

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– VIII (New) EXAMINATION – WINTER 2019****Subject Code: 2180505****Date: 25/11/2019****Subject Name: Multi Component Distillation****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.**

		Marks
Q.1	(a) Discuss the advantages of vacuum distillation in detail.	03
	(b) Describe. (1) Light key (2) Split key components (3) Distributed components (4) Adjacent key component	04
	(c) Explain the stepwise procedure of Thiele Geddes method for Multicomponent distillation.	07
Q.2	(a) Discuss the concept of HETP	03
	(b) Discuss Extractive Distillation with industrial example.	04
	(c) Discuss the selection of Operating pressure for various industrial distillation columns with examples.	07
	OR	
	(c) Discuss criteria for selection between tray tower and packed tower with industrial examples.	07
Q.3	(a) What is the application of hegstebeck and gedded equation? Discuss the equation.	03
	(b) Explain the various methods used for calculating the number of theoretical stages for multicomponent distillation.	04
	(c) Discuss the use of heat pump with refrigerant in distillation column for energy saving	07
	OR	
	(a) Write short note on Optimum reflux ratio.	03
	(b) States the advantages and disadvantages of extractive distillation over azeotropic distillation.	04
	(c) Discuss sequencing of multicomponent distillation column also write an expression to calculate the number of possible sequences.	07
Q.4	(a) Discuss methods of determination of Vapour Liquid Equilibrium data.	03
	(b) Discuss about the different flow pattern of liquid in column with neat sketch.	04
	(c) Discuss the stepwise procedure for process design of multicomponent batch with constant overhead composition.	07
	OR	
	(a) Determine the minimum reflux ratio, minimum number of theoretical stages required and number of theoretical stages required for the desired separation for the following system by FUG method. Feed	14

flowrate is 70 kmol/hr and feed is saturated liquid. Toluene is light key. Composition of Distillation column streams and average relative volatilities of all components of feed are as follows:

Component	α_{av}	Feed, mole %	Distillate, mole %	Residue, mole %
Benzene	8.96	2.2	22.8	0
Toluene	2.8407	7.4	72.2	0.5
Ethyl Benzene	1	43.4	5.0	47.5
Styrene	0.6596	47	0	52.0

- Q.5**
- (a) Discuss the criteria for selection of solvent for extractive distillation. **03**
 - (b) Demonstrate kirk bride equation with detail specifications for finding the feed stage location in multicomponent distillation column. **04**
 - (c) Discuss energy saving in distillation column by thermally coupled distillation. **07**
- OR**
- (a) Define following terms: Jet flooding, Down comer flooding, Liquid entrainment. **03**
 - (b) Discuss batch distillation with rectification **04**
 - (c) Discuss the equation tearing procedure for multi component distillation. **07**

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