



Attempt all questions before checking the answer key. Draw open-chain/cyclic structures only where asked; use clear linkage and functional-group labels.

A. Very short answers - 1 mark each

1. Define a monosaccharide.
2. What is a reducing sugar?
3. Name the linkage joining amino acids in proteins.
4. What is denaturation of a protein?
5. Name the pentose sugar present in RNA.
6. Which vitamin deficiency causes scurvy?

B. Short answers / practice - 2 marks each

7. Distinguish glucose from fructose by their open-chain carbonyl functional groups.
8. Why is sucrose non-reducing whereas maltose is reducing?
9. Name the monosaccharides obtained on hydrolysis of sucrose and lactose.
10. What is a zwitterion? Illustrate using glycine.
11. Distinguish a nucleoside from a nucleotide.
12. Classify vitamins A, B, C, D, E and K as water- or fat-soluble.
13. Is glucose a reducing sugar?
14. Does sucrose have a free anomeric hemiacetal group?
15. How many monosaccharide molecules result from one sucrose molecule on hydrolysis?
16. Name the base present in RNA in place of thymine.
17. Does ordinary protein denaturation necessarily break peptide bonds?
18. Find peptide bonds in an open-chain tetrapeptide.

C. Short answers - 3 marks each

19. Explain what glucose's reactions with hydroxylamine, acetic anhydride and bromine water reveal about its structure.
20. Explain two observations that cannot be satisfactorily explained by a purely open-chain glucose structure.

21. Compare starch and cellulose in monomer, glycosidic linkage and biological role.
22. Distinguish primary, secondary and tertiary structures of proteins.
23. Explain enzyme specificity and the effects of temperature and pH on enzyme activity qualitatively.
24. Compare DNA and RNA in sugar, nitrogenous bases, typical strand structure and broad biological roles.

D. Long answers - 5 marks each

25. Discuss structural evidence for glucose: carbon chain, aldehyde group, hydroxyl groups and cyclic hemiacetal formation. Explain α and β anomers and why their interconversion is possible in solution.
26. Classify carbohydrates as monosaccharides, oligosaccharides and polysaccharides with examples. Compare hydrolysis and reducing behaviour of sucrose, maltose, starch and cellulose.
27. Explain peptide-bond formation, protein structural levels and denaturation. Distinguish a change in folded structure from hydrolysis of peptide bonds, giving examples.
28. Describe DNA's basic chemical composition and double-helical organisation, including complementary base pairing. Compare it with RNA and state the roles of nucleic acids in heredity and protein synthesis.
29. List vitamins A, B₁, B₁₂, C, D and K with one principal function and a deficiency effect for each. Explain why deficiency risk and body storage differ between water- and fat-soluble vitamins.
30. Compare enzymes and hormones in function, chemical nature and mode of action at the NCERT level. Give two examples of each and explain why not every hormone is a protein.

ANSWER KEY - Numerical / short answers

- 13) Yes. 14) No. 15) 2: glucose and fructose. 16) Uracil. 17) No; it mainly disrupts higher-order structure. 18) 3.