

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (NEW) EXAMINATION – SUMMER 2019****Subject Code: 2132301****Date: 04/06/2019****Subject Name: Introduction to Plastic 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.

MARKS

- Q.1**
- (a) Define: Monomer, Homochain Polymer, Initiator **03**
- (b) Give functionality of: (i) $\text{HOOCCH}_2\text{COOH}$ (ii) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$ **04**
(iii) $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$ (iv) $\text{H}_2\text{NCH}_2(\text{CH}_2)_4\text{CH}_2\text{NH}_2$
- (c) Give classification of Polymers giving suitable examples. **07**
- Q.2**
- (a) Describe Bulk polymerization technique with advantages. **03**
- (b) Give structures of: PVC, PAN, PMMA, PP **04**
- (c) Differentiate between low molecular weight compound and polymers. **07**
- OR**
- (c) Explain various steps of Cationic Polymerization. **07**
- Q.3**
- (a) Discuss: Linear, Branched and crosslinked polymer structures. **03**
- (b) Give difference between Step and Chain polymerization. **04**
- (c) You have a polymer sample that contains the following molecules: **07**

M_i , g/mol	N
1,000,000	2
700,000	5
400,000	10
100,000	4
50,000	2
Total	23

What are M_n , M_w and the polydispersity index?**OR**

- Q.3**
- (a) Calculate the contour length and the extended chain length of PE Mol. **03**
Given: - $n = 5000$, Bond angle - $109^\circ 28'$, Segment length - 1.54 \AA .
- (b) Write a note on: Suspension Polymerization. **04**
- (c) List the types of Chain Polymerization? Explain Free radical Polymerization in detail. **07**
- Q.4**
- (a) Calculate the degree of polymerization of a sample of polyethylene $[(\text{CH}_2-\text{CH}_2)_n]$, which has a molecular weight of $150,000 \text{ g/mol}$. **03**
- (b) What do you mean by Homopolymer and Copolymer? List the types of copolymers and explain them with suitable example. **04**
- (c) Explain factors influencing the Glass transition temperature with suitable examples. **07**
- OR**
- Q.4**
- (a) What are inhibitors? Give its types and its uses. **03**
- (b) Explain effect of crystallinity on the properties of Polymer. **04**
- (c) Discuss about the tacticity of polymers with example. **07**

- Q.5 (a) Give difference between amorphous & crystalline polymers and their examples. **03**
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- (b) Plot graph for specific volume v/s temperature for highly crystalline, amorphous and partially crystalline polymers and explain. **04**
- (c) Explain Polydispersity & Molecular weight distribution in polymers. **07**
- OR**
- Q.5 (a) Explain relation between: T_g & Molecular weight **03**
- (b) Explain (1) Hydrolysis (2) Aminolysis. **04**
- (c) Explain Emulsion Polymerization technique with schematic diagram. **07**

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