

Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 1 – EXAMINATION – SUMMER
2026

Subject Code: BE01000031/ BE01R00031

Date: 17/06/2026

Subject Name: Chemistry

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)** What are the characteristic of good fuels? **03**
 - (b)** What are alloys? Justify necessity of alloys with example. **04**
 - (c)** What is hardness of water? Differentiate between internal and external treatment for water softening in the boiler. **07**
- Q.2**
- (a)** Write a note on corrosion inhibitors. **03**
 - (b)** Differentiate between scale and sludge formation in the boiler. **04**
 - (c)** Define hybridization in molecule. Give the examples of sp , sp^2 , sp^3 , sp^3d and sp^3d^2 hybridization. **07**

OR

- Q.2**
- (c)** Explain any one type of coal analysis with its significance. **07**
- Q.3**
- (a)** Discuss any one method of heat treatment applied to steel and its purpose. **03**
 - (b)** Explain Heisenberg's uncertainty principle. **04**
 - (c)** Explain electrochemical theory of corrosion with appropriate diagrams. **07**

OR

- Q.3**
- (a)** Define corrosion and list its various types. **03**
 - (b)** Discuss the method of calorific value determination using bomb calorimeter. **04**
 - (c)** Explain fractional distillation of petroleum with a neat and well labeled diagram. **07**

- Q.4** (a) Explain what biodegradable polymers are, providing an example. **03**
(b) Explain hard soft acids and bases concept with examples. **04**
(c) Discuss Ion exchange process of softening of water with neat diagram. **07**

OR

- Q.4** (a) Write a note on photolysis of water. **03**
(b) Explain the principle and working of lithium batteries. **04**
(c) What is 'Fermentation'? Explain manufacturing of ethanol by fermentation process. **07**

- Q.5** (a) Elaborate the properties and applications of fullerenes. **03**
(b) Write a note on application of Nanomaterials. **04**
(c) Discuss the "Top-Down" and "Bottom-Up" approaches for synthesizing nanomaterial. **07**

OR

- Q.5** (a) Provide an overview of the thin layer chromatography. **03**
(b) Discuss the fundamental principle and applications of UV-Visible spectroscopy. **04**
(c) Elucidate the working principle and operational mechanism of infrared spectroscopy with an illustrative diagram. **07**
