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

CLASS: M. Sc./Pre_PhD **SEMESTER : II/I**
BRANCH: Biotechnology **SESSION: SP/2024**

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)	For the pelleting of the microsomal fraction from a liver homogenate, an ultracentrifuge is operated at a speed of 70000 rpm. Calculate the angular velocity, ω, in radians per second.	[2]	**CO3**	**B5**
Q.1(b)	Calculate the RCFmin, RCFav and RCFmax for a centrifuge tube rotating at 60000 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 RCFmax if the rotating speed is further increased by 12000 rpm?	[3]	**CO3**	**B5**
Q.1(c)	Create a schematic representation of a Scanning Electron Microscope emphasizing the function of main components.	[5]	**CO1**	**B6**
Q.2(a)	How are you going to analyze the isolated samples of DNA to find out its 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)	What is the principle of Affinity chromatography? Explain the process of affinity chromatography in detail.	[5]	**CO1, CO2**	**B6**
Q.3(b)	Explain the term with proper figures (i) Capacity factor (ii) Selectivity (iv) Resolution	[5]	**CO1, CO3**	**B5**
Q.4(a)	Derive Beers Lambert Law and mention its limitations.	[5]	**CO3, CO4**	**B4**
Q.4(b)	Give a neat sketch of the single and dual-beam UV-visible spectrophotometer and list the components and their functions.	[5]	**CO1, CO4**	**B4**
Q.5(a)	Design a mass spectrometer equipment and show the different stages of analysis.	[5]	CO5	B6
Q.5(b)	Describe the instrumentation of TGA. Give any example of thermogravimetric measurement.	[5]	**CO1, CO4**	**B5**

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