PART C — (3 × 10 = 30)

Answer any THREE questions.

16. Explain the step-by-step procedure involved in the differential centrifugation of cells and organelles, highlighting its importance in cell biology research.

17. Discuss the principle and applications of affinity chromatography, emphasizing its role in the purification of proteins and other biomolecules. Highlight any challenges associated with this technique.

18. Discuss the basic principles of electrophoresis and the factors that affect electrophoretic mobility. Discuss how these principles are applied in various electrophoresis techniques.

19. Discuss the principle and mathematical expression of The Beer-Lambert Law. Explain how it is applied to determine the concentration of a solute in a solution. Highlight its limitations and situations where it may not be applicable.

20. Explain the Bragg's equation in detail, including the significance of the terms involved. How is it used to determine the spacing between crystal lattice planes?

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(For candidates admitted from 2016–2021 Batch)

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Part III — Allied

APPLIED BIOCHEMISTRY

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20)

Answer ALL questions.

1. What is an ultracentrifuge, and when is it typically used?

2. What are the factors that can affect the sedimentation equilibrium of molecules?

3. Explain the principle of partition chromatography.

4. Define sedimentation velocity in the context of molecular weight determination.

5. How does voltage affect the migration of molecules in electrophoresis?

6. State the applications of capillary electrophoresis.

7. What does AAS stand for, and what is its primary application?

8. What is the basic principle of a photoelectric colorimeter?

9. Describe the basic principle of X-ray diffraction.

10. What is a unit cell in the context of crystal structures?

PART B — (5 × 5 = 25)

Answer ALL questions, Choosing either (a) or (b).

11. (a) Describe the basic principles of sedimentation and how it is used to separate particles in a centrifuge.

Or

(b) Elaborate on the concept of density gradient centrifugation and how it is employed to separate biomolecules based on density.

12. (a) Explain the differences between thin-layer chromatography (TLC) and high-performance thin-layer chromatography (HPTLC), emphasizing their respective roles in analytical chemistry.

Or

(b) Describe the key components of a gas chromatograph and explain how each contributes to separation and analysis of compounds.

13. (a) Compare and contrast two-dimensional electrophoresis and isoelectric focusing in terms of their principles, methods, and applications in proteomics and protein characterization.

Or

(b) Discuss in detail the technique of agarose gel electrophoresis and provide examples of its applications in molecular biology.

14. (a) Compare and contrast the applications of UV-visible spectroscopy and atomic absorption spectrophotometry in the analysis of elements and compounds. Provide examples of each application.

Or

(b) Describe the basic design of a photoelectric colorimeter, including its key components and their functions. How does it measure the concentration of a substance?

15. (a) Explain Miller indices and how they are used to represent crystallographic planes and directions. Provide examples to illustrate their use.

Or

(b) Discuss the concept of the reciprocal lattice in crystallography, including its definition and importance in understanding diffraction patterns.