

Answer all questions in Part I and six questions in Part II, choosing two questions from each of the two section A and three from section B.

All working including rough work should be done on the same sheet as, and adjacent to, the rest of the answer.

The intended marks for questions or parts of questions are given in brackets [].

**Part II each point carries half mark.**

**NOTE: ATTACH THE QUESTION PAPER WITH THE ANSWERSHEET.**

**Part I (20 marks)**

*Answer all questions*

**Question 1**

**A. Mention two differences between each of the following:** [3]

1. Nucleoside and nucleotide
2. Ureotelism and uricotelism
3. Glycogenesis and glyconeogenesis

**B. What would happen if....** [3]

1. Plaque build up in the coronary artery.
2. There is a long hydrocarbons tail in phospholipids molecule.
3. There is no herbivores in the ecosystem

**C. Name the scientist/scientists** [2]

1. Levene
2. Hertwig

**D. Elaborate the following:** [3]

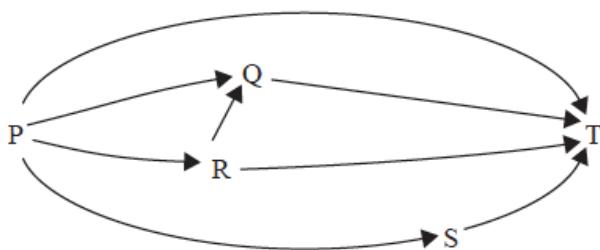
1. CAPD
2. GIP
3. TMP

**E. Choose the correct option (copy and write the answer with the alphabet):** [4]

1. During which phase of the cell cycle do chromosomes duplicate?
 

A. G1	C. G2
B. S	D. Mitosis
2. Why is most food digested?
  - A. Digestive enzymes require a variety of substrates.
  - B. It ensures that the diet is balanced.
  - C. Most ingested food molecules are large.
  - D. To prevent disorders of the intestine.

3. Consider the simple food web below.



Which organism could be a saprotroph?

- A. P
- B. Q
- C. S
- D. T

4. Which processes are required for the reabsorption of glucose in the kidney tubules?

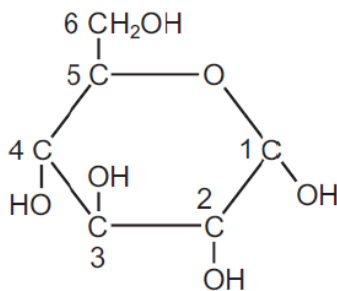
- I. Simple diffusion
- II. Facilitated diffusion
- III. Active transport

- A. I and II only
- B. II and III only
- C. I and III only
- D. I, II and III

5. Fish oils are thought to have beneficial effects on the conduction of electrical excitation through the ventricles of the heart. What could the fish oils influence?

- A. atrioventricular node
- B. Purkinjetissue
- C. sinoatrial node
- D. vagus nerve

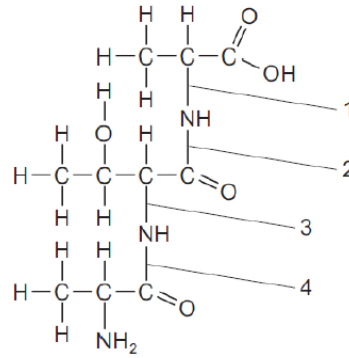
6. The hexose sugar molecule in the diagram has its six carbon atoms numbered.



Which carbon atoms join by glycosidic bonds to form amylose and amylopectin?

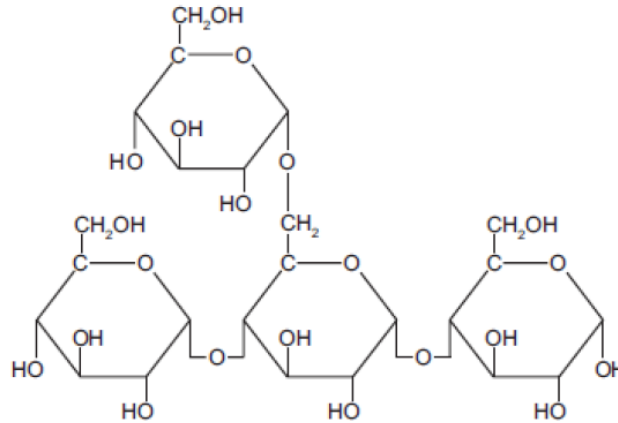
	amylose	amylopectin
<b>A</b>	1 to 4	1 to 4 and 1 to 6
<b>B</b>	1 to 6	1 to 4 and 1 to 6
<b>C</b>	1 to 4 and 1 to 6	1 to 4
<b>D</b>	1 to 4 and 1 to 6	1 to 6

7. The diagram shows a tripeptide molecule.



At which two points will hydrolysis occur to release three amino acids?

- A. 1 and 2  
 B. 1 and 3  
 C. 2 and 3  
 D. 2 and 4
8. The diagram shows part of a carbohydrate molecule.



If all the 1, 4 glycosidic bonds in this molecule are hydrolysed, how many water molecules will be used and how many separate glucose molecules will be produced?

	number of water molecules used	number of glucose molecules produced
<b>A</b>	1	1
<b>B</b>	2	2
<b>C</b>	3	3
<b>D</b>	4	4

**F. Give the most significant function of-**

[2]

- Papillary muscles
- Adenoid cells.

**G. Give a term for**

[3]

- The effect that leads to displacement of  $\text{CO}_2$  from the haemoglobin in presence of  $\text{O}_2$
- The stomach contents pass into the lower oesophageal sphincter.
- The cycle by which urea is produced in the liver

**Part II (50 marks)**

**Section A (20 marks)**

*Answer any two questions*

**Q 1. Digestive system deals with digestion of food. Nutrients taken in are of three basic types. A person has boiled egg for break fast, baked potatoes for lunch and sprouted beans for dinner.**

- a. Mention the type of nutrients the person has consumed and its monomeric form. 2
- b. An enzyme sucrase is present in the *succus entricus*. With the help of a diagram show its function. 2
- c. The lining of the stomach has mucus on it. Explain its role and what happens if there is no mucus or there is damage to the mucus layer? Mention another location in the body that has mucus other than the digestive system and its function. 2
- d. What will be the fate of nutrient in boiled potatoes? 2
- e. With the help of a diagram show the relation between part of the alimentary canal and the organs releasing secretions for complete digestion of nutrients. 2

**Q 2. An athlete who has not properly trained their cardiovascular system is likely to incur other injuries more easily by the rapid onset of fatigue and the consequent lowering of motivation and mental awareness. For anyone competing at varying altitudes, they must allow themselves a considerable period to acclimatize before an event.**

**Dehydration occurs during exercise when body water is lost through sweating and not adequately replenished. A loss of more than two percent body water decreases physical and mental performance, particularly in a warm or hot environment, states the American College of Sports Medicine (ACSM). Severe dehydration may lead to heat stroke, muscle cramps and electrolyte deficits, such as hyponatremia. Exercise-induced hyponatremia, or low blood sodium levels, can occur during endurance activities where sweat losses exceed the amount of fluid and sodium replenished.**

- a. Mention the change that occurs in the cardiovascular system of a trained athlete and its advantage. 2
- b. Which body organ can regulate the occurrence of hyponatremia? What is this mechanism of regulation called? 1
- c. When there is excess of loss of water from the body, water is reabsorbed to compensate the loss. Draw the diagram of the unit that is responsible for this. Mark the parts from where reabsorption of water takes place. 3
- d. The respiratory cycle in the athletes increases during the activity. Discuss the changes in the respiratory system during the respiratory cycle. 4

**Q3. Heart and lung function appear to be intimately intertwined, so that even mild cases of chronic lung disease affect the heart's ability to pump blood, a new study finds. COPD is the fourth-leading cause of death in the United States. One form of COPD is emphysema, another form is chronic obstructive bronchitis.**

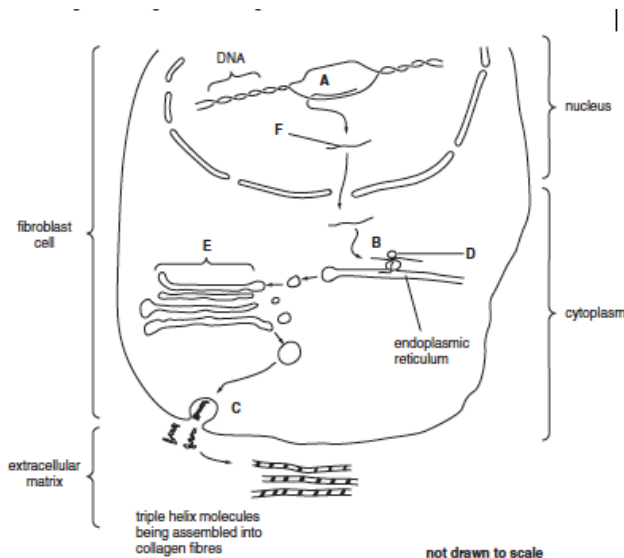
- a. What is the cause of COPD how is it different from emphysema? 2

- b. The lungs contain arteries, veins and capillaries. Explain the arrangement and role of capillaries in the lungs. 2
- c. “Heart and lung function appear to be intimately intertwined”. Explain this statement. 1½
- d. With the help of a schematic representation describe double circulation in humans, showing the chambers of the heart. 2
- e. During most of the diseases, the blood leucocyte content increases. Show the classification and draw its types. 2½

**Section B (30 marks)**

*Answer any three questions*

**Q4. Given below is a fibroblast cell, showing the process of secretion of collagen fibers.**



- a. Name the part **D** and **E** and give its function and relation. 2
- b. Describe the process C. 1
- c. Mention any two differences between collagen and haemoglobin structure. 2
- d. Suppose this cell divides by mitosis and give rise to many cells. Explain the changes that happen in the DNA of one of these cells. 2
- e. State three structural features that are present in a fibroblast cell that are not present in a cell of *E. coli*. 3

**Q5. Food webs in hot deserts are much simpler than those of other areas, such as temperate woodlands or coral reefs. The physical conditions in deserts are so extreme that few organisms can survive. However, there are plants and animals that have special adaptations to with stand big changes in temperature and lack of rainfall. Desert plants provide shade and food for herbivorous animals, such as insects, lizards and rodents. Snakes, scorpions and spiders feed on the herbivores. Animals such as the fennec fox and hawks feed as top carnivores.**

- a. State the term that best describes each of the following. 2½

- (i) Organisms, such as desert plants, that forms the first trophic level in a food web.
- (ii) All the fennec foxes living in one area at the same time.
- (iii) All the different species that inhabit a desert at the same time.
- (iv) A natural unit, such as a desert, consisting of all the living organisms and the physical environment interacting together to give a stable system.
- (v) Herbivorous animals, such as lizards and rodents, which are prey for carnivores.

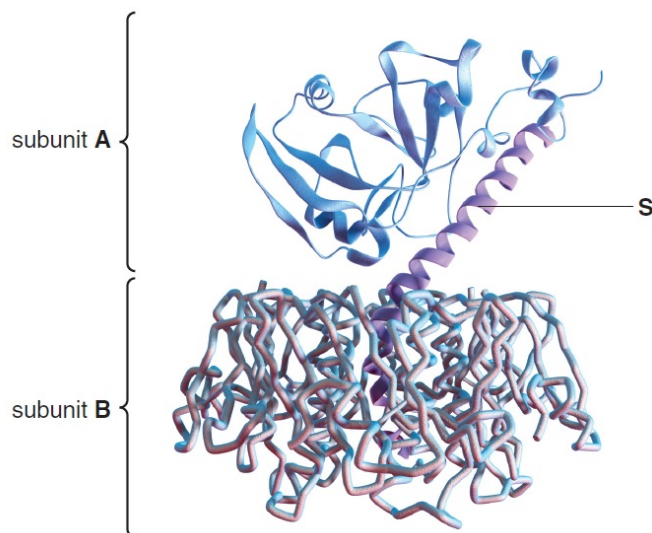
b. Prepare a food web based on the organisms in the paragraph. Add organisms to make a total of at least twelve organisms. Mention a named example instead of the groups given in the food web. 3½

c. Desert animals need certain adaptations to be able to survive with very less water. One of the body systems shows adaptation for this. Explain. 1

d. Herbivores are capable of digesting cellulose in the plants. Name the part of the digestive system where the digestion takes place. Is it present and functional in humans? 1

e. Name the polymer of carbohydrate other than cellulose present plants and mention the differences between the two. 3

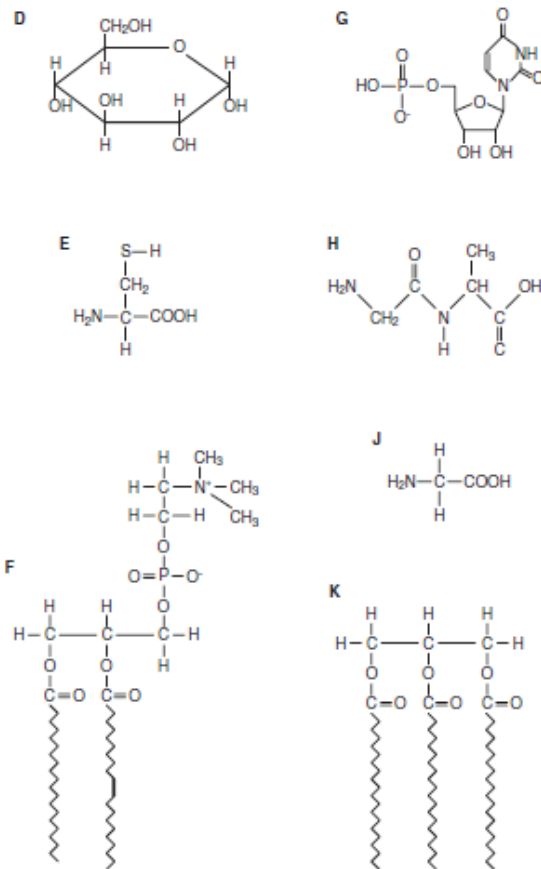
**Q 6. Cholera is a disease caused by the bacterium *Vibrio cholerae*. The disease symptoms are caused by a toxin, produced by the bacterium, interacting with proteins in the cell surface membranes of epithelial cells in the human intestine. The cholera toxin is a protein and is composed of two subunits, A and B. Subunit A is made from one polypeptide and subunit B is made from five identical polypeptides. Given figure shows the structure of the cholera toxin.**



- a. Name the level of structure that is only shown by a protein that has more than one polypeptide chain 1
- b. Label the part S. 1
- c. Explain the formation of bond present between the monomer of cholera toxin. 2
- d. Give examples of proteins that belong to following categories.

- Contractile protein, defense protein, regulatory protein, transport protein 2
- e. What role do certain bacteria play in the ecosystem? Why are they important? 2
- f. Mitochondria have ribosomes and circular DNA similar to the bacteria. Explain the statement. 2

**Q 7. Figure given below shows seven biological molecules, labeled D to K.**



a. Given table contains statements about the biological molecules in Figure above.

**Copy and complete** the table by selecting the biological molecule from figure that matches each of the statements.

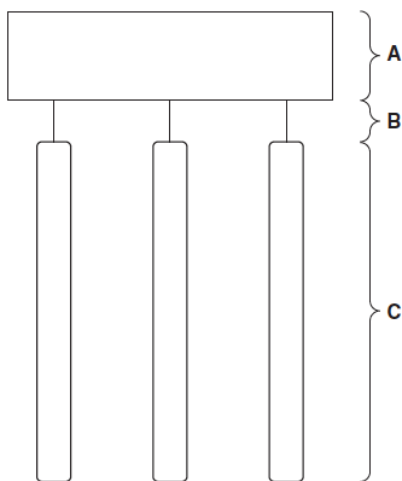
Write the appropriate letter from figure in the table given. The first one has been done for you. You may use each letter once, more than once or not at all.

3

statement	letter
an amino acid that is a major constituent of collagen	<b>J</b>
a component of RNA	
a molecule that is polymerised to form glycogen	
a molecule with a peptide bond	
an important store of energy, insoluble in water	
a molecule with hydrophilic and hydrophobic regions	
an amino acid that forms disulfide (disulphide) bonds in proteins	

- b. DNA and protein both are polymers. Describe two ways in which the structure of DNA differs from the structure of protein. 2
- c. A cell has 4 strands of DNA. Draw the changes happening during prophase I in this cell. 3
- d. Draw the nucleus of the above given cell after it has completed division. 2

**Q 8. Given figure represents a molecule of a triglyceride.**



- a. Redraw the structure in the answer sheet and label the components A and C and the bond B. 2
- b. Is this a saturated or unsaturated triglyceride? Explain your answer. 1
- c. Explain the result of these substances being deposited in the blood vessels. 2
- d. Triglycerides form fat. Name the cells that show fat deposition. Give a characteristic of this tissue. 1
- e. Which type of ecosystem will have organisms that need a deposition of fat under their skin? Construct a food chain including such an organism. 2
- d. Explain the process of absorption of fats in the alimentary canal. 2