

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2018****Subject Code:2152306****Date:20/11/2018****Subject Name:Chemistry of Plastic Materials****Time: 10:30 AM TO 01:00 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) (1) The Mn of Polypropylene is 106gm/mol. Find the DPn. **03**
 (2) Define Homopolymer and co-polymer.
 (3) List the generalized steps for polymerization.
- (b) (1) Polymers formed by addition polymerization are less crystalline than polymers formed by condensation polymerization. Why? **04**
 (2) Give one example of alternating and block copolymers with structure.
 (3) What is difference between Buna-N and Buna-S rubber?
 (4) Give the classification of Polymer on the basis of Polymerization process.
- (c) What is a Polymer? Explain Addition and Condensation Polymerization with suitable example & Enlist polymerization techniques. **07**
- Q.2** (a) Short note on: Natural Polymer Starch and Lignin. **03**
 (b) Give chemical structure of PTFE. Discuss the properties of PTFE. **04**
 (c) Give ten differences between Thermoplastic and Thermoset. **07**
- OR**
- (c) What is functionality? State the functionality of the monomers: styrene, pentaerythritol, 1, 4-butane diol, ethylene glycol. **07**
- Q.3** (a) Define: Thermoplastic, Thermoset and Polymer **03**
 (b) Explain about addition polymerization with example. **04**
 (c) Give classification of Polymer in detail with example. **07**
- OR**
- Q.3** (a) Write chemistry of formation of Melamine Formaldehyde (MF) **03**
 (b) Explain the manufacturing process of MF with flow diagram. **04**
 (c) Discuss Carothers' Equation in detail. **07**
- Q.4** (a) Give chemical structure of the following polymer: **03**
 (1) PE (2) PVC (3) ABS
 (b) Explain in brief about Tapping (Extraction) of Latex. **04**
 (c) Explain the mechanism of Anionic addition polymerization in detail. **07**

- Q.4** (a) Calculate the number average degree of polymerisation of an equimolecular mixture of hexamethylenediamine and adipic acid for the extents of reaction 0.4 and 0.8. **03**
- (b) What is natural rubber? Give the structure of polyisoprene. **04**
- (c) Explain various types of bonding exist in polymers with example. **07**
- Q.5** (a) In the polymerisation of ω -hydroxy caproic acid, $\text{HO}(\text{CH}_2)_5\text{COOH}$, a 2% impurity present. Calculate the degree of polymerisation of polymer formed. **03**
- (b) What is compounding. Explain vulcanization of rubber in brief. **04**
- (c) Derive the following equation for free radical polymerization **07**
 $R_p = K_p (K_d^{1/2}/K_t^{1/2}) \{ (f [I]^{1/2}) [M] \}$

OR

- Q.5** (a) Derive the equation between number average degree of polymerisation (P) and Kinetic chain length (γ). **03**
- (b) Discuss chemistry, properties and application of HDPE. **04**
- (c) Write structure, properties, and application of chlorinated rubber. **07**

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