

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur (GIET University)



B. Tech (Fourth Semester – Regular/Supplementary) Examinations, April 2026

23BBTPC24004 – Bio-Analytical Techniques

(Biotechnology)

Time: 3 hrs

Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer *ALL* questions

- | | CO # | Blooms Level |
|--|------|--------------|
| a. What is the "Fingerprint Region" in IR spectroscopy | CO1 | K1 |
| b. Why dehydration step is required in microscopy sample preparation. | CO2 | K2 |
| c. What is the principle of Isoelectric Focusing (IEF)? | CO3 | K3 |
| d. What is Retention Time | CO4 | K2 |
| e. How are chromatographic methods classified based on the mobile phase? | CO3 | K2 |

PART – B

(10 x 5 = 50 Marks)

Answer *ALL* the questions

- | | Marks | CO # | Blooms Level |
|---|-------|------|--------------|
| 2. a. Explain the principle and applications of NMR Spectroscopy. | 5 | CO1 | K2 |
| b. Describe laws of light relevant to microscopy. | 5 | CO1 | K2 |
| (OR) | | | |
| c. Explain ESR Spectroscopy and its applications. | 5 | CO1 | K2 |
| d. Explain UV-Visible Spectroscopy with principle and instrumentation. | 5 | CO1 | K3 |
| 3.a. Explain the working principle of TEM with neat diagram | 5 | CO2 | K2 |
| b. Explain the Phase Contrast microscopy, working principle with neat diagram. | 5 | CO2 | K2 |
| (OR) | | | |
| c. Discuss about the Sample preparation for SEM and TEM microscopy | 5 | CO2 | K3 |
| d. Basic Principle of Sedimentation | 5 | CO2 | K3 |
| 4.a. Explain the working of PCR and reagents used. | 5 | CO5 | K3 |
| b. Describe the working of Isoelectric Focusing. | 5 | CO3 | K2 |
| (OR) | | | |
| c. Illustrate the 2D PAGE | 5 | CO5 | K3 |
| d. Discuss in detail about the Agarose Gel Electrophoresis | 5 | CO3 | K2 |
| 5.a. What is HPLC. Discuss about in detail about its working and also discuss about | 10 | CO4 | K4 |
| a) Reverse phase HPLC | | | |
| b) Normal phase HPLC | | | |
| (OR) | | | |
| c. Explain Paper Chromatography technique in detail procedure. | 5 | CO5 | K2 |
| d. Discuss about Ion Exchange Chromatography. | 5 | CO4 | K3 |
| 6.a. Explain in detail about Geiger-Muller Monitor Method for radiation detection. | 5 | CO5 | K2 |
| b. Define Distribution Coefficient. Explain about its importance in Chromatography. | 5 | CO4 | K3 |
| (OR) | | | |
| c. What are the safety aspects of handling radioactive materials. | 5 | CO5 | K2 |
| d. Discuss in detail about the Northern blotting technique and its application | 5 | CO5 | K3 |

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