

B.Sc. Semester - 4 (CBCS) Examination
March/April-2025 [NEW COURSE]
BioChemistry-BC401(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 principles and working of a double-beam spectrophotometer.
 - 2) Explain the Beer-Lambert law and discuss its limitations in detail.
- Que-1 (B) Attempt any one. (Out of Two) (04)
- 1) Differentiate between single-beam and double-beam spectrophotometers.
 - 2) Explain any four applications of UV-Visible spectroscopy.
- Que-1 (C) Attempt any three. (Out of Five) (03)
- 1) The wavelength range of UV-Visible spectroscopy is from _____ to _____ nm.
 - 2) According to Beer-Lambert's law, absorbance is directly proportional to _____ and _____.
 - 3) The molar extinction coefficient depends on the nature of the absorbing substance and the solvent used. (True/False)
 - 4) A single-beam spectrophotometer measures the intensity of light before and after passing through the sample at the same time. (True/False)
 - 5) Define: Biochemistry
- Que-2 (A) Answer the following. (Any one Out of two) (07)
- 1) Explain the principles and techniques of preparative centrifugation with examples.
 - 2) Describe the instrumentation and working of an analytical ultracentrifuge.
- Que-2 (B) Attempt any one. (Out of two) (04)
- 1) Differentiate between centrifugal force and relative centrifugal force.
 - 2) Name three key applications of analytical centrifugation.
- Que-2 (C) Attempt any three. (Out of Five) (03)
- 1) The force acting on a particle due to rotation in a centrifuge is called _____ force.
 - 2) The formula to calculate Relative Centrifugal Force (RCF) is _____.
 - 3) The sedimentation rate of a particle in a centrifuge depends only on its mass. (True/False)
 - 4) Analytical centrifugation is primarily used for purifying biological samples. (True/False)
 - 5) What is the primary purpose of preparative centrifugation?
- Que-3 (A) Answer the following. (Any one Out of two) (07)
- 1) Explain the biological hazards of radiation exposure and the safety measures required while handling radioisotopes.
 - 2) Describe the working principles and applications of liquid scintillation counting.
- Que-3 (B) Attempt any one. (Out of two) (04)
- 1) Differentiate between gas ionization detectors and liquid scintillation counters.
 - 2) List two biological applications of radioisotopes.

- Que-3 (C) Attempt any three. (Out of Five) (03)
- 1) The SI unit of radioactivity is _____.
 - 2) _____ and _____ are two commonly used techniques for measuring radioactivity.
 - 3) Gamma emitters are commonly used in biological studies because they have high penetration power. (True/False)
 - 4) Liquid scintillation counting is primarily used for detecting alpha radiation. (True/False)
 - 5) Name any two radioisotopes commonly used in biochemical research.
- Que-4 (A) Answer the following. (Any one Out of two) (07)
- 1) Explain the principle, method, and application of Ion Exchange Chromatography.
 - 2) Describe the working and advantages of HPLC.
- Que-4 (B) Attempt any one. (Out of two) (04)
- 1) Differentiate between Paper Chromatography and Thin-Layer Chromatography.
 - 2) How does Molecular Sieve Chromatography separate molecules?
- Que-4 (C) Attempt any three. (Out of Five) (03)
- 1) Molecular sieve chromatography separates molecules based on their charge. (True/False)
 - 2) High-Performance Liquid Chromatography (HPLC) has higher resolution and sensitivity than Paper Chromatography. (True/False)
 - 3) In thin-layer chromatography (TLC), the separation of compounds is based on their differences in _____ and _____.
 - 4) The stationary phase in ion exchange chromatography consists of _____ resins.
 - 5) What is the mobile phase used in Gas-Liquid Chromatography (GLC)?
- Que-5 (A) Answer the following. (Any one Out of two) (07)
- 1) Explain the principle, materials used, and applications of Agarose gel electrophoresis.
 - 2) Describe the technique of Isoelectric Focusing and its importance in protein separation.
- Que-5 (B) Attempt any one. (Out of two) (04)
- 1) Differentiate between Agarose gel electrophoresis and Polyacrylamide gel electrophoresis.
 - 2) What is the significance of 2-D gel electrophoresis in protein analysis?
- Que-5 (C) Attempt any three. (Out of Five) (03)
- 1) The movement of charged particles in an electric field during electrophoresis is called _____.
 - 2) In SDS-PAGE, proteins are separated based on their _____.
 - 3) Agarose gel electrophoresis is primarily used for separating proteins. (True/False)
 - 4) The isoelectric point (pI) of a protein is the pH at which it carries no net charge. (True/False)
 - 5) Name one factor that affects electrophoretic mobility.
