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

CLASS: BTECH **SEMESTER : IV**
BRANCH: CHEMICAL ENGINEERING **SESSION : SP/2024**

SUBJECT: CL229 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)	Classify polymers based on 5 different classification parameters. Give example in each case.	[5]	1	2
Q.1(b)	Discuss the principle of viscosity average molecular weight.	[5]	2	5
Q.2(a)	Develop Carother's equation for condensation polymerization and mention it's usefulness.	[5]	1	3
Q.2(b)	Pure terephthalic acid (HOOC-C_6H_4-COOH) and glycerol (HOH_2C-CHOH-CH_2OH) are used to manufacture polyester. What will be the extent of reaction at its gelation point? Construct a plot degree of polymerization vs. extent of reaction for this reaction.	[5]	5	3
Q.3(a)	What is Zeigler Natta catalyst? Discuss any one mechanism of this catalyst to produce isotactic polymer.	[5]	1	5
Q.3(b)	Develop the copolymerization kinetics equation with reaction mechanism.	[5]	2	3
Q.4(a)	Suspension polymerization is also called 'mini bulk polymerization' – Explain with the relevant theory.	[3]	2	4
Q.4(b)	It is observed that a styrene-butadiene copolymer (δ = 16.5) is insoluble in pentane (δ = 14.5) and ethyl acetate (δ = 18.6), but soluble in a 1 : 1 mixture of the two. Interpret the observation with the relevant theory.	[2]	3	4
Q.4(c)	Discuss Flory-Huggins theory for polymer solubility.	[5]	1	5
Q.5(a)	Construct tensile curves for different types of polymer material behaviour.	[5]	1	5
Q.5(b)	Develop the equation of Maxwell Element and solve for creep, stress relaxation, with appropriate Boundary conditions. Does the model describe actual polymer behaviour?	[5]	3	3

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