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

CLASS: B.TECH. **SEMESTER : VII/ADD**
BRANCH: CHEMICAL ENGINEERING **SESSION : MO/2024**

SUBJECT: CL421 FIBER SCIENCE AND TECHNOLOGY

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)	Write down the chemical structures and names of the precursors used for manufacturing the following fibres: PAN, PET, NOMEX Write down the most suitable fibres that are used for the following applications and justify their use: ballistic jacket, pump bearings	[3+2]]	1	1
Q.1(b)	Describe the manufacturing procedure of Aramid Paper. Illustrate the salient features and application of such paper.	[3+2]	1	1
Q.2(a)	Derive the expression of "spin stretch" for wet spinning.	[5]	3	2
Q.2(b)	Draw the i) wet spinning ii) dry jet wet spinning and iii) dry spinning line for manufacturing fibres and compare the features seen in these techniques.	[3+2]	3	1
Q.3(a)	Calculate the mass of one filament for 240/12 denier PET fibre coming out at 3200m/minute. Describe the various spin finishes used on fibres produced by melt spinning. Give examples of various spin finishes.	[2+3]	2	3
Q.3(b)	Write down the salient features of air-cooling systems used after melt spinning. Compare the various types of cooling arrangements in melt spinning line.	[2+3]	2	4
Q.4(a)	Draw the typical TGA thermogram for a hygroscopic polymer (PF) and explain the significance of different steps shown in the curve. Show the temperature corresponding to different steps as T1, T2 andT3 as T1< T2<T3.	[3+2]	4	1
Q.4(b)	Write down the principle of SEM. Explain the nature of G' Vs. Temperature graph obtained from DMTA with respect to the molecular movements of the material.	[2+3]	4	1
Q.5(a)	Describe the steps of weaving cotton cloth. Illustrate the application of VAT dyes and describe the method of its production.	[2+3]	5	2
Q.5(b)	Describe the process of Jigger dyeing of fabrics. Elaborate the Physical and chemical theories of dyeing fibre/fabrics.	[2+3]	5	2

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