BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M. SC. **SEMESTER : II**
BRANCH: BIOTECHNOLOGY **SESSION: SP/2025**

SUBJECT: BT418 ANALYTICAL TECHNIQUES IN BIOTECHNOLOGY

TIME: 3 HOURS **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Calculate the RCF_{min}, RCF_{av} and RCF_{max} for a centrifuge tube rotating at 40000 rpm and in which the distance between the rotation axis and the meniscus is 16 cm and the average distance during centrifugation is 20.5 cm. What will happen to RCF_{max} if the rotating speed is further increased by 10000 rpm?	[3]	CO3	B5
Q.1(b)	For the pelleting of the microsomal fraction from a liver homogenate, an ultracentrifuge is operated at a speed of 60000 rpm. Calculate the angular velocity, ω, in radians per second.	[2]	CO3	B5
Q.1(c)	Create a schematic representation of an Atomic Force Microscope, emphasizing the function of the main components.	[5]	CO1	B6
Q.2(a)	How are you going to analyze the isolated samples of DNA to find out their size? Explain the process in detail.	[5]	CO1, CO3	B4
Q.2(b)	Describe the various steps involved in SDS- PAGE starting from sample preparation.	[5]	CO1, CO3	B4
Q.3(a)	Why are Tswett's experiments a pioneer in the field of chromatography? Support your answer with a schematic of a proper modern chromatographic equipment.	[5]	CO1, CO2	B6
Q.3(b)	Explain the principle of ion exchange chromatography. Give examples of cationic and anionic resins used in ion exchange chromatography.	[5]	CO1, CO3	B5
Q.4(a)	Analyze the relationship between Absorbance, % of transmission, and molecular absorptivity, and mention the limiting factors affecting this relation.	[5]	CO3, CO4	B4
Q.4(b)	Describe the instrumentation of a beam UV-Vis spectrophotometer and also mention its applications.	[5]	CO1, CO4	B4
Q.5(a)	Explain the instrumentation and applications of ICP.	[5]	CO1	B4
Q.5(b)	Design a mass spectrometer instrument and show the different stages of analysis.	[5]	CO1, CO4	B5

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