

Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 6 – EXAMINATION – SUMMER 2026

Subject Code: 3160511

Date: 29/05/2026

Subject Name: Polymer Science and Technology

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.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1**
- (a) The product ethyl acetate, $\text{CH}_3\text{CH}_2\text{COOCH}_3$ cannot further undergo ester formation justify the statement. 03
- (b) Write two thermoplastic polymer examples. 04
Define block polymer
Write chemical structure of polyvinyl chloride
Example of liner polymer
- (c) Explain the different ways in which polymerization can be classified based on various factors. 07
- Q.2**
- (a) Relate the molecular weight of normal chemical compound with the molecular weight of polymer with an appropriate example 03
- (b) Apply your understanding of T_g to justify why it is called the working temperature and analyze its significance in the design phase of a polymer. 04
- (c) Describe how addition polymerization occurs, citing a suitable industrial example. 07
- OR
- Q.2**
- (c) Discuss coordination polymerization with appropriate example 07
- Q.3**
- (a) Explain the following terms 03
Solubility parameter
Mark-Houwink constants
Sakurda equation
- (b) Given an industrial application such as nylon production, explain how step polymerization is used to synthesize the polymer and justify why this method is suitable. 04
- (c) Define polydispersity and molecular weight distribution in polymers, and explain how polydispersity is linked to molecular weight distribution. 07
- OR
- Q.3**
- (a) Given a monomer like styrene, describe how bulk polymerization can be applied to synthesize the polymer and explain why this method is suitable for industrial production. 03
- (b) Apply your knowledge of polymerization techniques to identify similarities and differences between bulk and solution polymerization in a practical scenario. 04
- (c) Describe emulsion polymerization techniques with appropriate industrial example. 07

Q.4

- (a) The global polymers market is booming, express your idea with appropriate reasons. Predict the growing sector of polymer market by 2030 03
- (b) Explain the different methods by which polymers undergo degradation, giving an example for each type. 04
- (c) Describe how polymers undergo oxidative degradation and illustrate with a specific example. 07

OR

- Q.4**
- (a) Explain how solution polymerization is carried out and why a solvent is used in the process? 03
 - (b) Describe the concept of stereo regularity in polymers and illustrate it with an example. 04
 - (c) Explain the blow molding process and illustrate how it is applied in manufacturing plastic products with the help of a suitable diagram 07

- Q.5**
- (a) Describe the calendaring process in polymer processing and explain its basic principle and purpose. 03
 - (b) A polymer sheet shows uneven thickness after extrusion. Suggest an adjustment in the process to correct it.” 04
 - (c) Differentiate between injection molding and compression molding in terms of process and applications. 07

OR

- Q.5**
- (a) How does UV light affect polymers? 03
 - (b) Explain photo-oxidative degradation of polymers with a suitable example 04
 - (c) Define stereoregular polymerization and explain its significance. 07
