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

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2016

Subject Code:2160501 **Date:06/05/2016**

Subject Name: Mass Transfer Operation - 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 **(a)** With neat sketch discuss various types of cooling towers. **07**

(b) Explain Azeotropic distillation with example. **07**

Q.2 **(a)** Derive q-line equation for feed tray location. **07**

(b) With neat sketch explain positive deviation from ideality. **07**

OR

(b) Discuss in detail steam distillation and compare it with vacuum distillation. **07**

Q.3 **(a)** Discuss differential distillation and derive Rayleigh's equation for binary distillation. **07**

(b) A gas (B) – benzene (A) mixture is saturated at 1 std atm, 50°C. Calculate the absolute humidity if B is (a) nitrogen and (b) carbon dioxide. Vapor pressure of nitrogen at 50°C = 0.362 std atm **07**

OR

Q.3 Explain: (1) Relative volatility (2)Raoult's law (3) Bound moisture (4)Free Moisture (5) Dry Bulb Temperature(6) Dew Point (7) Lewis relationship **14**

Q.4 A continuous distillation column is to separate 50 Kmol/hr of feed mixture having 65% Benzene (A) and 35% Toluene (B). Top product contains 95% Benzene and Bottom product contains 95% Toluene (by mole).Feed is saturated liquid at its bubble point. Average relative volatility is 2.44. If reflux ratio R= 2.25 R_{min}, determine feed tray location and number of theoretical stages by Mccabe-Thiele method. **14**

OR

Q.4 A batch of solid for which the material is dried from 25 to 9% moisture has the initial weight of solid to be 160 kg. The drying surface is 1 m2/40 kg dry weight. Determine the time of drying for constant rate period and falling rate period using graphical method. The data are as follows: **14**

X	0.25	0.2	0.18	0.16	0.14	0.12	0.1	0.09	0.08	0.07	0.06
N	0.3	0.3	0.266	0.239	0.208	0.18	0.15	0.097	0.07	0.043	0.025

Where X= kg moisture / kg dry solid

N= rate of drying x 10^3, kg evaporated /m^2-sec.

Q.5	**(a)**	Explain Adsorption isotherm and hysteresis	**07**
	(b)	Explain rate of drying curve.	**07**

OR

Q.5	**(a)**	Explain with neat sketch principle and working of rotary dryer.	**07**
	(b)	Write Freundlich equation and explain its application for two stage cross current adsorption.	**07**

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