2018

(October)

BIOCHEMISTRY

(Honours)

(BCHEM –101)

(Biomolecules and Biophysical Techniques)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **four** questions, taking at least **one** from each Part

PART—A

1. *(a)* Explain how the concept of pH is derived from the ion product of water. 5

(b) For a solution whose pH is 6·0, what is $[H^+]$? If $[H^+]$ is $5\times10^{-7}M$, what is the pH? 4

(c) "Buffers resist a change in pH under addition of small amounts of acid or base." Explain. 5

2. *(a)* What are carbohydrates? How do you classify carbohydrates? 2+3=5

(b) Write the structures of α-D-glucose and β-D-glucose. What type of isomerism do they represent?

(c) How are glycosidic bonds formed? Write the structure of lactose and sucrose. What type of glycosidic linkage is present in both the sugars? 2+2+2=6

3. *(a)* Explain the forces that stabilize the tertiary structures of proteins.

(b) Discuss the salient features of α-helix and β-pleated sheet.

4. *(a)* Explain the role of fatty acid derivatives as detergents.

(b) Discuss the general structure and function of acyl glycerol and prostaglandins.

5. *(a)* Explain the biological role, chemistry and structure of DNA.

(b) What is T_m? Describe the factors that influence T_m during the denaturation of DNA.

(Continued

PART—B

6. *(a)* A protein *x* was found to have molecular mass of 40 kDa using Native-PAGE. However, when the same protein was separated using SDS-PAGE it was found that two bands were formed corresponding to 30 kDa and 10 kDa. Using this information, discuss the subunit compositions and structure of protein *x*. 4

(b) Describe the principle underlying electrophoresis. Explain why the results obtained using Native-PAGE differ from that of SDS-PAGE even though the same protein sample was used. 4+6=10

7. Write short notes on any *two* of the following : 7×2=14

(a) Affinity chromatography

(b) UV and visible spectrophotometry

(c) Quenching and autoradiography

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