Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V- EXAMINATION – SUMMER 2016

Subject Code: 150501 **Date: 19/05/2016**

Subject Name: Mass Transfer Operation – I

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.**

Q.1	**(a)**	Derive the equation of N_A for steady state diffusion of A through nondiffusing B and also for steady state equimolal counter diffusion.	**07**
	(b)	Explain molecular diffusion of liquids and diffusivity of liquids.	**07**
Q.2	**(a)**	Discuss in detail about Penetration theory.	**07**
	(b)	Discuss about Heat, Mass and Momentum transfer analogies.	**07**
		OR	
	(b)	Discuss the important criteria for choice of solvent for absorption.	**07**
Q.3	**(a)**	Discuss the criteria for choice of solvent for liquid-liquid extraction.	**07**
	(b)	Explain about ternary equilibrium diagram and tie line data.	**07**
		OR	
Q.3		A packed tower is to be designed to absorb sulfur dioxide from air by scrubbing the gas with water. The entering gas is 14% SO_2 by volume. The water flow is to be twice the minimum. The air flow rate (SO_2 free basis) is 1050 m^3/hr. The temperature is 30 ^{0}C and the total pressure is 1.6 atm. The equilibrium data is governed by $y^* = 21.8x$ where y and x are in mole fractions units. Compute the number of overall gas phase transfer units for 95% removal of SO_2.	**14**
Q.4	**(a)**	Explain with a sketch the material balance for single stage liquid liquid extraction.	**07**
	(b)	Write short note on 'Agitated vessels'.	**07**
		OR	
Q.4	**(a)**	With a neat sketch explain the working of countercurrent multiple contact; the Shanks system.	**07**
	(b)	Explain the material balance of single stage leaching or washing.	**07**
Q.5	**(a)**	With a neat sketch explain the working of Ballman Extractor.	**07**
	(b)	What is crystallization? Discuss the theory and principle of crystallization.	**07**
		OR	
Q.5	**(a)**	Discuss about the various types of packings and their selection criteria.	**07**
	(b)	Discuss the difference between tray tower v/s packed tower.	**07**

****