Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 3 – EXAMINATION – SUMMER 2026

Subject Code: 3132301 **Date: 17/06/2026**

Subject Name: Plastics Material Science

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Give structures of: PE, PS, PVC	**03**
	(b)	Differentiate between polymers and low molecular weight compounds.	**04**
	(c)	Explain initiation, propagation and termination steps in free radical polymerization using suitable example.	**07**
Q.2	**(a)**	Explain Linear, Branched and crosslinked polymer structures.	**03**
	(b)	Give difference between Step and Chain Polymerization.	**04**
	(c)	Define Glass transition temperature. Explain various factors affecting glass transition temperature with suitable examples.	**07**
		OR	
Q.2	**(c)**	Classify Polymers with suitable examples.	**07**
Q.3	**(a)**	Define: Polymer, Organic Polymer, Monomer.	**03**
	(b)	Explain Bulk polymerization technique with its advantages.	**04**
	(c)	Explain Number average (Mn) and weight average molecular weight (Mw) concept for Polymers	**07**
		OR	
Q.3	**(a)**	Give difference between Crystalline and Amorphous polymers.	**03**
	(b)	Differentiate between Suspension and Emulsion polymerization.	**04**
	(c)	Discuss Polydispersity and Molecular weight distribution in polymers.	**07**
Q.4	**(a)**	Identify the functionality of following monomers: (i) $CH_2=CH_2$ (ii) $OHCH_2COOH$ (iii) $HOOCC_6H_2(OH)_3$	**03**
	(b)	Define Copolymer and give different types of copolymers with suitable example.	**04**
	(c)	Explain Isotactic, syndiotactic and atactic polymers with suitable example.	**07**
		OR	
Q.4	**(a)**	Define Degree of polymerization (DP) and Calculate the molecular weight of a sample of polyethylene $(-CH_2-CH_2-)_n$, which has number of repeating units i.e, DP is 2000.	**03**
	(b)	Explain Solution Polymerization along with its disadvantages.	**04**
	(c)	Explain factors affecting polymer crystallinity.	**07**
Q.5	**(a)**	Define Natural polymer. Give any two examples of natural polymer.	**03**
	(b)	Write about (1) Hydrolysis (2) Acidolysis with suitable example.	**04**
	(c)	Explain Specific volume v/s temperature graph for highly crystalline, amorphous and partially crystalline polymers.	**07**
		OR	

Q.5 **(a)** State the role of inhibitor. Give any 02-inhibitor used in polymerization. **03**

(b) Explain cationic polymerization steps with suitable example. **04**

(c) Calculate Mn, Mw and Polydispersity Index (PDI) for a polymer consisting of three fractions with molecular weights, 10000, 20000 and 30000. The mole fractions of each of these fractions are found to be 0.2, 0.5 and 0.3 respectively. **07**

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