Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – WINTER • 2014

Subject Code: 150404 Date: 01-12-2014

Subject Name: Principles of Process Engineering - II

Time: 10.30 am - 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.**

Q.1	**(a)**	Differentiate between direct and indirect mass transfer operations with examples.	**07**
	(b)	State Fick's first law of diffusion and explain N_A and J_A. Also, prove that for unidirectional binary diffusion $J_A = - J_B$.	**07**
Q.2	**(a)**	State different theories explaining the meaning of mass transfer coefficients. Explain any one in detail.	**07**
	(b)	Explain concept of equilibrium for interphase mass transfer.	**07**
		OR	
	(b)	Oxygen is diffusing through non-diffusing mixture of methane and hydrogen in volume ratio of 2:1. The total pressure is 1×10^5 N/m^2 and the temperature is 0ºC. The partial pressure of oxygen at two planes 2 mm apart is respectively 13000 and 6500 N/m^2. The diffusivities are as… $D_{Oxygen-Hydrogen} = 6.99 \times 10^{-5}$ m^2/s $D_{Oxygen-Methane} = 1.86 \times 10^{-5}$ m^2/s Calculate the rate of diffusion of oxygen.	**07**
Q.3	**(a)**	Explain the selection criteria for choice of solvent for absorption.	**07**
	(b)	Define and explain the terms : Tray efficiency, Murphree efficiency, HETP, HTU and NTU.	**07**
		OR	
Q.3	**(a)**	Write a short note on minimum liquid gas ratio for absorbers.	**07**
	(b)	Explain Adsorption factor 'A' for gas adsorption in detail.	**07**
Q.4	**(a)**	Write a short note on "preparation of solids for leaching".	**07**
	(b)	Explain the selection criteria for choice of solvent for liquid extraction.	**07**
		OR	
Q.4	**(a)**	Explain with a sketch the material balance for single stage liquid-liquid extraction.	**07**
	(b)	Write a short note on absorption with chemical reaction.	**07**
Q.5	**(a)**	What is leaching? What are the industrial applications of leaching? Discuss the different types of equilibrium diagram for leaching.	**07**
	(b)	Define liquid extraction giving typical examples. Explain equilateral triangular co-ordinates and the mixture rule.	**07**
		OR	
Q.5	**(a)**	Write a short note on Bollman Extractor.	**07**
	(b)	Explain counter current multiple contact, Shanks system for leaching.	**07**

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