Name	Class				Index Number		

BROADRICK SECONDARY SCHOOL
SECONDARY 4 EXPRESS
PRELIMINARY EXAMINATION 2019

BIOLOGY **6093/02**

Paper 2 Theory

Sep 2019

Candidates answer on the Question Paper

No Additional Materials are required.

1 hour 45 minutes

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on the work you hand in.
You may use an HB pencil for any diagrams, graphs, tables or rough working.
Write in dark blue or black pen.
Do not use staples, paper clips, glue or correction fluid.

Section A
Answer **all** questions.

Section B
Answer all the questions. Question 9 is an Either/Or question.
Write your answers in the spaces provided on the Question Paper.
You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.

Candidates are reminded that **all** quantitative answers should include appropriate units.
The use of an approved scientific calculator is expected, where appropriate.

The number of marks is given in brackets [ ] at the end of each question or part question.

For examiner's use	
P2	/ 80

This question paper consists of **19** printed pages including this page.

[Turn over

Section A (50 marks)

Answer **all** the questions in the space provided.

1 **(a)** Define the term *translocation.* [2]

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(b) The figure below shows a scanning electron micrograph of a type of vascular tissue found in plants.

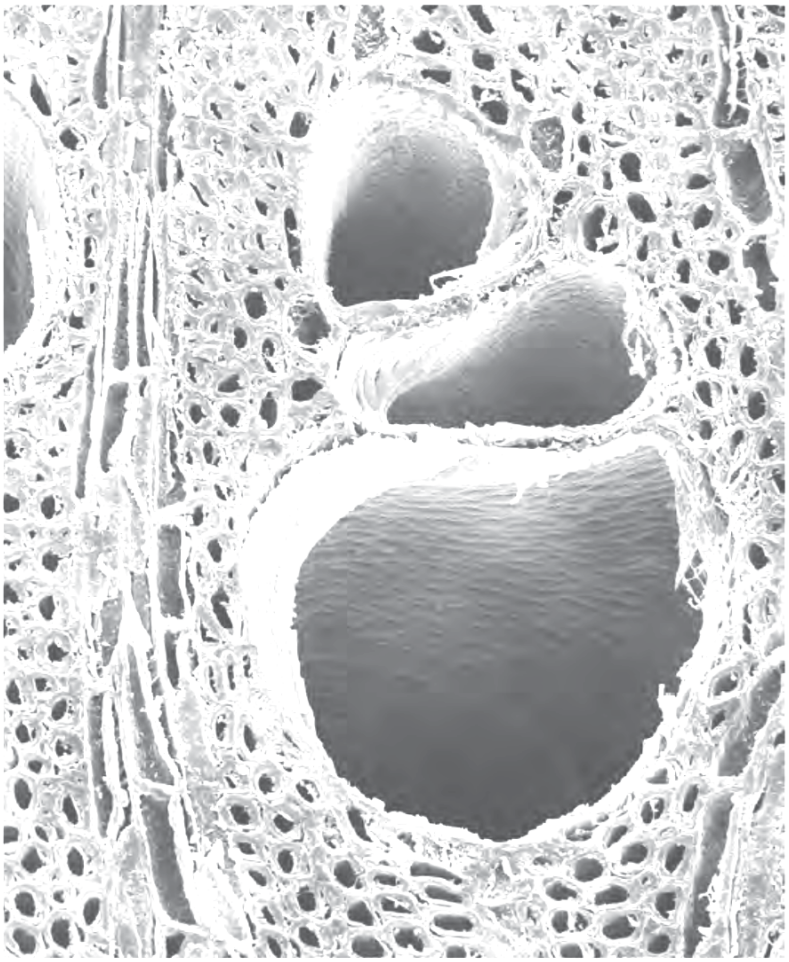

Fig 1.1

(i) Name the vascular tissue. [1]

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(ii) With reference to **Fig. 1.1**, describe two ways that these vascular tissues are adapted to their functions. [2]

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(c) Some weedkillers stop the plant from photosynthesising. These are often applied to the soil where the weeds are growing. [4]

Explain how the weedkiller reaches its site of action in the leaves.

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[Total:9m]

2 **(a)** State what is meant by the term ‘activation energy’. [1]

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(b) Fig 2.1 shows a section of photographic film.

The top layer is made of silver particles embedded in a layer of gelatine which is a type of protein.

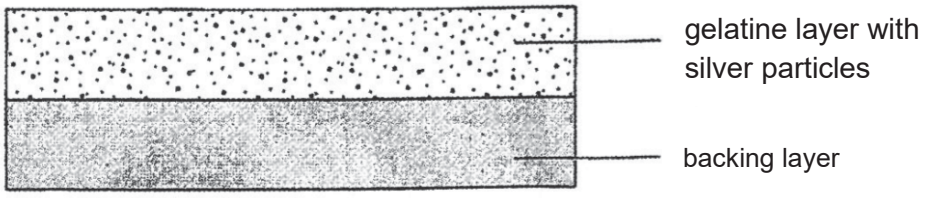

Fig 2.1

In an investigation, a 20 mm length of photographic film was placed in each of three boiling tubes.

- The film was immersed in 20cm^3 water.
- 1 cm^3 of liquid at different pH values was added to the boiling tubes.
- 1 cm^3 of protease solution was added to each boiling tube.
- Each boiling tube was shaken gently to mix the contents.
- Each boiling tube was kept at 37^{0}C for 1 hour.

Fig 2.2 shows the apparatus and the results of the investigation.

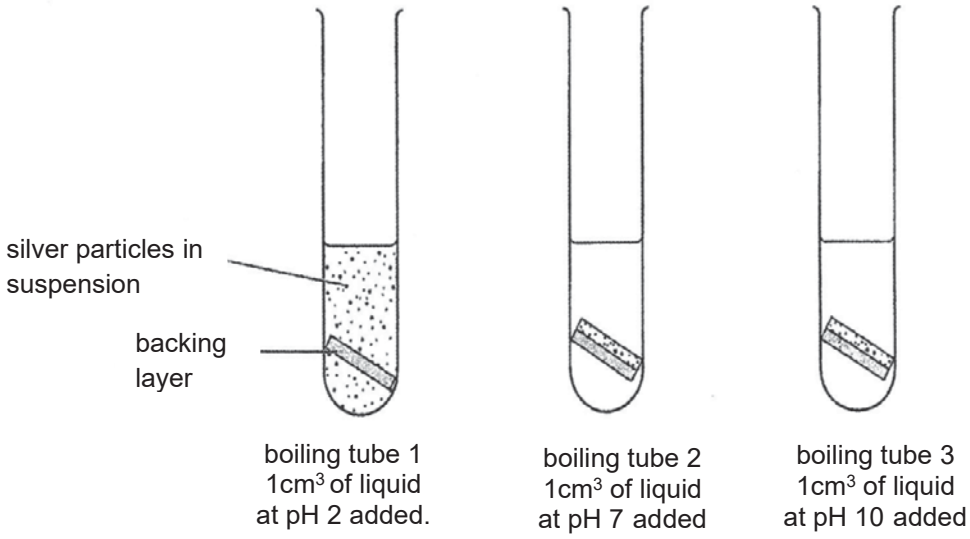

Fig 2.2

(i) Explain the difference in results obtained between boiling tube 1 and boiling tubes 2 and 3. [3]

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(c) Carbon dioxide is released during respiration in all living cells in the human body. [3]
Describe the role of carbonic anhydrase in the excretion of carbon dioxide from the lungs.

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[Total:7m]

3 The figure below shows the relationship between air temperature and the body temperature of an insect.

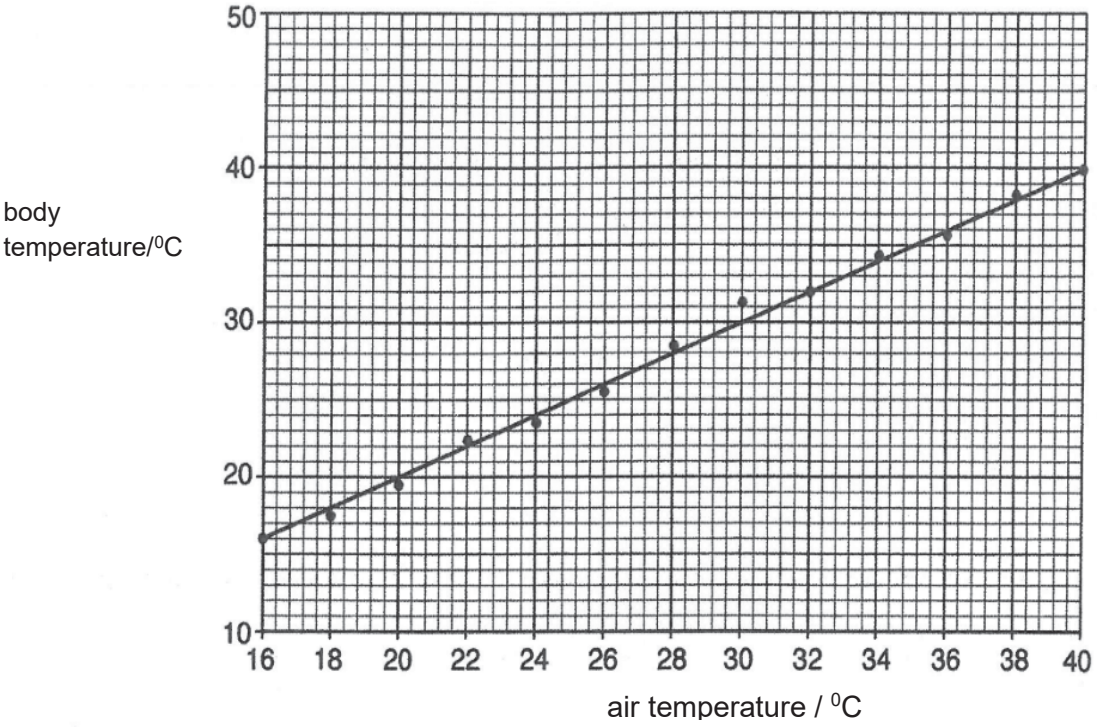

Fig. 3.1

(a) State the change in the body temperature of the insect as air temperature changes from 16^{0}C to 40^{0}C, as shown in Fig 3.1 [1]

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(b) State two conclusions which may be drawn from Fig 3.1. [2]

1 : ……

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2 :……

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(c) Sketch a line on Fig 3.1 to show the body temperature of an adult human between air temperatures of 20^{0}C and 36^{0}C. [2]

Show answer on the graph of Fig. 3.1.

(d) Describe the role of insulin in regulating blood glucose concentration in the human body. [3]

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[Total:8m]

4 **(a)** Define the term *excretion* and explain its importance. [2]

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(b) Fig 4.1 shows a kidney tubule and its blood supply.

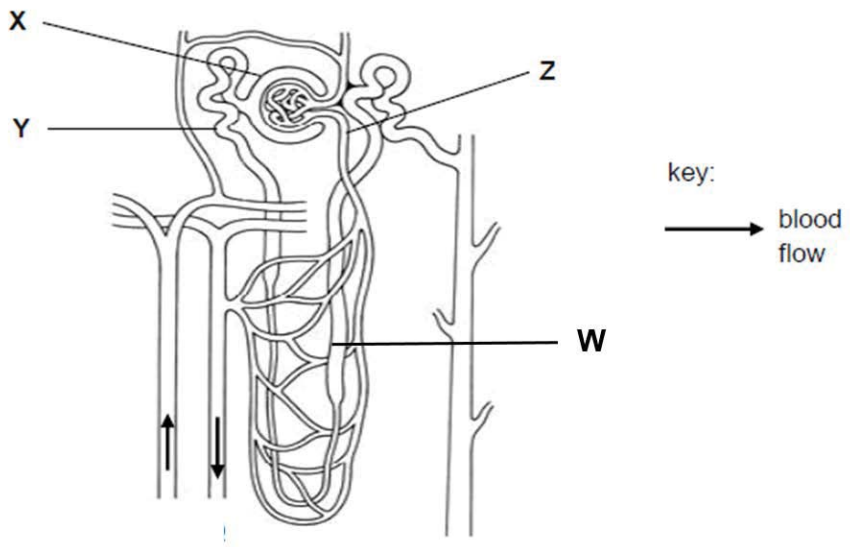

Fig 4.1

(i) Name the structure labelled Z on Fig 4.1. [1]

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(ii) Using an **'A'**, indicate on the structure(s) in Fig 4.1, where the anti-diuretic hormone (ADH) act(s) on during homeostasis. [1]

(c) Table 4.1 below shows the composition of a liquid taken from part X and W of the kidney nephron above.

substance	composition/ g per 100cm^3	
	X	W
glucose	0.100	
urea	0.100	0.500

Table 4.1

(i) Complete Table 4.1 to show the glucose content at region W. [1]

(ii) Explain your answer to c(i). [2]

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(iii) Explain the difference in the urea concentration between regions X and W. [2]

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(d) Anti-diuretic hormone (ADH) is involved in the prevention of dehydration. [3]
Explain how ADH reduces water loss from the body.

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[Total:12m]

5 Fig 5.1. shows the transfer of energy through a food web in a pond ecosystem.

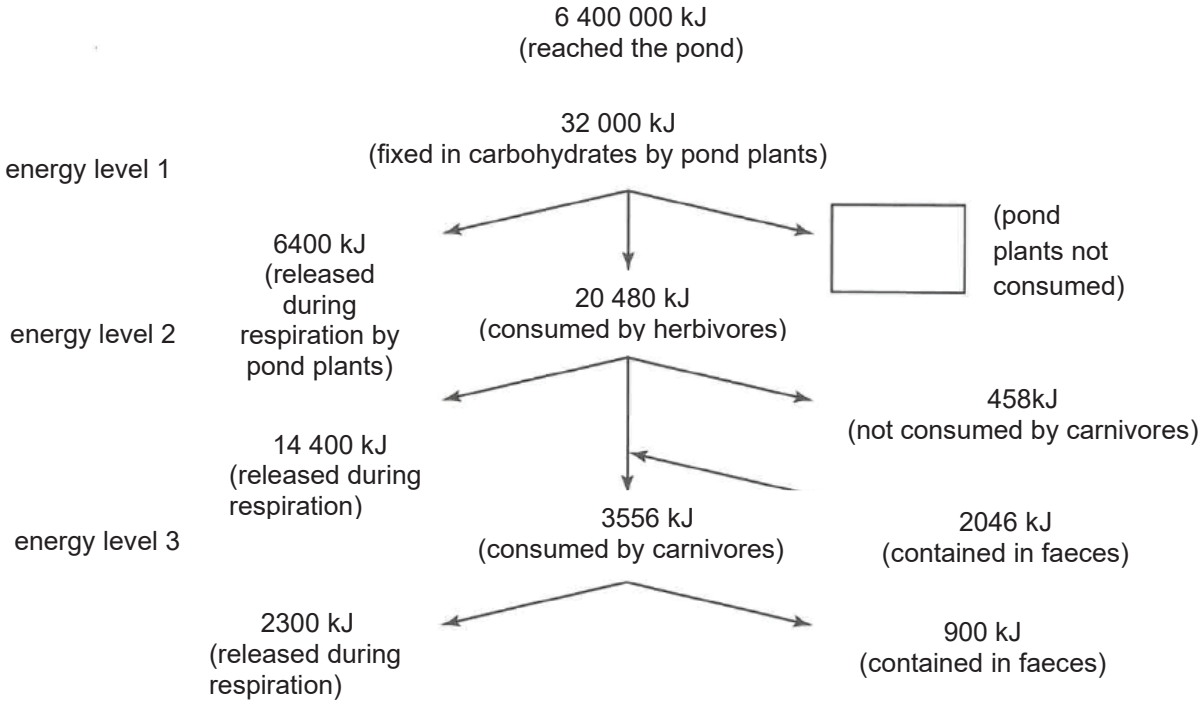

Fig. 5.1

(a) State the process that converts the energy from sunlight into carbohydrates. [1]

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(b) Calculate the percentage of energy from sunlight that was eventually fixed into carbohydrates. Show your working. [2]

…….. %

(c) Calculate the amount of energy in the pond plants that remained unconsumed by herbivores. Show your working. [2]

…….. kJ

(d) Explain why food chains and food webs rarely exceed five trophic levels. [3]

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[Total: 8]

6 **(a)** The diagram below shows a pair of homologous chromosomes during meiosis. P and Q show points where crossing over ***may*** occur. The other letters show the positions of the alleles of four genes.

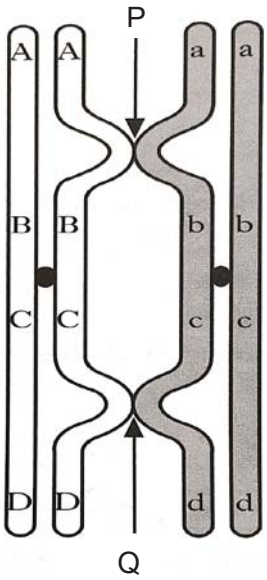

Fig 6.1

(i) What evidence confirms that these chromosomes are homologous? [2]

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(ii) What name is given to points P and Q? [1]

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(iii) State the importance of crossing over in meiosis. [1]

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(b) State two places in plants where meiosis takes place. [2]

1. …….
2. ……..

[Total:6m]

-End of Section A

Section B (30 marks)

Question **7** and **8** are compulsory questions.
Question **9** is in the form of an **Either/Or** question.
Only one part should be answered.

7 Germination is the process by which the plant grows from a seed. It results in the formation of a seedling. Germination of seeds requires both external and internal conditions such as temperature, water, light and air. Cells of germinating seeds were found to have high levels of enzymatic activity.

The experiment in Fig. 7.1 is used to measure the changes in the volume of gases confined inside a flask of seeds that are germinating.

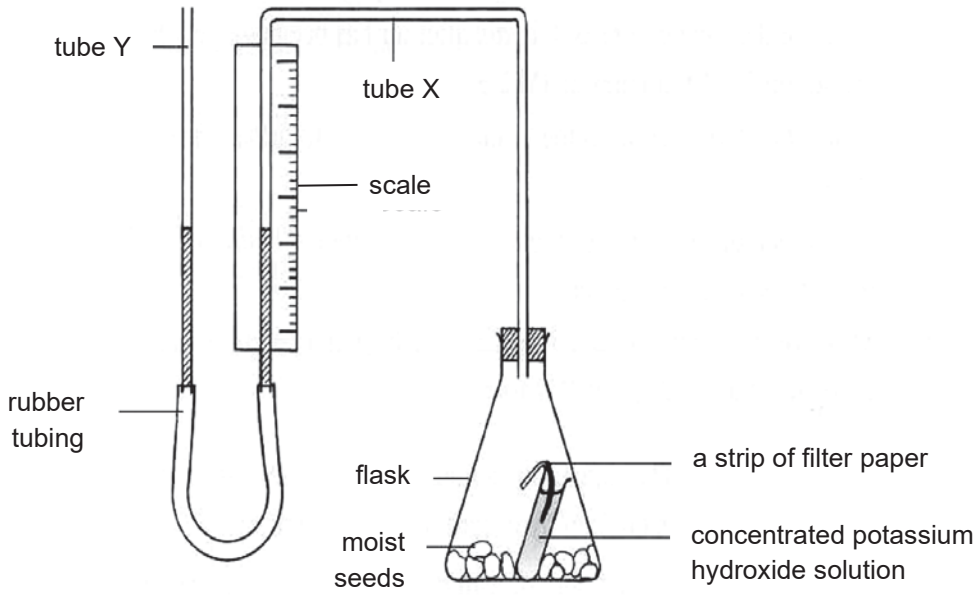

Fig 7.1

At half hour intervals, the liquid level in tube X is measured on the scale.

The result is recorded in Table 7.2.

Table 7.2

time (h)	reading on scale that shows liquid level in tube X/ cm	volume changes of gases in flask/ arbitrary units
0	2.3	0
0.5	3.1	-0.8
1.0	3.9	-1.6
1.5	4.8	-2.5
2.0	5.6	-3.3
2.5	6.4	-4.1
3.0	7.0	-4.7
3.5	7.3	-5.0
4.0	7.3	-5.0

(a) Plot and draw a graph to show the volume changes of gases in flask against time taken. [4]

(b) Describe the relationship between the reading on the scale and the volume changes of gases in the flask. [1]

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(c) Describe and explain the volume changes occurring in the flask. [2]

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(d) Describe and explain the changes in the graph from the 3rd to 4th hour. [2]

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(e) A control is set up to show that the seeds undergoing germination cause the volume changes of gases in the flask. [1]

Suggest what could be done to stop the seeds from germinating.

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[Total:10m]

8 **(a)** Describe the events that occur after a human egg cell is fertilised which enable it to develop and survive in the uterus. [5]

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(b) In humans, the ability to taste PTC paper, (paper impregnated with phenylthiocarbamide), is controlled by a dominant allele (T) and the inability to taste it is controlled by the recessive allele (t). [5]

Using a fully labelled genetic diagram, explain how, in a family with three children, only the mother and one child are unable to taste PTC.

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[Total:10m]

9 Either

9 (a) Outline the relationship between gene, DNA and chromosome. [6]

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(b) Explain how meiosis and reproduction gives rise to new variations in offsprings. [4]

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[Total : 10m]

9 Or

(a) Fig 9.1 shows a vertical section of the human heart.

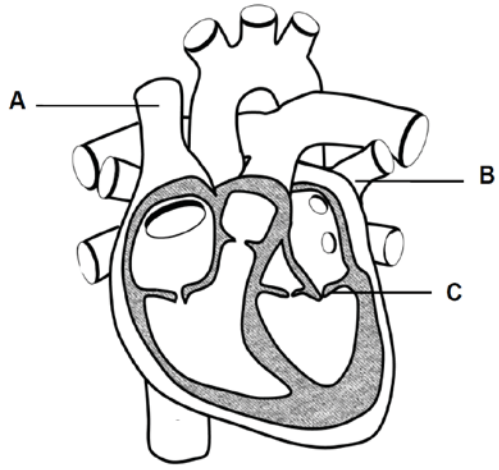

Fig 9.1

(i) Name the blood vessels: [2]

A: …… B: ……...

(ii) Describe the function of the part labelled C. [1]

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(iii) Describe and explain how blood entering the heart from the body organs reaches the lungs. [5]

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(b) Explain, using a named example, what is meant by an endocrine gland. [2]

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[Total : 10m]

-End of Paper-