Roll no. _____

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M.Sc. Chemistry (Semester IV)

MCHDCE-404
Polymer Chemistry

Maximum Marks: 60 **Duration: 2.5 Hours**

Note: This paper has 3 sections A, B, and C, Attempt all three sections; ***Section A:*** *Answer* ***all*** *the questions,* ***Section B****: Answer* ***any 2 out of 4;*** ***Section C:*** *Answer* ***all*** *the questions, each question has an* ***internal choice***

Abbreviations Used: CLO- Course Learning Outcome, PLO- Program learning 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.

Q1.	Attempt **Any Ten** of the following questions (10 x 1.5 =15 marks)	**CLO**	**PLO**
a	Give the Monomeric unit of the following polymers a) PMMA; b) PVC; c) Nylon-66: d)PAN	2	2
b	Justify the correctness of the following statement: Polycarbonates and polyurethanes both shows intermolecular and intramolecular H-bonds	2	2
c	Explain briefly the role of H-bonds in KEVLAR	1-2	1-2
d	Why ring opening polymerisation is more atom economical then condensation polymerisation?	2-3	2-3
e	Differentiate between initiator and quencher.	2	2
f	ESR is very useful in studying condensation polymerisation?	4	4
g	How Cellulose is conversted to Nitrocellulose	3-4	4
h	Define: a) Stopper and b) End Group	3-4	3
i	How cross linking is performed in Natural Rubber	3-5	3
j	What is Calendaring?	2-3	2-3
k	What is Carothers's equation	4	4

Q2	**Attempt any TWO of the following:** **(2 x 10 =20 marks)**		
1	Explain unit operations in Polymer processing. What are the criteria's of manufacturing material suitable for a) Packing and b) Sheets	5-6	5-6
2	Define Degree of polymerisation and what are various effecting degree of polymerisation. Also prove the relation of degree of polymerisation and rate of polymerisation	3-5	3-5

3	Explain the TGA and DSC techniques in characterisation of Polymers	5-6	5-6
4	Explain the preparation, purification and processing of PAN.	4-5	3-5

Q3 Attempt All the question: Short answer type (5 x 5 =25 marks)

A	I.	Derive an expression for determining the rate of polymerisation in a) step growth polymerisation; b) Chain Polymerisation	2-5	2-4
		Or		
	II.	Differentiate between the LDPE and HDPE and briefly explain their preparation.	3-5	3-4
B	I.	A rubber material on treating with H_2O_2 gets brittle explain the mechanism associated and compare behaviour of the material in open air under UV irradiation.	4-5	4-6
		Or		
	II.	Explain why crystallinity of a polymers varies due to structural modification.	4-6	3-6
C	I.	What are the various techniques for the determination of crystallinity?	2-5	2-6
		Or		
	II.	Explain methods for the preparation of polyvinyl carbazole from acetaldehyde.	3-4	3-4
D	I.	How NMR techniques could be employed for the analysis of condensation polymerisation?	4-5	4-5
		Or		
	II.	Write Short note on determination molecular weight of a given polymer.	2-4	2-4
E	I.	Classify polymers on the basis of reaction mechanism.	1-4	1-4
		Or		
	II.	Explain the melting point and glass transition how they are correlated with each other. Why even no. of Carbon containing polymers possesses higher Tg and Tm then their odd no. of carbon analogues?	3-5	3-5