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

CLASS: B. TECH. **SEMESTER : VII**
BRANCH: CHEMICAL ENGG. **SESSION : MO/2025**

SUBJECT: CL421 FIBRE SCIENCE & TECHNOLOGY

TIME: 02 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Describe the salient features of natural and synthetic fibres in terms of chemical composition, manufacturing process and limitations. Give examples.	[3]	1	1
Q.1(b)	Explain the usefulness of the surface treatments given on natural fibre before their use in composite manufacturing.	[2]	1	1
Q.2(a)	Elaborate the manufacturing process of glass fibre and draw the flow chart of the process.	[4]	1	2
Q.2(b)	Write down the chemical structure of repeat units of Nomex and Kevlar.	[1]	2	1
Q.3(a)	Compare the processes of dry, wet and dry jet wet spinning processes by drawing the spinning line of these.	[4]	3	2
Q.3(b)	Explain the limitations of melt spinning.	[1]	2	2
Q.4(a)	Explain the effects of temperature, coagulation bath composition and type of nonsolvent on the texture of wet spun fibres.	[3]	3	2
Q.4(b)	Draw the various stages of development of crystallinity for melt spun fibres. Why are the melted spun fibres less crystalline than wet spun fibres?	[2]	2	2
Q.5(a)	Estimate the Nusselt number of quench air (T_{air}=20˚C) for 240/12 PET yarn if given Cp=1005.6KJ/Kg. ˚C, μ=1.8116 Kg/m.sec and K_{air} =0.026, velocity of air(V)=0.5m/sec and kinematic viscosity of air(v)=15.077x$10^{-6}$$m^2$/sec, C=0.99	[3]	2	3
Q.5(b)	Calculate the filament temperature for the above PET fibre at 1.2 meter from the spinneret when take up speed is 3200rpm and Tm=290˚C.	[2]	2	3

:::::22/09/2025 :::::M