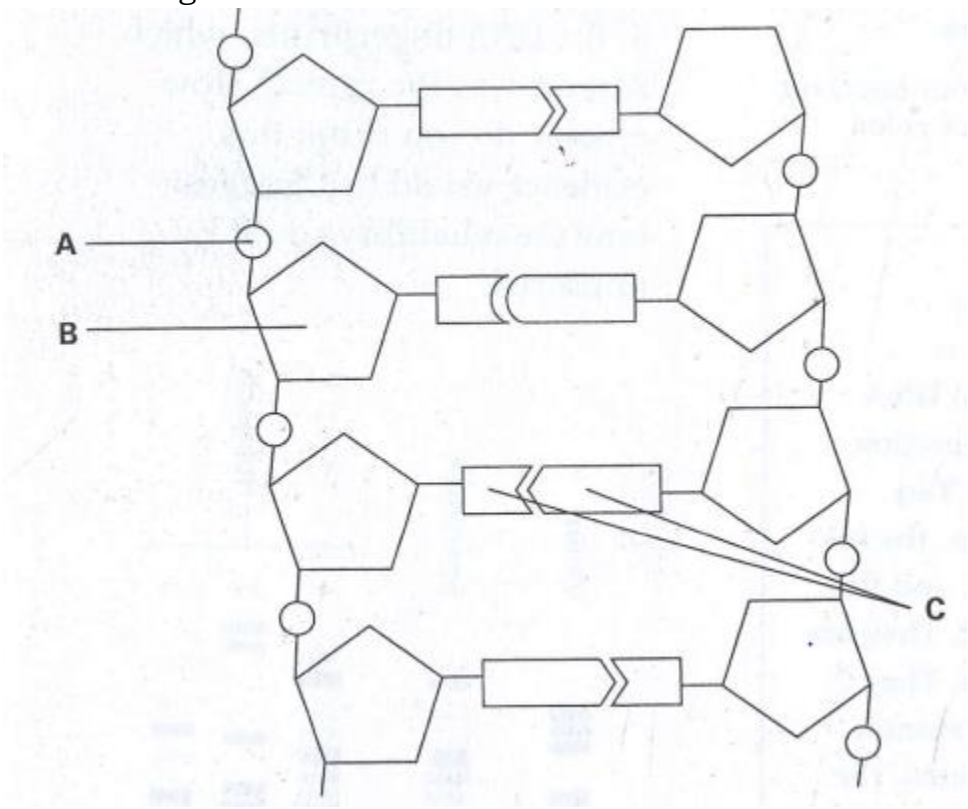
SECTION A: ATTEMPT ALL QUESTIONS (60 marks)

1. No organism exists in an absolute isolation; every organism interacts with others within a community.
   a) Explain what is meant by intraspecific interaction. **2marks**
   b) Give two examples of interspecific interactions. **1mark**
   c) On what basis biological interactions are classified? **2marks**

2. (a) Plants growing in a salty soil have problems getting water. Using your knowledge of osmosis, try and explain why. **2 marks**
   (b) When a respiratory inhibitor is used, the concentration of phosphate ions in the root hair cells is the same as in the soil. However, if no inhibitor is used, the concentration in the root hair cells is found to be much higher. Explain why this happens. **3 marks.**

3. The drawing shows a section of a DNA molecule.



   (a) Name the parts labelled A, B, C. **1 mark**
   (b) The messenger RNA code for the amino acid serine is UCA.
   i. Give the DNA code for serine. **1 mark**
   ii. Give the transfer RNA code for serine. **1 mark**

   (c)
   i. What type of molecule is the end product of translation? **1 mark**

ii. Describe the role of transfer RNA in the translation process. **1 mark**

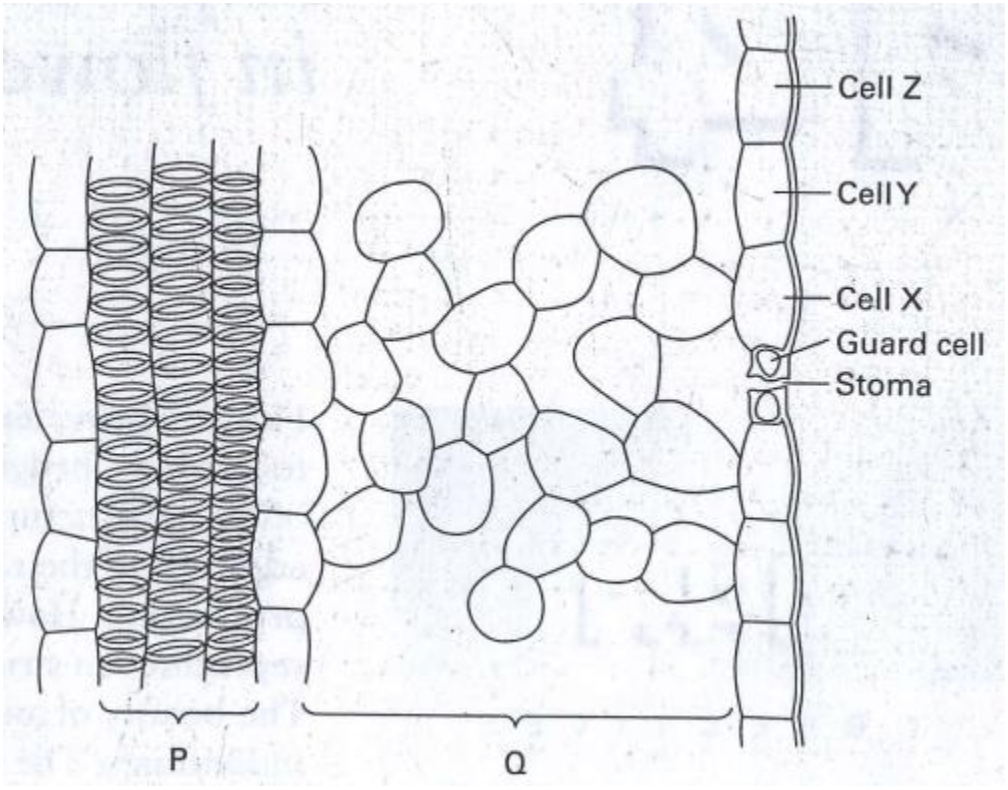
4. Copy and complete the following table to distinguish between the processes of transcription and translation. **5 marks**

	Transcription	**Translation**
Site in cell where process occurs		
Molecule used as a template in process		
Molecule produced by the process		
Component molecule (monomers) used in process		
One other molecule that is essential for the process to occur		

5.What would be the effect of lowering oxygen concentrations on:

a) C3 photosynthesis **1 mark**
b) C4 photosynthesis **1 mark**
Explain your answers in (a) and (b) **3 marks**

6.The diagram below shows some of the cells involved in the loss of water from part of a leaf.



a) Name the tissues labelled P and Q on the diagram. **1 mark**
b) The table below shows the concentration of potassium ions in some cells shown in the diagram when the stoma is open and when the stoma is closed.

	concentration of potassium ions/arbitrary units	
	stoma closed	stoma open
Guard cell	96	448
Cell X	157	293
Cell Y	199	98
Cell z	649	73

i. Describe the changes that take place in the concentrations of potassium ions in the cells X, Y and Z when the stoma is open. **2 marks**
ii. Explain how these changes in the potassium ions concentration are related to the mechanism for the opening of the stoma. **2 marks**

7.Compare the mechanisms of transpiration with translocation **5 marks**

8. (a) Complete the following table

Organism	Respiratory surface
Amoeba	
Insects	
Fish	
Tadpole	
Bird	

5 marks

(b)Differentiate between positive pressure breathing and negative pressure breathing in amphibians. **2 marks**

9.Explain how the deposition of tar can lead to smoker's cough. **3 marks**

10 Explain fully the following biological terms:

(a) Okazaki fragment **1 mark**

(b) Tissue fluid **1 mark**
(c) Homeostasis **1 mark**
(d) Tidal volume **1 mark**
(e) Telomere **1 mark**

11.Read through the passage below and then fill in the gaps with the most appropriate word, words or numbers:

The normal body temperature of a human is ……^{0}C. When the blood temperature rises, receptors in the …….send……to the heat loss centre which initiates mechanisms to lose heat from the body. There is an…….in the rate of sweating which loses heat by…….Superficial blood vessels in the skin undergo…….which…….the amount of heat loss by convection and…….from the skin's surface. **4 marks**

12.Diabetes mellitus is a complex disease that occurs in two forms; insulin dependent (type1) and non-insulin dependent (type2).

(a) which cells are destroyed in type I diabetes? **2 marks**
(b)Why does insulin must be taken by injection rather than swallowing a tablet?

2 marks

(c)Suggest why dietary control can be useful for patients to treat type II diabetes

3 marks

SECTION B: ATTEMPT ANY THREE QUESTIONS (30 marks)

13.

(a) Explain why the genetic code is described as:
i. Universal **1 mark**
ii.Degenerate **1 mark**
iii.Non-overlapping **1 mark**

(b)State three ways in which the molecular structure of RNA differs from DNA. **3 marks**

(c) Explain why:
i.DNA needs to be chemically very stable. **2 marks**
ii.mRNA needs to be easily broken down (chemically unstable). **2 marks**

14.

(a) Define the terms 'transcription' and 'translation', indicating why these processes are necessary for an organism's survival. **4 marks**
(b) Explain fully how the cell carries out these processes. **6 marks**

15.Write an account of DNA replication in eukaryotic cells **10 marks**

16.

(a) Describe fully the passage of water from the soil to the xylem tissue of plants. **4 marks**

(b) Explain how this route is also used to carry nitrogen into the plant.**4 marks**

(c) Indicate the function of nitrogen in plants and the consequences if the nitrogen supply is inadequate. **2 marks**

17.

(a) Explain the importance of a human of a human being maintaining a constant internal temperature. **3 marks**

(b) Explain why in a normal healthy individual, the blood glucose level fluctuates very little. **4 marks**

(c)Describe the role of the hypothalamus in the regulation of body temperature. **3 mark**

PRACTICAL SECTION: THIS SECTION IS COMPULSORY (10 marks)

18.Students were provided with specimen M, which is a plant material (pawpaw) and sugar solutions of concentration 25%, 20%, 15%, 10%, 5%, 1% and 0%.

They peeled the specimen and cut seven strips of the material each measuring 0.5cm x 0.5cm. Strips were dropped in each test tube and left to stand for 20 minutes.

After 20 minutes, strips were removed and length measured. Results were recorded in the table below.

The length after 20 min was subtracted from its initial length and also recorded in the table.

concentration of sugar	25	20	15	10	5	1	0
Initial length of	5	5	5	5	5	5	5

strip(cm)							
Final length of strip(cm)	4.8	4.9	4.95	5	5.05	5.1	5.2
difference in length(cm)							

(a) Copy and complete the table **2 marks**
(b) Plot a graph of concentration against difference in length. **2 marks**
(c) Explain the meaning of the following;
(i) A difference in length of less than 0.0cm **2 marks**
(ii) A difference in length of more than 0.0cm **2 marks**
(iii) No difference in length. **2 marks**