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

CLASS: BTech **SEMESTER : IV**
BRANCH: Chemical Engineering **SESSION : SP/2025**

SUBJECT: CL229A MACROMOLECULAR SCIENCE

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)	Draw the modulus versus temperature plot of a polymer with labeling.	[2]	1	2
Q.1(b)	State the principle of Gel Permeation Chromatography for molecular weight determination.	[3]	5	2
Q.1(c)	Discuss the principle of viscosity average molecular weight.	[5]	2	5
Q.2(a)	Develop Carother's equation for condensation polymerization.	[2]	2	3
Q.2(b)	How does stochiometric imbalance affect the degree of polymerization?	[3]	1	3
Q.2(c)	Discuss the principles, advantages, and drawbacks of Interfacial Polymerization.	[5]	2	2
Q.3(a)	How does cationic polymerization differ from addition polymerization?	[2]	2	2
Q.3(b)	Deduce the rate of polymerization for addition polymerization process.	[3]	2	3
Q.3(c)	What is Zeigler Natta catalyst? Discuss any one mechanism of this catalyst to produce isotactic polymer.	[5]	4	5
Q.4(a)	Write down the ingredients used for Emulsion polymerization with each ingredient's function.	[3]	2	4
Q.4(b)	It is observed that a styrene-butadiene copolymer (δ = 16.5) is insoluble in solvent 1 (δ = 15.45) and solvent 2 (δ = 18.6). At what ratio will the solvents be mixed to dissolve styrene-butadiene copolymer? Interpret the observation with the relevant theory.	[3]	3	4
Q.4(c)	Discuss Flory-Huggins theory for polymer solubility.	[5]	1	5
Q.5(a)	What is toughness? Discuss with the help of tensile curve.	[2]	1	5
Q.5(b)	How does temperature affect the viscosity? Discuss relevant theory.	[3]	1	2
Q.5(c)	Develop the equation of Kelvin Voigt Element and solve for creep, and stress relaxation with appropriate Boundary conditions. Comment on the result.	[5]	3	3

:::::01/05/2025 M:::::