

B.Sc. Semester - 1 (CBCS) Examination
Oct/Nov-2024 (As Per Syllabus Year June-2018)
BIO-CHEMISTRY(CORE)

Time: 2:30 Hours**Marks: 70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

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- Que.1(A) Answer the following (Any one out of Two) (07)
- (1) Describe the importance of Van der Waals forces in biomolecular interactions.
 - (2) Discuss the physical and chemical properties of water that make it essential for life.
- Que.1(B) Attempt any one (Any one out of Two) (04)
- (1) Explain the role of water as a biological solvent and its significance for living organisms.
 - (2) Differentiate between inter-molecular and intra-molecular hydrogen bonds with examples.
- Que.1(C) Attempt any three (out of five) (03)
- (1) What is Biological solvent?
 - (2) Which bond is strongest bond?
 - (3) Define Atom.
 - (4) Define hydrophilic interactions
 - (5) Give an example of ionic bond
- Que.2(A) Answer the following (Any one out of Two) (07)
- (1) Compare and contrast the First and Second Laws of Thermodynamics with examples from biological systems.
 - (2) Define free energy, standard energy and High energy compounds.
- Que.2(B) Attempt any one (Any one out of Two) (04)
- (1) Describe the role of redox potential in biochemical reactions.
 - (2) Explain the significance of Gibbs free energy in biochemical reactions
- Que.2(C) Attempt any three (out of five) (03)
- (1) What is a thermodynamic system?
 - (2) State the First Law of Thermodynamics.
 - (3) What is free energy?
 - (4) Define standard free energy change (ΔG°).
 - (5) What are high-energy compounds?
- Que.3(A) Answer the following (Any one out of Two) (07)
- (1) Compare and contrast the titration curves of a weak acid with a strong base. Include key features such as the equivalence point and the buffer region.
 - (2) Discuss the factors affecting the buffer capacity of a solution and provide an example of a physiological buffer and its importance.
- Que.3(B) Attempt any one (Any one out of Two) (04)
- (1) Explain the shape of the titration curve for a strong acid with a strong base.
 - (2) Describe the Henderson-Hasselbalch equation and its application.

- Que.3(C) Attempt any three (out of five) (03)
- (1) What is the meaning of the term "pH"?
 - (2) Define the term "pKa".
 - (3) What does a high pH value indicate about a solution?
 - (4) What is the principle behind a pH meter?
 - (5) What is a buffer solution?
- Que.4(A) Answer the following (Any one out of Two) (07)
- (1) Discuss the factors affecting the rate of diffusion and provide an example of how diffusion is important in biological systems.
 - (2) Explain the principles of adsorption and its biological importance. Provide an example of adsorption in life sciences.
- Que.4(B) Attempt any one. (Any one out of Two) (04)
- (1) Describe the basic principle of osmosis in biological systems.
 - (2) Explain how viscosity impacts the flow of blood in the circulatory system.
- Que.4(C) Attempt any three (Out of Five) (03)
- (1) What is osmosis?
 - (2) How does viscosity affect the movement of molecules in a liquid?
 - (3) What is diffusion?
 - (4) Define adsorption.
 - (5) How does temperature affect diffusion?
- Que.5(A) Answer the following (Any one out of Two) 7 Marks (07)
- (1) Calculate the molality of a solution prepared by dissolving 20 grams of glucose ($C_6H_{12}O_6$, molar mass = 180 g/mol) in 250 grams of water.
 - (2) Describe the steps to prepare a 10% (w/v) NaCl solution and a 5% (v/v) ethanol solution.
- Que.5(B) Attempt any one (Any one out of Two) (04)
- (1) How would you prepare a 1 M solution of NaCl from solid NaCl?
 - (2) Explain the concept of stock solutions and how they are used to prepare working solutions.
- Que.5(C) Attempt any three (Out of Five) (03)
- (1) Define Mole
 - (2) what is W/V?
 - (3) Give a formula of molarity
 - (4) Define specific gravity
 - (5) write a definition of Normality
