29.4 BIOLOGY (231)

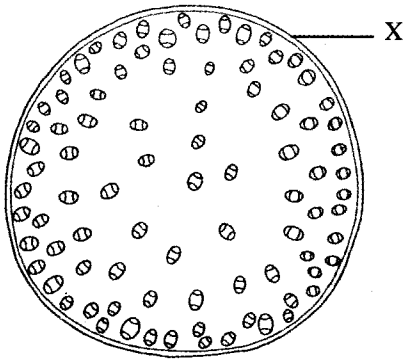
29.4.1 Biology Paper 1 (231/1)

1 State the name given to the study of:

(a) the cell; (1 mark)

(b) microorganisms. (1 mark)

2 The diagram below shows a transverse section of a plant organ.



(a) Name the plant organ from which the section was obtained. (1 mark)

(b) (i) Name the class to which the plant organ was obtained. (1 mark)

(ii) Give a reason for your answer in (b)(i) above. (1 mark)

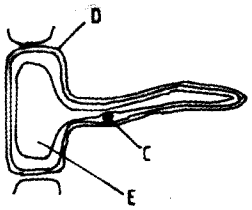
(c) Name the part labelled X. (1 mark)

3 State the functions of:

(a) Ribosomes; (1 mark)

(b) Lysosomes. (1 mark)

4 The diagram below shows a specialised plant cell.



(a) (i) Name the cell. (1 mark)

(ii) Name the parts labelled **D** and **E**. (2 marks)

D .....

E .....

(b) State the function of the part labelled **C**. (1 mark)

5 State **three** ways in which a respiratory surface is adapted to its function. (3 marks)

6 State **one** function for each of the following:

(a) Cerebellum; (1 mark)

(b) Medulla oblongata. (1 mark)

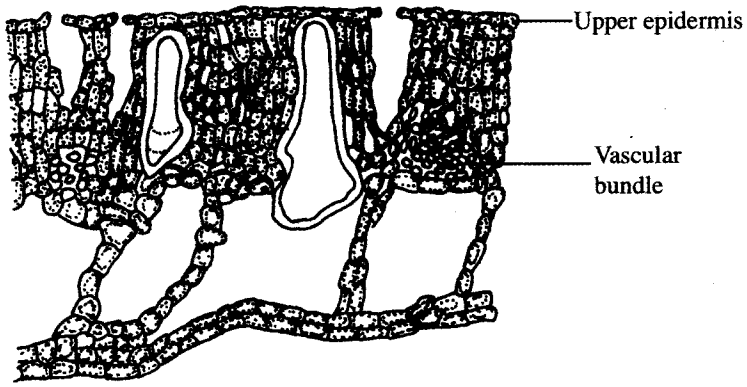
7 Distinguish between haemolysis and plasmolysis. (2 marks)

8 State **three** external differences between chilopoda and diplopoda. (3 marks)

9 State **two** ways in which chloroplasts are adapted to their function. (2 marks)

10 State **two** advantages of hybrid vigour. (2 marks)

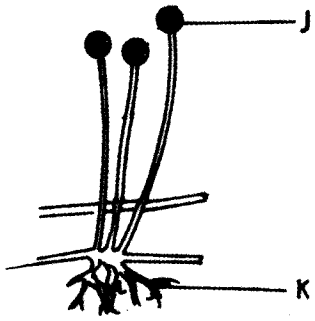
11 The diagram below shows a transverse section of a leaf.



(a) Name the habitat of the plant from which the leaf was obtained. (1 mark)

(b) Give **two** reasons for your answer in (a) above. (2 marks)

12 The diagram below illustrates the structure of bread mould.



(a) Name the part labelled **J**. (1 mark)

(b) State the functions of the structure labelled **K**. (2 marks)

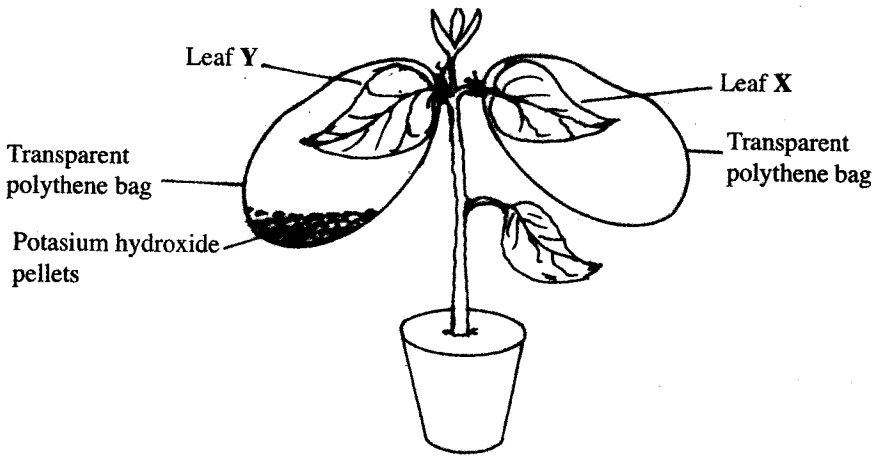
13 What is meant by the following terms?

(a) Habitat; (1 mark)

(b) Ecosystem. (1 mark)

14 Explain why it is not advisable to be in a poorly ventilated room with a burning charcoal stove. (3 marks)

15 A potted plant was kept in the dark for 48 hours. Two leaves **X** and **Y** were treated as shown in the diagram below.



The experimental set-up was kept in sunlight for 6 hours after which a starch test was carried out on the two leaves.

(a) What were the results of the starch test on leaves **X** and **Y**? (2 marks)

X .....

Y .....

(b) Give reasons for your answers in (a) above. (2 marks)

16 What is the role of bile salts in digestion in humans? (2 marks)

17 The following is the dental formula of a certain mammal:

$$i\frac{0}{3}\ c\frac{0}{1}\ pm\frac{3}{3}\ m\frac{3}{3}$$

(a) State the likely mode of feeding for the mammal. (1 mark)

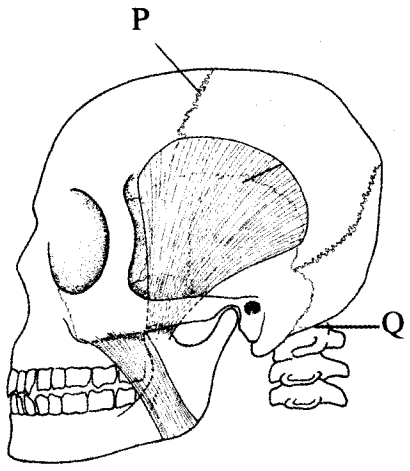
(b) Give a reason for your answer in (a) above. (1 mark)

18 Give **two** reasons why animals have specialised organs for excretion as compared to plants. (2 marks)

19 State the changes that occur in arterioles in the human skin during thermoregulation. (2 marks)

20 State **two** advantages of internal fertilization in humans. (2 marks)

21 The diagram below represents part of the human skeleton.



(a) Name the part labelled **P**. (1 mark)

(b) (i) Name the bone that articulates with the part labelled **Q**. (1 mark)

(ii) What type of joint is formed between the part labelled **Q** and the bone named in (b)(i) above? (1 mark)

22 What is the function of the following structures in the human reproductive organs?

(a) Fallopian tubes. (1 mark)

(b) Epididymis. (1 mark)

(c) Scrotal sac. (1 mark)

23 Explain **three** ways in which red blood cells are adapted to their function. (3 marks)

24 (a) State **two** ideas proposed by Lamark in his theory of evolution. (2 marks)

(b) Why is Lamark's theory not acceptable? (1 mark)

25 State **three** factors that contribute to the deceleration phase in the population curve of an organism. (3 marks)

26 State **one** survival value for each of the following in plants:

(a) Thigmotropism in stems; (1 mark)

(b) Geotropism in roots. (1 mark)

27 (a) What is meant by the term non-disjunction? (1 mark)

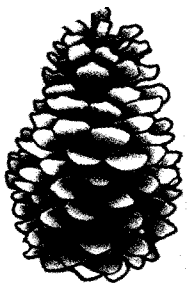
(b) Give an example of a genetic disorder caused by:

(i) non-disjunction; (1 mark)

(ii) gene mutation. (1 mark)

28 State **three** structural differences between arteries and veins. (3 marks)

29 The diagram below represents a female cone.



(a) Name the subdivision of the plant from which the cone was obtained. (1 mark)

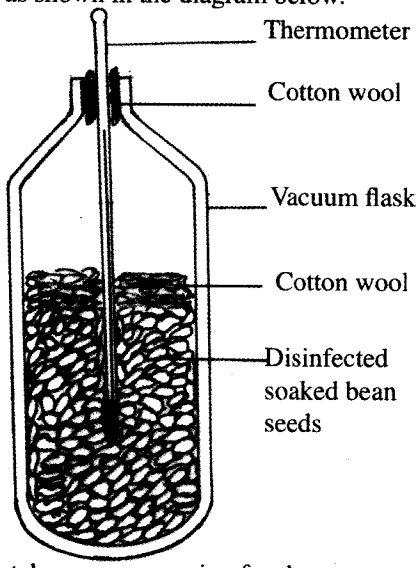
(b) Other than the presence of cones, name **two** other external features that identify plants in the subdivision named in (a) above. (2 marks)

30 What is meant by the term apical dominance? (3 marks)

SECTION A (40 marks)

*Answer **ALL** the questions in this section in the spaces provided.*

1 In an experiment, disinfected soaked bean seeds were put in a vacuum flask which was then fitted with a thermometer as shown in the diagram below.



The temperature readings were taken every morning for three consecutive days.

(a) Which process was being investigated? (1 mark)

(b) (i) What were the expected results? (1 mark)

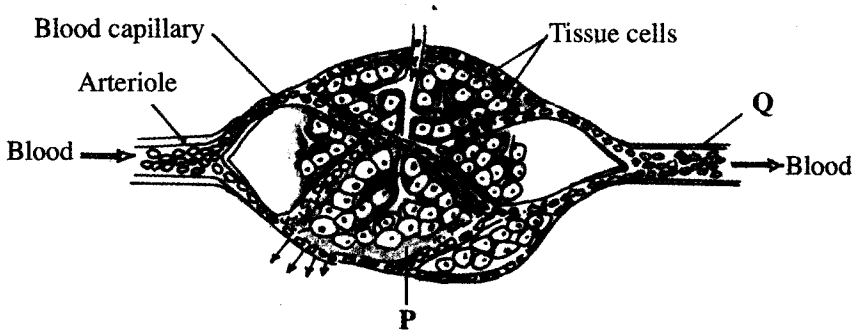
(ii) Account for the answer in (b)(i) above. (2 marks)

(c) Why were the seeds disinfected? (2 marks)

(d) Why was a vacuum flask used in the set-up? (1 mark)

(e) How would a control for this experiment be set? (1 mark)

2 The diagram below shows blood circulation in a mammalian tissue.



(a) Name the parts labelled **P** and **Q**.

P ..... (1 mark)

Q ..... (1 mark)

(b) Name the substances that are:

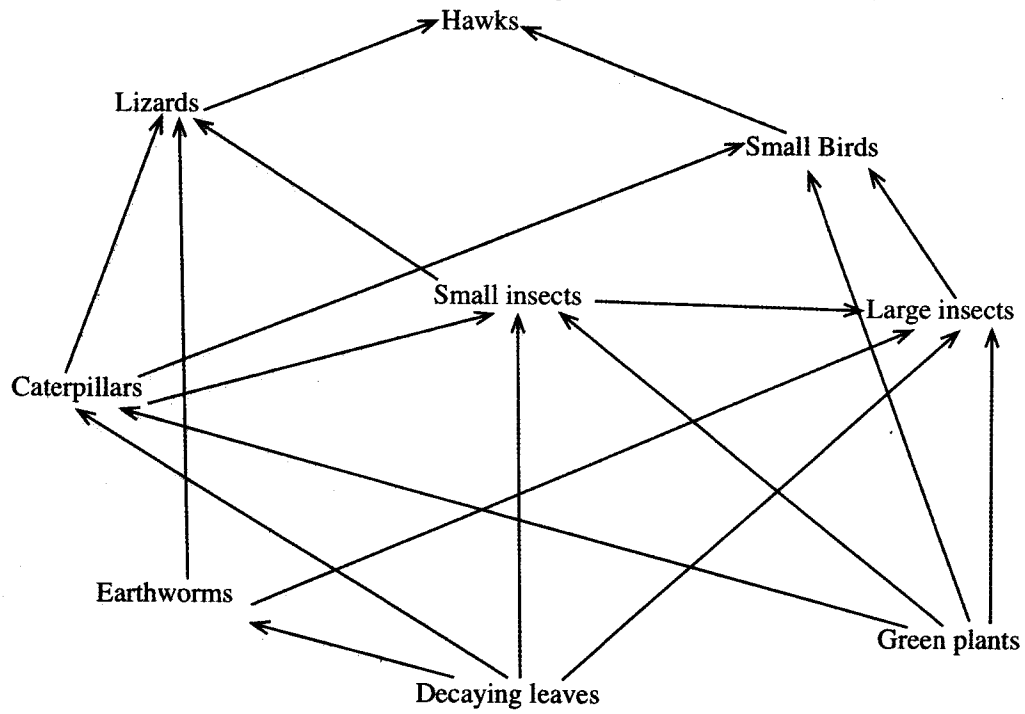
(i) required for respiration that move out of capillaries; (1 mark)

(ii) removed from tissue cells as a result of respiration. (1 mark)

(c) Explain how substances move from blood capillaries into the tissue cells. (3 marks)

(d) Name **one** component of the blood that is not found in the part labelled **P**. (1 mark)

3 The diagram below represents a food web in a certain ecosystem.



(a) Name the trophic level occupied by each of the following:

(i) caterpillars; (1 mark)

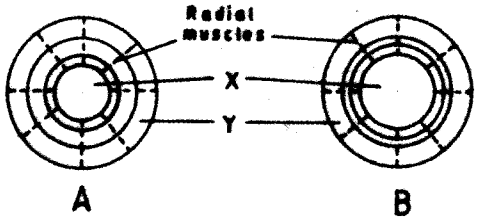
(ii) small insects. (1 mark)

(b) From the food web, construct **two** food chains which end with lizards as a tertiary consumer. (2 marks)

(c) (i) Which organisms have the least biomass in this ecosystem? (1 mark)

(ii) Explain the answer in (c) (i) above. (3 marks)

4 The diagram below shows how the iris and pupil of a human eye appear under different conditions.



(a) Name the structures labelled **X** and **Y**. (2 marks)

X .....

Y .....

(b) (i) State the condition that leads to the change in appearance shown in the diagram labelled **B**. (1 mark)

(ii) Describe the changes that lead to the appearance of the iris and pupil as shown in the diagram labelled **B.** (4 marks)

(iii) What is the significance of the changes described in (b) (ii) above? (1 mark)

5 When pure breeding black guinea pigs were crossed with pure breeding white guinea pigs, the offspring had a coat with black and white patches.

(a) Using letter G to represent the gene for black coat colour and letter H for white coat colour, work out the genotypic ratio of F_2. (5 marks)

(b) State the phenotypic ratio of F_2. (1 mark)

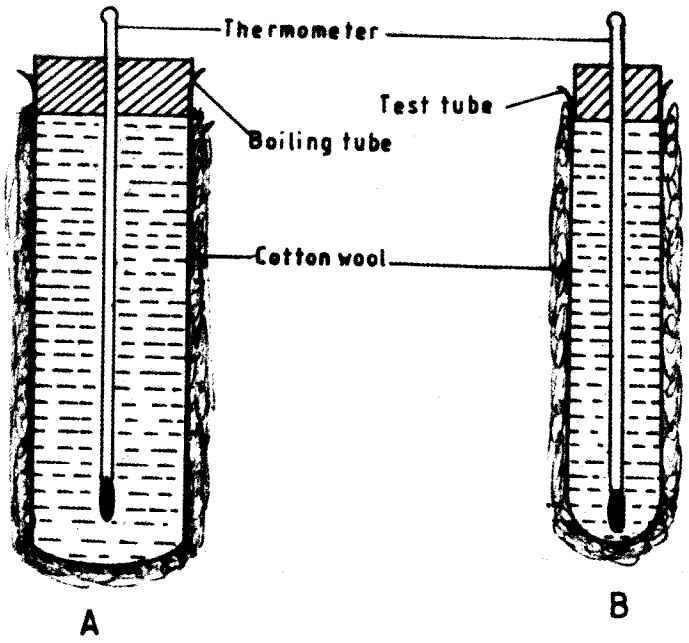
(c) (i) Name the term used when two alleles in heterozygous state are fully expressed phenotypically in an organism. (1 mark)

(ii) Give an example of a trait in human beings where the condition whose term is named in (c) (i) above expresses itself. (1 mark)

SECTION B (40 marks)

*Answer question 6 (**compulsory**) and either question 7 or 8 in the spaces provided after question 8.*

6 In an experiment to investigate a certain physiological process, a boiling tube labelled **A** and a test tube labelled **B** were covered with cotton wool. The two tubes were simultaneously filled with hot water and fitted with thermometers. The experimental set-up was as in the diagrams below.



Temperature readings were taken at the start and after every two minutes for twenty minutes. The results were as shown in the table below.

Time (Minutes)	Temperature (°C)	
	Boiling tube A	Test tube B
0	60	60
2	59	54
4	57	50
6	55	46
8	53	43
10	52	40
12	51	37
14	49	35
16	48	33
18	47	32
20	46	30

(a) Using the same axes, draw graphs of temperature against time.

(6 marks)

(b) (i) Work out the rate of heat loss in the boiling tube labelled **A** and test-tube labelled **B** between the 5th and 15th minutes.

A ..... (2 marks)

B ..... (2 marks)

(ii) Account for the answers in (b) (i) above. (2 marks)

(iii) How does the explanation in (b) (ii) above apply to an elephant and a rat? (2 marks)

(c) (i) State the role of the cotton wool in this experiment. (1 mark)

(ii) Name **two** structures in mammals that play the role stated in (c) (i) above. (2 marks)

(d) State **three** advantages of having constant body temperature in mammals. (3 marks)

7 Describe the process of fertilization in flowering plants. (20 marks)

8 Describe how a finned fish such as Tilapia moves in water. (20 marks)

29.4.3 Biology Paper 3 (231/3)

1 You are provided with a visking tubing, a solution labelled **L**, Iodine solution labelled solution **E**, Benedict's solution labelled solution **F** and a piece of thread.

Tie one end of the visking tubing tightly using the thread provided. With the help of a syringe, put 10 ml of the solution labelled **L** into the visking tubing. Tie the other end of the visking tubing tightly.

Ensure that there is no leakage at both ends of the visking tubing.

Wash the outside of the visking tubing with water. Place the visking tubing upright in a 100 ml beaker. Add distilled water into the beaker to reach the level of the liquid in the visking tubing. Allow the set up to stand for 30 minutes or more.

(a) Using 2ml in a test-tube in each case, test for the food substance in the liquid outside the visking tubing using (6 marks)

TEST	Procedure	Observations	Conclusion
(i) Iodine solution (Solution **E**)			
(ii) Benedict's solution (Solution **F**)			

(b) Using 2ml in a test-tube in each case, test for the food substance in the contents of the visking tubing using (2 marks)

TEST	Procedure	Observations	Conclusion
(i) Iodine solution (Solution **E**)			

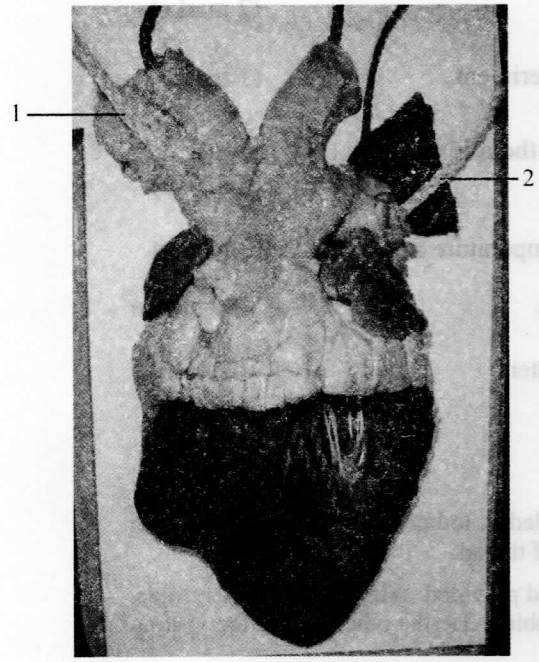
(ii) Benedict's solution (Solution **F**)			

(c) Account for your results in *(a)* and *(b)* above. (3 marks)

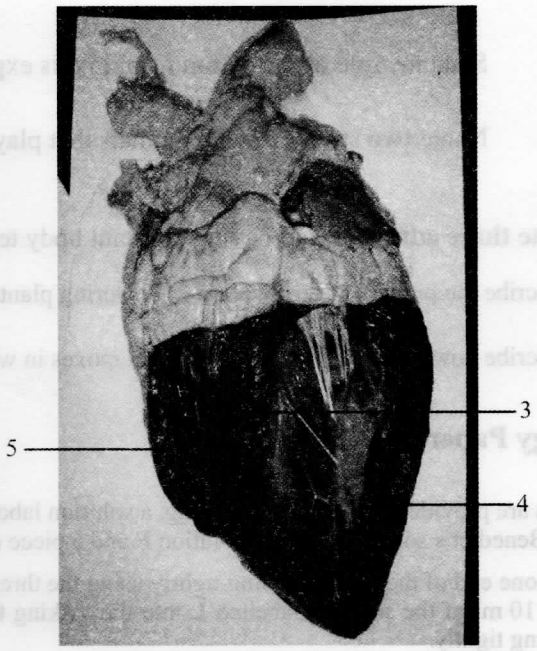
(a) .....

(b) .....

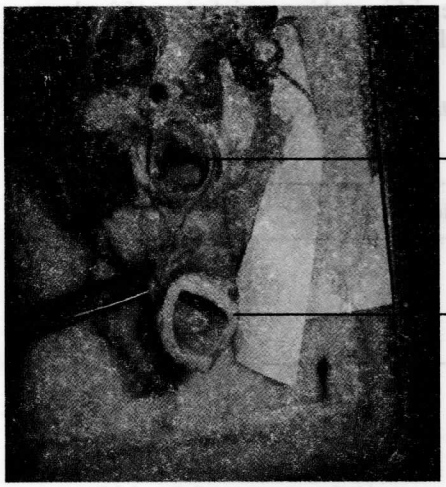
2 The photographs labelled **J**, **K**, $\mathbf{M_1}$ and $\mathbf{M_2}$ are sections of a mammalian heart. Examine them.



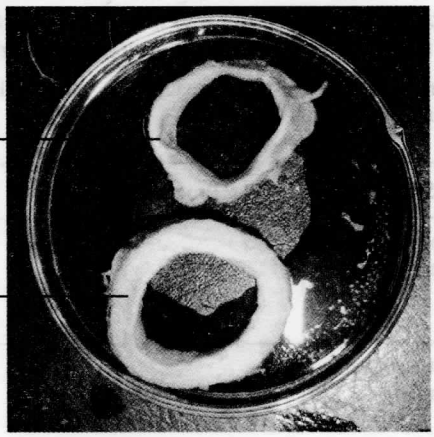
PHOTOGRAPH **J**



PHOTOGRAPH **K**



PHOTOGRAPH $\mathbf{M_1}$



PHOTOGRAPH $\mathbf{M_2}$

(a) The blue, green and cream strings go through various blood vessels and end up at various chambers of the heart. For each string, name the chamber where the string ends and the blood vessel through which the string goes. (8 marks)

String	Chamber	Blood vessel
Blue	.....	.....
Green	.....	.....
Cream 1	.....	.....
Cream 2	.....	.....

(b) Name the part labelled 3 in photograph **K**. (1 mark)

(c) The parts labelled 4 and 5 are walls of two chambers of the heart. Account for the difference in the thickness of the walls. (1 mark)

(d) Photograph $\mathbf{M}_1$ shows two blood vessels labelled **X** and **Y** while $\mathbf{M}_2$ shows transverse sections of the same blood vessels.

With a reason, identify the type of each of the blood vessels. (4 marks)

X .....

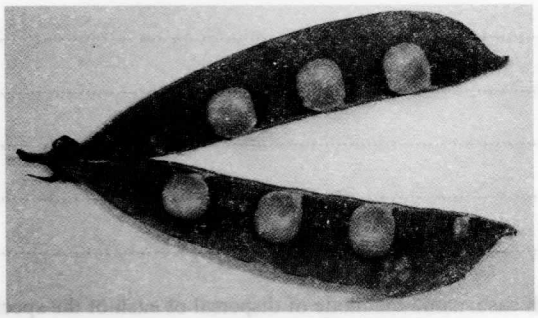
Reason .....

Y .....

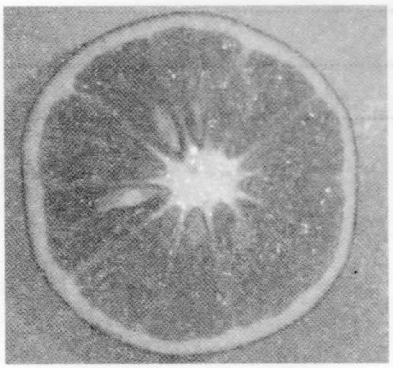
Reason .....

(e) In photograph **K**, indicate by letter B the part of the heart which would be cut to expose the bicuspid valve. (1 mark)

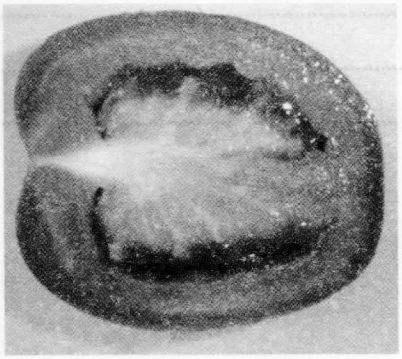
3 The photographs labelled **Q**, **R**, **S** and **T** are sections of some parts of plants.



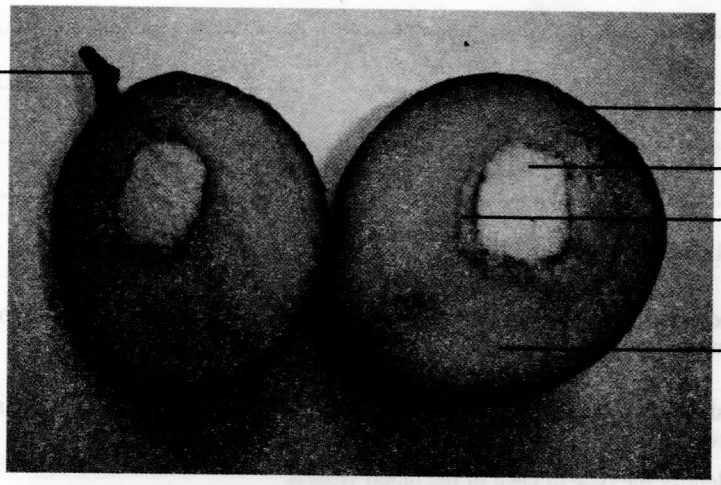
PHOTOGRAPH **Q**



PHOTOGRAPH **R**



PHOTOGRAPH **S**



PHOTOGRAPH **T**

(a) Name the type of placentation in the specimens shown in photographs **Q**, **R** and **S**. (3 marks)

Q .....

R .....

S .....

(b) Label a seed in photographs **R** and **S**. (2 marks)

(c) Name the parts labelled 6, 7, 8, 9 and 10 in photograph **T**. (5 marks)

6 .....

7 .....

8 .....

9 .....

10 .....

(d) Giving a reason in each case, name the mode of dispersal of each of the specimens in photographs **Q** and **T**. (4 marks)

Q .....

Reason .....

T .....

Reason .....