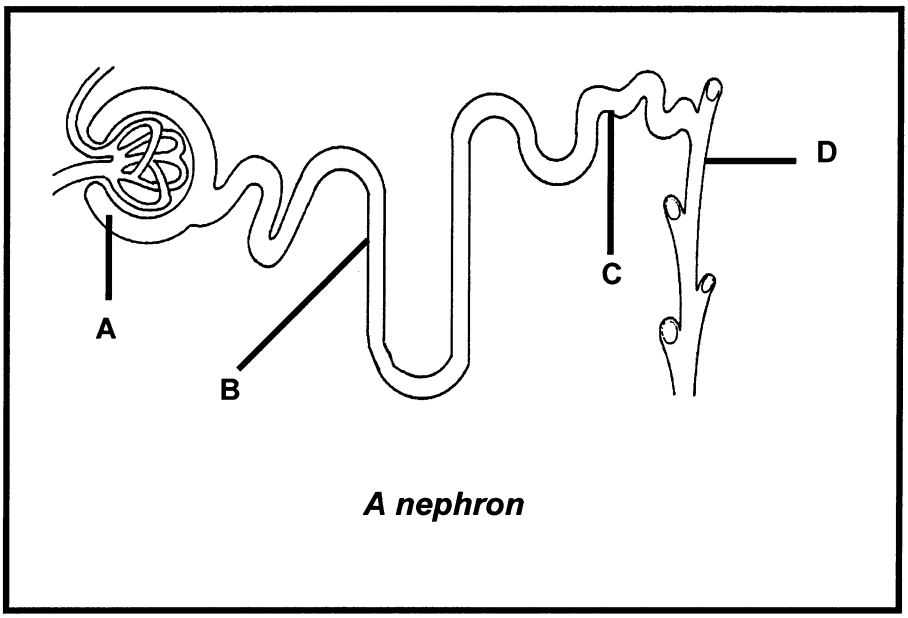
1.4.2 Which liquid in the apparatus in Diagram II has the highest water potential? (1)

1.4.3 There is a serious mistake in the apparatus in Diagram II. Explain the mistake and say how you could correct it. (3)

1.4.4 State TWO observations that could be made if the apparatus was working correctly. (2)

1.4.5 State TWO ways in which the root hair is structurally adapted for its function. (2)
(9)

1.5 Study the following diagram and answer the questions that follow.



A nephron

In a study of the working of a nephron, samples of filtrate were taken from the nephron at parts A, B and C as shown on the diagram. A sample of blood plasma was also taken from the renal artery. In each case, the sample was analysed to find out how much protein, glucose, urea and ammonium ions were present. Use this information to answer the questions that follow.

1.5.1 Identify parts A, B, C and D. (4)

1.5.2 What is the main difference between sample A and normal blood plasma? (2)

1.5.3 Suggest how sample B might differ from its expected composition if the person suffered from diabetes mellitus. (1)

1.5.4 What causes an increase in the concentration of ammonium ions in sample C? (2)
(9)

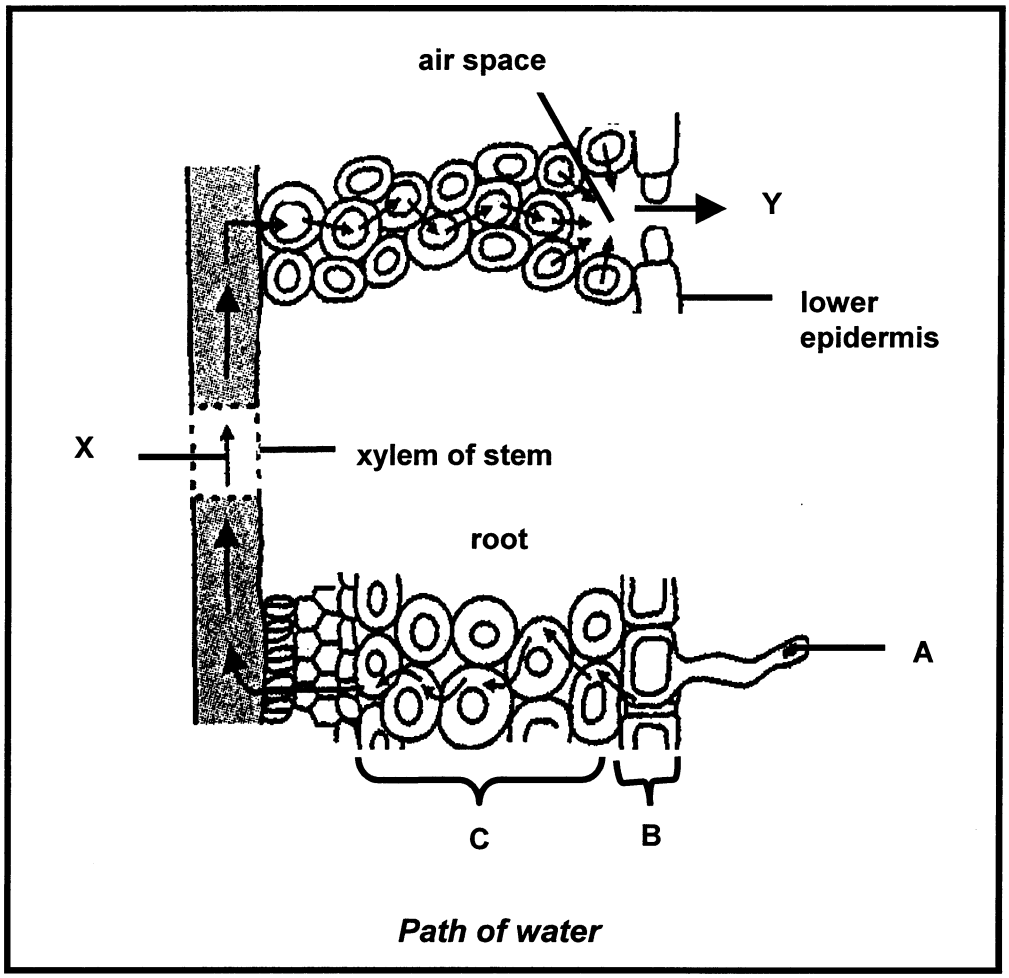
TOTAL QUESTION 1: 50

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Study the following diagram and answer the questions that follow.



2.1.1 Identify parts A, B and C. (3)

2.1.2 What feature of the xylem allows lateral movement of water to occur? (1)

2.1.3 Name THREE factors responsible for the movement of water as indicated by the arrow labelled X. (3)

2.1.4 Describe the movement of water along the mesophyll cells towards Y. (5)
(12)

2.2 The table below shows the distribution and size of stomata on the leaves of five different plants.

Plant	Average number of stomata per cm^2		Average size of stomata (Length x breadth) (µm)
	Upper epidermis	Lower epidermis	
A	4 000	28 000	7 x 3
B	0	16 000	11 x 4
C	2 500	2 300	38 x 8
D	3 500	1 300	18 x 7
E	0	1 400	31 x 8

2.2.1 Which plant shows the most similar distribution of stomata on both surfaces of the leaf? (1)

2.2.2 Based on the number of stomata, which plant is likely to have the highest rate of transpiration per cm^2 of leaf area? (1)

2.2.3 (i) Which plant is most likely to be a xerophyte? (1)

(ii) Explain your answer in QUESTION 2.2.3(i). (2)

2.2.4 (i) Which plant will lose the least amount of water per stomatal pore? (1)

(ii) Explain your answer in QUESTION 2.2.4(i). (2)

2.2.5 State TWO ways in which leaves are adapted to reduce water loss, with regard to their stomata. (2)
(10)

2.3 An investigation was carried out to determine the rates of water loss from plants in still air and in wind. All the other factors were kept constant. The results of the investigation are shown in the table below.

Conditions	Leaves of plants	
	Initial mass (g)	Mass after 15 minutes (g)
X	3,0	2,1
Y	2,0	1,8

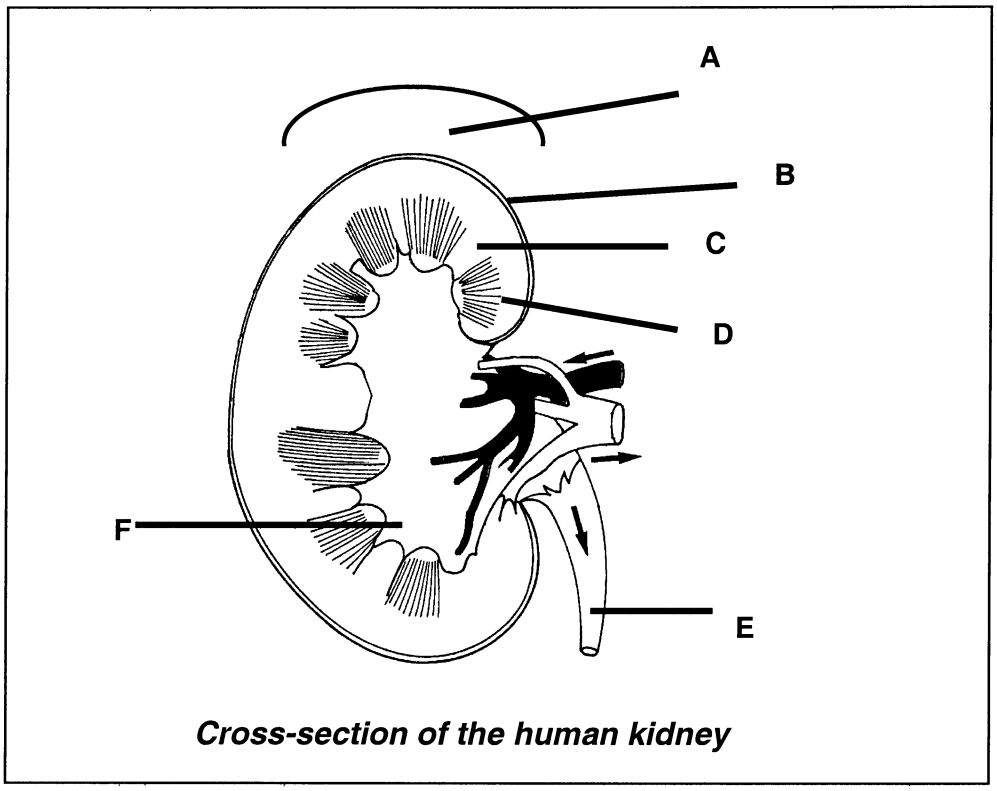
2.3.1 Which condition, X or Y, refers to windy conditions? (1)

2.3.2 Explain your answer in QUESTION 2.3.1. (2)
(3)

TOTAL QUESTION 2: 25

QUESTION 3

3.1 Study the diagram below and answer the questions which follow.



Cross-section of the human kidney

3.1.1 Identify parts C, D, and F. (3)

3.1.2 Give the function of part:

(i) B (1)

(ii) E (1)

3.1.3 Give the **lette**r of the part in which Malpighian bodies occur. (1)

3.1.4 List THREE ways in which the glomerulus is structurally adapted to perform its function. (3)

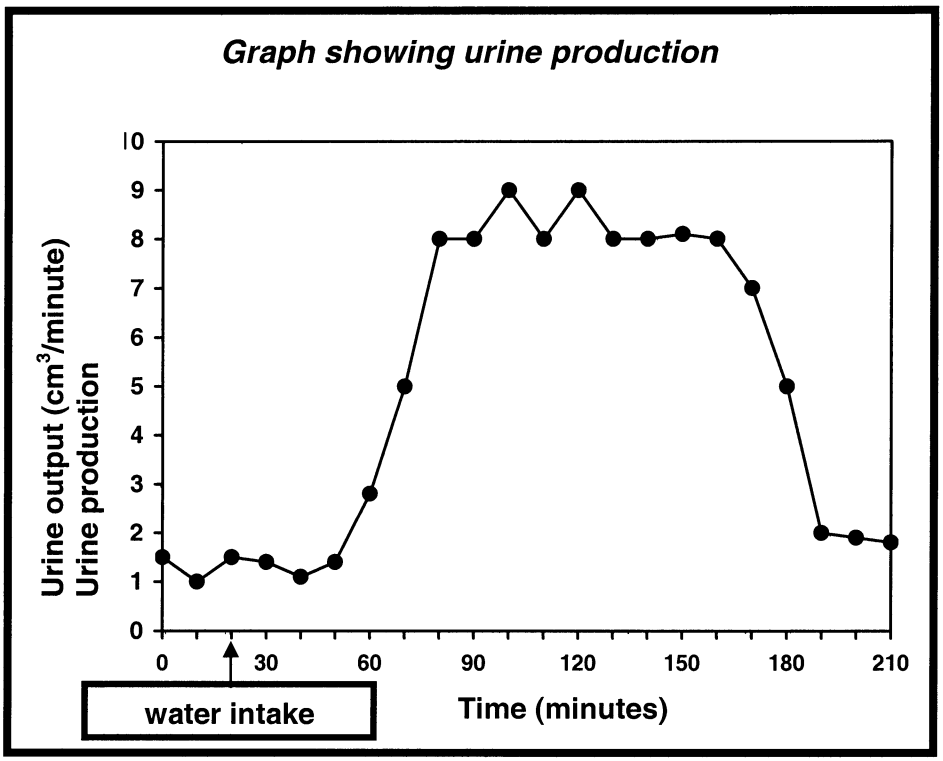
3.1.5 Name ONE hormone secreted by part A but not involved in the control of salt balance in the human body. (1)

3.1.6 Under what circumstances would the hormone mentioned in QUESTION 3.1.5 be secreted? (1)

3.1.7 List FOUR effects of the hormone mentioned in QUESTION 3.1.5 on the human body. (4)

3.1.8 Give TWO functions of the kidney other than pH regulation. (2)
(17)

3.2 Study the graph below and answer the questions that follow.



3.2.1 Name the endocrine gland that plays a role in the regulation of the excretion of water. (1)

3.2.2 What happened to the urine production from about 30 minutes after water intake? (1)

3.2.3 At which time was the urine production the highest? (2)

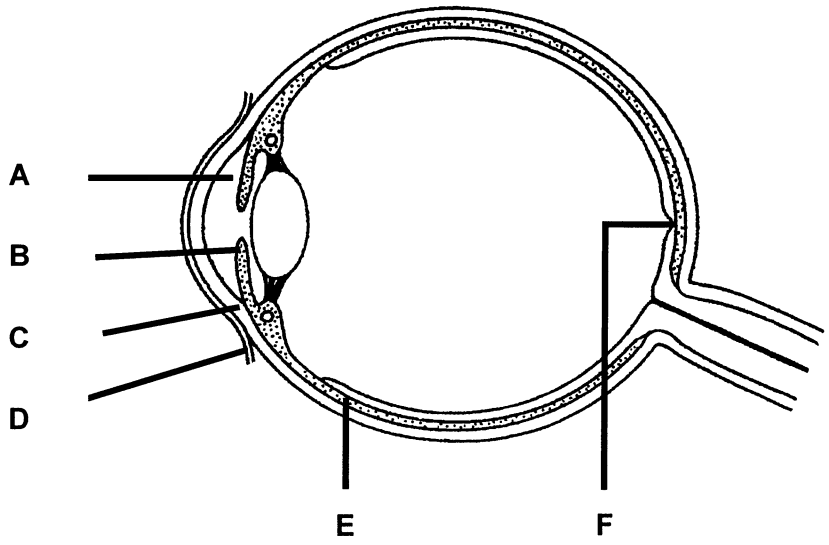
3.2.4 (i) Will the level of ADH be high or low at the 90th minute? (1)

(ii) Explain your answer in QUESTION 3.2.4(i). (3)
(8)

TOTAL QUESTION 3: 25

QUESTION 4

4.1 Study the following diagram and answer the questions that follow.



The human eye

4.1.1 Write the **letter** and the **name** of each of the following:

(i) Liquid that helps maintain the shape of the cornea (2)

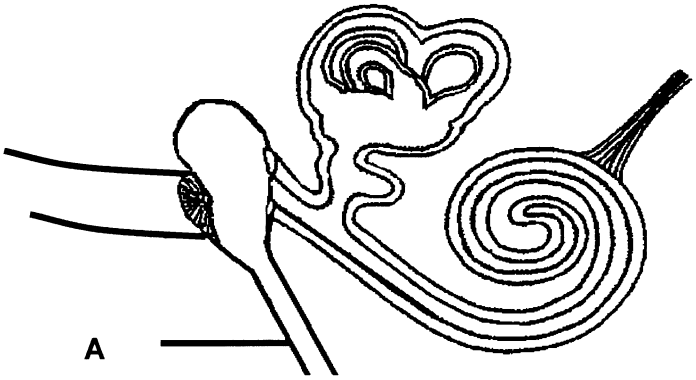
(ii) Region where the clearest image is formed (2)

(iii) Part responsible for the colour of the eye (2)

(iv) Layer that contains blood vessels and a brown pigment (2)
(8)

4.2 Describe the change that occurs in the eye to focus on a bird that is flying off into the distance. **(5)**

4.3 Study the following diagram and answer the questions that follow.



The human ear

4.3.1 In the diagram above, the structures responsible for amplifying sound have been left out. Draw and label only the missing structures. (6)

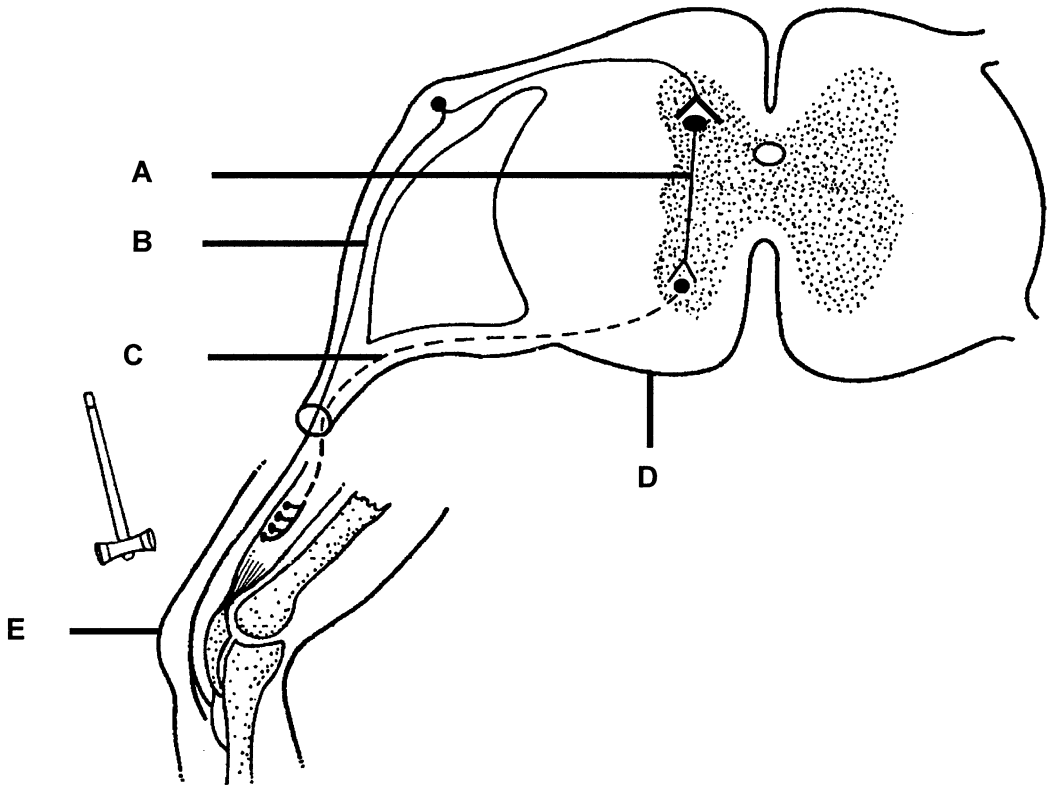
4.3.2 The structures drawn in QUESTION 4.3.1 sometimes become fused and may be removed and replaced by a tiny flexible plastic rod in an operation. Explain why patients who undergo such operations, experience problems if they sneeze or cough. (3)

4.3.3 The structure A in a parachutist is blocked with mucus as a result of a severe cold. Explain why it is not advisable for him to jump in this condition. (3)
(12)

TOTAL QUESTION 4: 25

QUESTION 5

5.1 The following diagram shows the pathway through which impulses are transmitted in bringing about the knee-jerk in humans. Study the diagram and answer the questions that follow.



Reflex arc

5.1.1 Identify the neurons marked A and B. (2)

5.1.2 Write the **letter** and **name** of the structure that is stimulated by the hammer. (2)

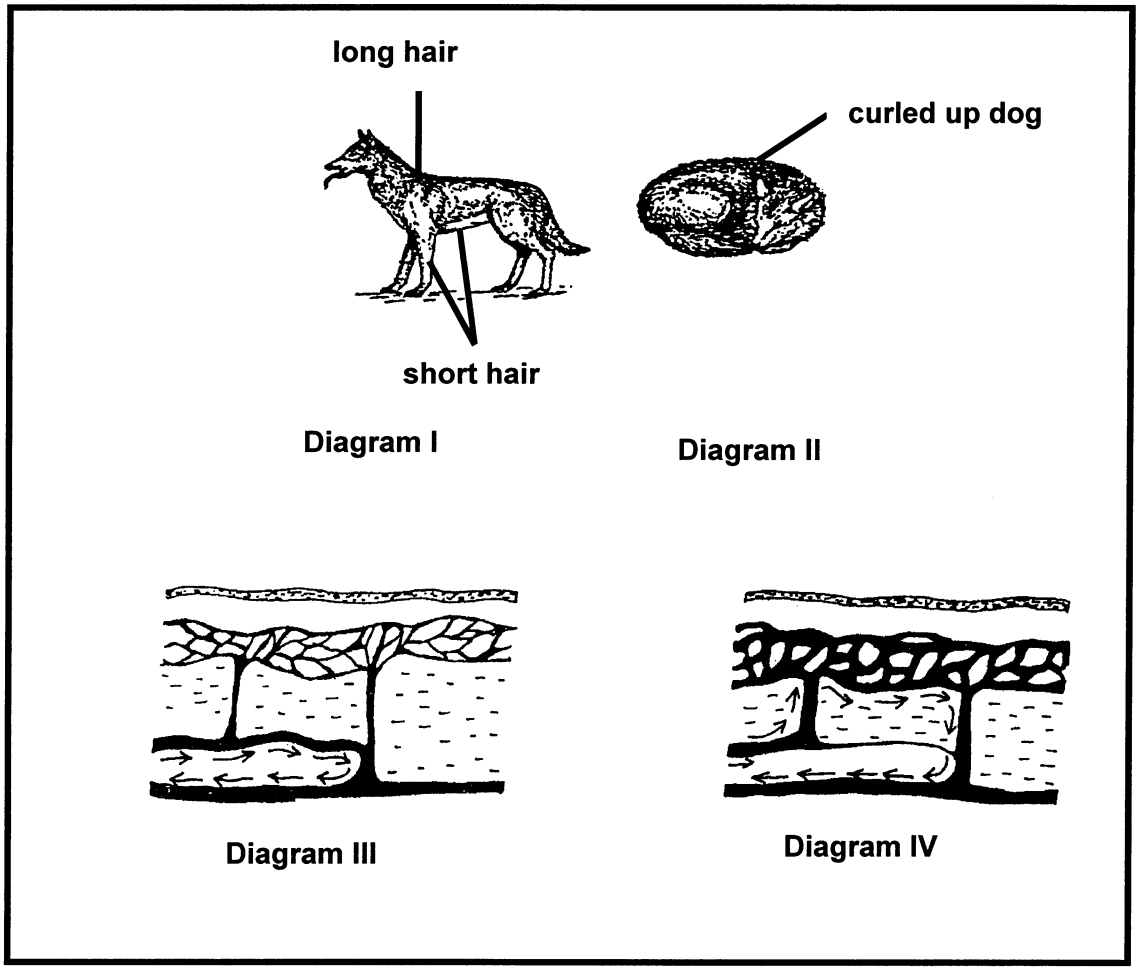
5.1.3 Explain what would happen if part C is severed. (2)

5.1.4 Give TWO examples of reflex actions other than the knee-jerk in humans. (2)

5.1.5 Why are reflex actions important to the human body? (1)
(9)

5.2 Make a flow chart showing a feedback mechanism involving two glands that control thyroxin production in humans. **(7)**

5.3 Diagrams I and II below illustrate two positions of a dog under different environmental conditions. Diagrams III and IV illustrate the effects of these conditions on the skin of a dog.



5.3.1 (i) Under what environmental conditions would the posture of the dog in Diagram II be displayed? (1)

(ii) Explain your answer in QUESTION 5.3.1 (i). (4)

5.3.2 Which Diagram (III or IV) is associated with Diagram I? (1)

5.3.3 Explain your answer in QUESTION 5.3.2. (2)

5.3.4 Which observable behavioural mechanism of controlling body temperature is displayed by Diagram I? (1)
(9)

TOTAL QUESTION 5: 25

TOTAL SECTION B: 100

GRAND TOTAL: 150