

M.Sc. (Botany) Semester - 2 (CBCS) Examination
March/April – 2025 (As Per Syllabus Year-2023)
Analytical Techniques (Ict-2)

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 Answer the following (any seven out of Eight, each of two marks) (14)**
- 1) What is fluorescence microscopy and how is it useful in cell biology?
 - 2) What is the importance of embedding in tissue preparation for microscopy?
 - 3) What information can UV spectroscopy provide about biomolecules?
 - 4) How does Raman spectroscopy differ from IR spectroscopy in principle?
 - 5) Define the principle of gel permeation chromatography.
 - 6) How is GC-MS useful in analytical biology?
 - 7) What is the difference between SDS-PAGE and native PAGE?
 - 8) Define blotting and mention one type used in molecular biology.
- Que-2 Answer the following (any two) (14)**
- 1) Explain tissue fixation and staining techniques. Why are they important in microscopic analysis?
 - 2) Explain the principle, method, and significance of fluorescence microscopy in biological research.
 - 3) Describe the principles and working mechanism of transmission and scanning electron microscopes.
- Que-3 Answer the following (any two) (14)**
- 1) Write a comparative account of Raman and ESR spectroscopy.
 - 2) How are neutron diffraction and X-ray diffraction used to elucidate the 3D structures of macromolecules?
 - 3) Describe the principle of mass spectrometry and its applications in molecular biology.
- Que-4 Answer the following (any two) (14)**
- 1) Describe the principles and types of chromatography. Mention two applications for each type.
 - 2) Explain the principle and applications of affinity chromatography in protein purification.
 - 3) Write a detailed account of HPLC and FPLC. How are these methods different from each other?
- Que-5 Answer the following (any two) (14)**
- 1) Discuss the principle, types, and applications of centrifugation techniques in molecular biology.
 - 2) Explain the methodology and advantages of 2D-PAGE in protein analysis.
 - 3) Describe agarose gel electrophoresis and SDS-PAGE. How are they useful in nucleic acid and protein analysis?
