

DEPARTMENT OF CHEMISTRY, SCLS
M.Sc. CHEMISTRY
SEMESTER-IV EXAMINATIONS-2023
PAPER CODE: MCHDCE-404
PAPER TITLE: POLYMER CHEMISTRY

Time 3 hours

Maximum Marks 75

Abbreviations Used

CLO- Course Outcome, PLO- Program Outcome, BTL- Bloom Taxonomy Level: BT level 1-Remember; BT level 2-Understand; BT level 3-Apply; BT level 4-Analyse; BT level 5-Evaluate, BT level 6-Create

Section A

(10x2=20Marks)

Q	Very Short Type Questions (Attempt all)	BTL	CLO	PLO
A1.	What are plasticizers used for?	2	1	1
A2.	Why are reactivity ratios important for copolymerization?	4	2	1/2
A3.	Which initiators can be used to initiate cationic polymerization?	6	2	2/3
A4.	Which technique can be used to measure heat flows associated with different transitions in materials as a function of time and temperature?	1	3	3
A5.	What is Poisson's ratio? How does it relate the tensile modulus to the shear modulus?	3	2	3/4
A6.	Which raw materials are required for Polyurethane synthesis?	5	4	2/4
A7.	What is the number average molecular weight of a polymer having 9 moles of MW = 30,000 and 5 moles of MW = 50,000?	2	1	1/2
A8.	What is the purpose of stretching and heat Setting in the spinning of fibers?	1	2	2/3
A9.	Which is the most common procedure for the synthesis of the monomer methyl methacrylate (MMA)?	4	2	1/2
A10.	The term semicrystalline is used to refer to some polymers-justify	1	5	3-5

Section B

(10x2=20 marks)

Q	Long Type questions (Attempt any two out four)	BTL	CLO	PLO
B1.	What is the gel effect? How does it affect the properties of a polymer?	6	3/4	3-5
B2.	Outline the principle of the GPC in the molecular weight determination of a polymer	2/3	3	4/5
B3.	Discuss the Kinetics of step-growth polymerization. What were Flory's assumptions in deducing the rate of the reaction?	4	2-4	3-5
B4.	Discuss the process of Reaction injection molding (RIM) and Rotational molding. Highlight the advantages of these processing techniques.	5/6	5/6	6

Section C

(7x5=35 marks)

Q	Short Type questions. (Attempt all questions)	BTL	CLO	PLO
		2/3	2/4	3/4
C1.	What are spherulites? OR How can the degree of crystallinity be determined by Colorimetry and X-ray diffraction techniques?			
C2.	What is Atom transfer radical polymerization (ATRP) and what are its advantages? OR Give the kinetic scheme for cationic polymerization	3-5	2/3	3-5
C3.	Derive Carothers equation. OR Discuss Ring-opening polymerization, which are the monomers that can be polymerized using this method?	3-5	3/5	3/4
C4.	Discuss the stress-strain curves of different plastics. OR What properties are affected by the tacticity of the polymer, and why?	4-6	3-5	5/6
C5.	Discuss the vulcanization of natural rubber. OR Discuss the PTA route of polyester synthesis	4-6	6	5
C6.	How is syndiotactic polypropylene synthesized using $\text{VCl}_4/\text{Al}(\text{C}_2\text{H}_5)_2\text{Cl}$? OR Give the mechanism of Zirconocene catalyzed polymerization of propylene.	6	4/6	3
C7.	How are sheets formed from thermoforming? OR Which structural factors affect the crystallinity and T_g of a polymer?	3/4	3-5	3/4

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