

Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 4 – EXAMINATION – SUMMER 2026

Subject Code: 3140508

Date: 16/06/2026

Subject Name: Unit Processes & Chemical 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) Define alkylation and give one industrial example. **03**
 - (b) List environmental issues in chemical manufacturing. **04**
 - (c) State the need for process optimization in chemical industries. **07**
- Q.2**
- (a) State the difference between alkylation and acylation. **03**
 - (b) Differentiate between mercury cell and diaphragm cell. **04**
 - (c) Describe the DCDA process for the manufacture of sulfuric acid. **07**
- OR
- Q.2**
- (c) Explain the process of H₂SO₄ manufacture with flow diagram, reactions, and environmental considerations. **07**
- Q.3**
- (a) Explain the mechanism of nitration of benzene. **03**
 - (b) Explain the manufacturing of Portland cement in detail with chemical reactions and flow diagram. **04**
 - (c) Explain the membrane cell process for caustic soda manufacture with neat flow sheet **07**
- OR
- Q.3**
- (a) List any three important uses of sulfuric acid. **03**
 - (b) Explain the preparation of sodium bicarbonate using Solvay process with flow diagram. **04**
 - (c) Explain the fermentation process for citric acid manufacture with reactions, process flow diagram, and applications. **07**
- Q.4**
- (a) What are the raw materials used in the manufacture of ammonia? **03**
 - (b) Provide flow diagram and reactions required in the manufacturing of urea from ammonia and carbon dioxide **04**
 - (c) Describe Ostwald's process for nitric acid manufacture with process flow sheet, reactions, and efficiency factors. **07**
- OR
- Q.4**
- (a) Define and classify fertilizers with examples. **03**
 - (b) Classify dyes based on their mode of application. **04**
 - (c) Discuss in detail the manufacture of aspirin – raw materials, reactions, process steps, and applications. **07**

- Q.5** (a) Differentiate between wet and dry process for cement manufacture. **03**
(b) List the major vitamins and their sources. **04**
(c) Explain the cracking process in petroleum refinery with types, mechanisms, and industrial significance. **07**

OR

- Q.5** (a) List the properties of good quality paper. **03**
(b) Explain the Kraft process for pulp manufacture. **04**
(c) Discuss polymerization reactions (addition and condensation) with mechanisms and industrial applications. **07**
