

B.Sc. Semester - 5 (Remedial) (NEP-2020) Examination**March/April-2026****BIT: Analytical Methods and Approaches (Theory) (Minor-4)****Time: 2:00 Hours****Marks:50****Instructions:**

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

- Que.1 (1) Explain the working principle of simple microscopy and mention its limitations. (05)
(2) Describe the principle of phase contrast microscopy and its advantage in observing living cells. (05)

OR

- (1) What is the principle of fluorescence microscopy? Give one clinical application (05)
(2) Write a short note on dark field microscopy with its diagnostic importance. (05)
- Que.2 (1) Describe the principle of colorimetry and its use in quantitative estimation of biomolecules. (05)
(2) State the principle of centrifugation and explain the difference between differential and density gradient centrifugation (05)

OR

- (1) What are cell fractionation techniques? Give two examples of how they are applied in microbial studies. (05)
(2) Explain the method of isolation of sub-cellular organelles using centrifugation and give one example of an organelle isolated. (05)
- Que.3 (1) State the principle of chromatography and explain why it is useful in microbiological research. (05)
(2) Differentiate between paper chromatography and thin layer chromatography (TLC) with one example each. (05)

OR

- (1) Explain the working principle of gel filtration chromatography and mention one use in protein separation. (05)
(2) Compare affinity chromatography and ion exchange chromatography with respect to separation basis. (05)
- Que.4 (1) Write a short note on SDS-PAGE and explain how it differs from native PAGE. (05)
(2) Describe the principle and application of agarose gel electrophoresis. (05)

OR

- (1) What is pulse field gel electrophoresis (PFGE)? Mention one major use in microbiology. (05)
(2) What is the principle of the Western blotting technique and how is it applied in protein detection? (05)
- Que.5 (1) Differentiate between Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM) based on principle and use. (05)
(2) Explain the principle of absorption fluorimetry and mention one of its applications in microbiology. (05)

OR

- (1) What is High Performance Liquid Chromatography (HPLC)? Mention one advantage it has over conventional chromatography. (05)
(2) Define isoelectric focusing. How does it separate proteins? (05)
