

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- V EXAMINATION-SUMMER 2023****Subject Code: 3150405****Date: 03/07/2023****Subject Name: Chemical Engineering Fundamentals II****Time: 02:30 PM TO 05:00 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) Define F and K type mass transfer coefficients.	03
	(b) Derive the performance equation of PFR	04
	(c) Explain classification of mass transfer operation with examples of each.	07
Q.2	(a) Explain concept of effective diffusivity.	03
	(b) Define: order of reaction. Discuss Molecularity. Mention the general formulae for the unit of rate constant k.	04
	(c) Explain the temperature dependency term in the rate equation using Arrhenius theory.	07
OR		
	(c) Discuss the system of three liquids – one pair partially soluble on ternary Equilibria for liquid extraction.	07
Q.3	(a) Define Thermal diffusivity and Mass diffusivity.	03
	(b) State and explain Fick's first law of diffusion and explain flux N_A type and J_A type.	04
	(c) State different theories explaining the meaning of mass transfer coefficients. Explain Penetration theory in details.	07
OR		
Q.3	(a) Define and give physical significance of Sherwood number and Schmidt number.	03
	(b) Discuss the criteria for solvent selection in the absorber.	04
	(c) Write a short note on minimum liquid to gas ratio in case of gas absorption.	07
Q.4	(a) What is extraction? Write the application of extraction.	03
	(b) Define: Liquid extraction, Extract, Raffinate., Tie line	04
	(c) Write different equipment's for extraction and explain any one in details.	07
OR		
Q.4	(a) What is leaching? Write the application of leaching.	03
	(b) Carry out material balance for single stage leaching operation and derive equations for the same.	04
	(c) Explain counter current multiple contact, shanks system for leaching with neat figure. .	07
Q.5	(a) Differentiate between Elementary and Non Elementary reactions.	03
	(b) Derive performance equation for CSTR.	04
	(c) Differentiate between Integral and Differential method for analysis for finding order of reaction.	07

OR

- Q.5** (a) Define space-time, space-velocity and holding time. **03**
(b) Derive performance equation for ideal batch reactor. **04**
(c) State difference between temperature dependency from Collision theory and that from Transition-state theory. **07**
