



<b>Class: XI</b>	<b>DEPARTMENT OF SCIENCE 2026– 2027</b> <b>SUBJECT: BIOLOGY</b>	<b>Date: 02/05/2026</b>
<b>Worksheet: 03</b>	<b>UNIT- III Cell: Structure and Function</b> <b>CHAPTER:9- BIOMOLECULES</b>	<b>Note:</b> <b>A4 FILE FORMAT</b>
<b>CLASS &amp; SEC:</b>	<b>NAME OF THE STUDENT:</b>	<b>ROLL NO.</b>

**I. MULTIPLE CHOICE QUESTIONS (1M)**

1. A prosthetic group is
  - A. The organic compounds that are tightly bound to the apoenzyme
  - B. The organic compounds that are loosely bound to the apoenzyme
  - C. The inorganic compounds that are tightly bound to the apoenzyme
  - D. The inorganic compounds that are loosely bound to the apoenzyme
2. Identify the components of Adenosine
  - A. Adenine, deoxyribose sugar and phosphate
  - B. Adenine, ribose/deoxyribose sugar and phosphate
  - C. Adenine and phosphate
  - D. Adenine and ribose/deoxyribose sugar
3. Identify the primary metabolite from the following
  - A. Amino acids
  - B. Fatty acids and glycerol
  - C. Both (a) and (b)
  - D. Resins and gums
4. Chitin is a
  - A. Heteropolymer
  - B. Homopolymer
  - C. Polypeptide
  - D. Biomolecule
5. Which of the following is a characteristic of enzymes?
  - A. They are consumed in the reaction.
  - B. They increase the activation energy of reactions
  - C. They are specific to substances
  - D. They function best at high temperatures.

## II. ASSERTION AND REASONING:

Two statements are given - one labelled as Assertion(A) and the other labelled as Reason (R).  
Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

- A. Both Assertion(A) and Reason (R) are true, and Reason (R) is the correct explanation of the Assertion(A).
- B. Both Assertion(A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion(A)
- C. Assertion(A) is true, Reason (R) is false
- D. Assertion(A) is false, Reason (R) is true.

6. **Assertion(A):** Unsaturated fats are more reactive compared with the saturated fats.

**Reason(R):** Unsaturated fats have only single bonds in their structure.

7. **Assertion(A):** Enzymes become inactive below the minimum temperature.

**Reason(R):** The inactivity of the enzyme is due to denaturation.

8. **Assertion(A):** Nucleic acids are essential for the storage and transmission of genetic information

**Reason(R):** DNA is a single-stranded molecule, while RNA is double-stranded.

9. **Assertion(A):** Carbohydrates are the primary source of energy for living organisms.

**Reason(R):** They are easily broken down into glucose.

## III. VERY SHORT ANSWER TYPE QUESTIONS(2M)

- 10. Explain the effect of temperature on enzymatic activity.
- 11. Distinguish between a prosthetic group and a coenzyme.
- 12. Draw the structure of the amino acid, alanine.
- 13. The two strands of DNA are not identical but complementary. Comment.
- 14. What are essential amino acids and non-essential amino acids? Give examples.

## IV. SHORT ANSWER TYPE QUESTIONS (3M)

- 15. What is the competitive inhibition of an enzyme? How is it different from non-competitive inhibition?
- 16. Mention any three differences between DNA and RNA.
- 17. Describe the important properties of enzymes.
- 18. Explain the different types of proteins.

## V. CASE STUDY BASED QUESTIONS (4M)

19. All enzymes (except ribozymes) are proteins. An enzyme, like any other protein, has a primary, secondary, and tertiary structure. The protein functions as an enzyme in its tertiary structure, where active sites are formed.

- A. What is the active site of an enzyme?

B. How are active sites formed?

OR

C. Name an enzyme which is not a protein. Explain its functions.

D. Mention one major difference between inorganic catalysts and enzyme catalysts.

**VI. LONG ANSWER TYPE QUESTIONS (5M)**

20. Explain in brief the primary, secondary and tertiary structures of proteins.

21. Describe the different functions of polysaccharides in living organisms.

**Answer Key**

Q. No.	Answer	
<b>I.</b>	<b>MULTIPLE CHOICE QUESTIONS (1M)</b>	
1	A. The organic compound that is tightly bound to the apoenzyme	
2	D. Adenine and ribose/deoxyribose sugar	
3	C. Both (a) and (b)	
4	A. Heteropolymer	
5	C. They are specific to substances	
	<b>ASSERTION &amp; REASONING</b>	
6	C. A is true, but R is false.	
7	C. A is true, but R is false.	
8	D. Assertion (A) is false, Reason (R) is true.	
9	B. Both Assertion(A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion(A)	
<b>II</b>	<b>VERY SHORT ANSWER TYPE QUESTIONS(2M)</b>	
10	<ul style="list-style-type: none"> <li>• Enzymes generally function in a narrow range of temperature and pH.</li> <li>• Each enzyme shows its highest activity at a particular temperature and pH called the optimum temperature and optimum pH.</li> <li>• Activity declines both below and above the optimum value.</li> <li>• Low temperature preserves the enzyme in a temporarily inactive state because proteins are denatured by heat.</li> </ul>	
11	Prosthetic Group	Coenzyme
	Non-polypeptide unit permanently attached to an enzyme.	Small organic molecules that are temporarily associated with an enzyme.
	Heme in haemoglobin, flavin in flavoproteins.	NAD <sup>+</sup> , coenzyme A
	Tightly and permanently bound to the enzyme.	Loosely and temporarily associated.
	Integral to enzyme activity, it often participates directly in catalysis.	Acts as a carrier for chemical groups or electrons can be reused.
	Remains unchanged during the reaction.	Often modified during the

		reaction but regenerated later.														
	Can be either metal ions or small organic molecules.	Organic molecules.														
12	$  \begin{array}{c}  \text{CH}_3 \\    \\  \text{H}_2\text{N}-\text{C}-\text{COOH} \\    \\  \text{H} \\  \text{Alanine}  \end{array}  $															
13	<p>The strands are made up of different nitrogenous bases. Adenine and cytosine form hydrogen bonds with thymine and guanine, respectively. So, on one strand, when there is adenine, the opposite side of the other strand must contain thymine or vice versa. Similarly, when cytosine is present on one strand, guanine must be present on the other side.</p>															
14	<p>Amino acids are crucial for the growth and development of the body. However, the body cannot synthesize every type of amino acid. Those amino acids that cannot be produced in the body and are acquired through food are called essential amino acids. For example, valine and tryptophan. The amino acids that the body can produce are known as non-essential amino acids. For example, glycine and glutamic acid.</p>															
<b>III</b>	<b>SHORT ANSWER TYPE QUESTIONS (3M)</b>															
15	<p>Nature of competitive inhibitor – structurally similar to substrate, binding to active site, non-competitive inhibitor – dissimilar, binds a site other than the active site)</p>															
16	<p>Mention the differences in sugar – ribose and deoxyribose, nitrogen base – thymine in DNA and uracil in RNA, RNA –single stranded and DNA – double stranded)</p>															
17	<p>(i) The enzymes are generally proteins which are high molecular weight complex globular proteins. They can associate with non-protein substances for their activity.  (ii) The enzymes do not start a chemical reaction but only accelerate it. They combine temporarily with the substrate molecules and are not consumed or changed permanently in the reaction which they catalyse.  (iii) The enzyme-controlled reactions are reversible.  (iv) The enzymes are specific in action. An enzyme catalyses only a particular kind of reaction or acts on a particular substrate only.</p>															
18	<table border="1"> <thead> <tr> <th><b>Protein</b></th> <th><b>Functions</b></th> </tr> </thead> <tbody> <tr> <td>Collagen</td> <td>Intercellular ground substance</td> </tr> <tr> <td>Trypsin</td> <td>Enzyme</td> </tr> <tr> <td>Insulin</td> <td>Hormone</td> </tr> <tr> <td>Antibody</td> <td>Fights infectious agents</td> </tr> <tr> <td>Receptor</td> <td>Sensory reception (smell, taste, hormone, etc.)</td> </tr> <tr> <td>GLUT-4</td> <td>Enables glucose transport into cells</td> </tr> </tbody> </table>		<b>Protein</b>	<b>Functions</b>	Collagen	Intercellular ground substance	Trypsin	Enzyme	Insulin	Hormone	Antibody	Fights infectious agents	Receptor	Sensory reception (smell, taste, hormone, etc.)	GLUT-4	Enables glucose transport into cells
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<b>IV</b>	<b>CASE STUDY BASED QUESTIONS (4M)</b>
19	<p>A. The active site of an enzyme is the region where substrates bind and undergo a chemical reaction.</p> <p>B. Active sites are formed through the folding of the enzyme into its specific three-dimensional shape.</p> <p style="text-align: center;">OR</p> <p>C. i) An enzyme that is not a protein is a ribozyme. ii) Its function is to catalyse biochemical reactions involving RNA.</p> <p>D. Inorganic catalysts work efficiently at high temperatures and high pressures, while enzymes get damaged at high temperatures.</p>
<b>V</b>	<b>LONG ANSWER TYPE QUESTIONS (5M)</b>
20	<p>The tertiary structure of proteins contains many amino acid units that form polypeptides. The peptide bonds hold the amino acids together in a particular way, constituting the protein molecules' primary structure. A functional protein is described as a protein that contains one or more polypeptide chains.</p> <p>Through the formation of hydrogen bonds, the peptide chains assume a secondary structure where the secondary protein may be in the form of a twisted helical structure or a pleated sheet structure.</p> <p>When the individual peptide chains made of amino acids of the secondary structure of the protein are further coiled and folded into sphere-like structures with the hydrogen bonds between the amino and carboxyl groups, cross-linking on-chain to another occurs as they form the tertiary structure.</p>
21	<p>Polysaccharides have many different types of functions, which can be classified as –</p> <p><b>Food storage polysaccharides:</b> These are the type of saccharides that store food. Common examples of food-storing polysaccharides are starch and glycogen.</p> <p>Starch: It is formed as a product of the photosynthesis process. It is found in large quantities in edible items like rice, wheat, etc. It is the major energy-giving substance as it performs the storage of food.</p> <p>Polysaccharides are relatively easy to store and easily break down by many enzymes to release energy.</p> <p><b>Structural Polysaccharides:</b> These contain the polysaccharides responsible for an organism's formation. They contain cellulose and chitin.</p> <p>Cellulose: It is specifically a plant product and the most abundant material found in the living world. Substances like wood and cotton have large quantities of cellulose.</p> <p>Chitin: Chitin is distinctly like cellulose in many ways. The only exception is that its basic unit is not glucose but a similar molecule called N-acetylglucosamine that contains nitrogen.</p>

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