GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)

B. Tech (Fourth Semester - Regular) Examinations, April – 2025

23BBTPC24004 – Bio-analytical Techniques

(Biotechnology)

Time: 3 hrs Maximum: 60 Marks

Answer ALL questions

(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.	How is Beer-Lambert's law applied in determining the concentration of a biomolecule?	CO1	K2
b.	How does phase-contrast microscopy enhance the visibility of transparent specimens?	CO2	K2
c.	What role does agarose play in electrophoretic separation of nucleic acids?	CO3	K1
d.	What is retention time in chromatography, and how is it useful in identifying compounds?	CO4	K2
e.	Why is autoradiography preferred for localizing radioactive compounds in biological samples?	CO5	K2

PART – B **(10 x 5 = 50 Marks)**

	Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a.	Critically analyze the principle, instrumentation and applications NMR spectroscopy in determining the structure of biomolecule.	10	CO1	K4
	(OR)			
b.	Describe the working principle, instrumentation and applications of UV-Visible spectroscopy.	5	CO1	K3
c.	Analyze the significance of X-ray crystallography in determining 3D structures of macromolecules.	5	CO1	K4
3.a.	Explain the principle and functioning of electron microscopy. Illustrate how TEM and SEM differ in image formation and usage.	10	CO2	K3
	(OR)			
b.	Explain the principle and instrumentation of fluorescence microscopy with an example of its application.	5	CO2	K3
c.	Describe the principle and procedure of differential centrifugation and its biological applications.	5	CO2	K3
4.a.	Explain the working principles and procedure of Southern hybridization techniques.	10	CO3	K3
	(OR)			
b.	Explain the application of gradient gels in protein separation and their advantages over uniform gels.	5	CO3	K3
c.	Differentiate between native PAGE and SDS-PAGE in terms of protein separation.	5	CO3	K4
5.a.	Explain the operational principle of HPLC. Discuss its instrumentation and applications in biochemical analysis.	10	CO4	K3
	(OR)			

b.	Explain the working principle and application of ion exchange chromatography in protein purification.	5	CO4	K3
c.	Analyze the role of affinity chromatography in the purification of biomolecules with high specificity.	5	CO4	K4
6.a.	Describe the principle, procedure and applications of liquid scintillation counting in biological research.	10	CO5	K3
	(OR)			
b.	Discuss the principle and applications of autoradiography.	5	CO5	K3
c.	Analyze the importance of safety protocols in handling radioactive materials in a laboratory setting.	5	CO5	K4

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