Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V(New) • EXAMINATION – WINTER 2016

Subject Code:2150404 **Date:22/11/2016**

Subject Name:Principles of Process Engineering-II

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.**

Q.1		**Short Questions**	**14**
	1	Unit of molal diffusivity is _____	**01**
	2	Explain Tie-line	**01**
	3	Define: Flooding	**01**
	4	Define: Priming	**01**
	5	Ratio of flux to concentration gradient is called_____	**01**
	6	Define: theoretical tray	**01**
	7	Define : Diffusion.	**01**
	8	According to film theory, mass transfer coefficient is directly proportional to _____	**01**
	9	Define : Tray efficiency for absorption.	**01**
	10	The binary diffusivity in gases is depends upon which parameters?	**01**
	11	Define :coning	**01**
	12	Define :Leaching	**01**
	13	Enlist any three indirect mass transfer operations.	**01**
	14	Define extract	**01**
Q.2	**(a)**	Explain preparation of solids for leaching.	**03**
	(b)	Define: (i) weeping (ii) Operating line (iii) Solutropic solution (iv)Raffinate	**04**
	(c)	A packed tower is designed to recover 98% CO_2 from a gas mixturecontaining10% CO_2 and 90% air using water. A relation y=14x can be used for equilibrium conditions where, y=kgCO_2/kg dry air and x=kg CO_2/kg water. The water to gas rate is kept 30% more than the minimum value. Calculate the height of the tower if $(HTU)_{OG}$ is 1 meter.	**07**
		OR	
	(c)	Draw the diagram of two consecutive Sieve trays and explain how the vapor and liquid flow occur.	**07**
Q.3	**(a)**	Write short note on ventury scrubber.	**03**
	(b)	For a given liquid flow rate give step wise procedure to calculate minimum liquid to gas ratio for absorbers.	**04**
	(c)	Explain selection criteria for choice of solvent for absorption.	**07**
		OR	
Q.3	**(a)**	Give comparison of Random packing and stacked packing in short.	**03**
	(b)	Discuss local and overall mass transfer coefficients.	**04**
	(c)	Discuss in detail classification of mass transfer operations and explain with examples.	**07**

Q.4	**(a)**	What are the problems encountered while operating packed columns for gas absorption.	**03**
	(b)	Explain counter current multiple contact, Shanks system for leaching.	**04**
	(c)	Write short note on Bollman extractor.	**07**

OR

Q.4	**(a)**	Give industrial applications of leaching.	**03**
	(b)	Enlist selection criteria for choice of solvent for liquid extraction. Explain any two of them.	**04**
	(c)	Explain with a neat sketch the material balance for single stage leaching operation.	**07**

Q.5	**(a)**	Write short note on gas absorption with chemical reaction.	**03**
	(b)	Differentiate between packed towers/tray tower.	**04**
	(c)	Derive Fick's law of diffusion and explain N_A and J_A. Also prove that For unidirectional binary diffusion $J_A = -J_B$.	**07**

OR

Q.5	**(a)**	Explain HETP.	**03**
	(b)	Explain HTU and NTU for gas absorption.	**04**
	(c)	Derive equations to calculate rate of steady state diffusion of 'A' through non-diffusing 'B' and also for steady state equimolal counter diffusion in case of gases.	**07**

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