

Enrolment No./Seat No _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2024

Subject Code: 3131306

Date: 29-11-2024

Subject Name: Unit Operations & Processes in Chemical Industries

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.

		Marks
Q.1	(a) What is crystallization, and how is it used to purify solids from a solution?	03
	(b) What are the differences between absorption and stripping in terms of operational principles?	04
	(c) Explain liquid- liquid extraction in detail.	07
Q.2	(a) What are the common applications of adsorption in water purification and air filtration?	03
	(b) Explain the difference between simple distillation and fractional distillation.	04
	(c) Describe the construction, working principle and uses of Stripping Tower with neat sketch.	07
	OR	
	(c) Describe the construction, working principle and uses of Heat Exchanger with neat sketch.	07
Q.3	(a) Define: MSDS. Describe the significance of MSDS.	03
	(b) What is the difference between sulfonation and sulfation in terms of chemical processes and products?	04
	(c) Identify the Unit Operation and Unit Process for the Ethanol with neat sketch of process flow diagram.	07
	OR	
Q.3	(a) What is ethylene, and how is it used as a feedstock for the production of ethanol?	03
	(b) What health and safety risks are associated with the handling of sulfonating agents, such as sulfuric acid or chlorosulfonic acid?	04
	(c) Explain manufacturing process of Phenol along with Flow diagram.	07
Q.4	(a) Enlist the applications of Urea.	03
	(b) What health risks are associated with exposure to acetic acid at workplace?	04
	(c) Explain manufacturing process of Urea along with Flow diagram.	07
	OR	
Q.4	(a) What is methanol, and what are its primary applications in industry?	03
	(b) Discuss the main sources of pollution associated with methanol production and the environmental implications of these emissions.	04
	(c) Provide a process flow diagram for the hydrogenation of cottonseed oil, detailing each step from raw material input to the final product.	07

- Q.5** (a) Write down the reaction Chemistry for Ethanol. **03**
(b) What are the health risks associated with exposure to ethyl acetate, and what safety precautions should be taken in the workplace **04**
(c) Describe the manufacturing process for vinyl acetate. **07**

OR

- Q.5** (a) Define the following terms: **03**
1. Boiling Point 2. Melting Point 3. Specific Gravity.
(b) What are the common sources of pollution associated with the furfural manufacturing process? **04**
(c) Provide a process flow diagram for the production of furfural, detailing each stage of the process. **07**
