

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2020****Subject Code:2170507****Date:28/01/2021****Subject Name:Computer Aided Process Synthesis****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

- Q.1**
- (a) What is Pinch Point? Explain Its Significance In Heat Exchanger Network. **03**
 - (b) Explain the Role of Engineer in Process Design. **04**
 - (c) Explain Step by step Procedure for Construction of attainable region for Reactor Design **07**
- Q.2**
- (a) Define Minimum Approach Temperature, Threshold Approach Temperature & Optimum Approach Temperature. **03**
 - (b) "No heat Passes Across The Pinch" Justify the Statement. **04**
 - (c) A Mixture of Four Components Labeled as A,B,C & D with flows in the feed of 1 , 0.5 , 1 & 7 mole/sec. respectively for a total 9.5 mole/sec. & Relative Volatilities are 4.3 , 4 , 3 & 2 respectively. Calculate the number of possible sequences for Four Products . Find the Best suitable Sequence & also draw the best sequence , The information about marginal flow estimated for non-key species are as bellow
- | | | | | |
|-----|-----|-----|-----|-----|
| | A | B | C | D |
| A/B | -- | -- | 2.6 | 6.5 |
| B/C | 5.3 | -- | -- | 9.3 |
| C/D | 2.4 | 1.3 | -- | -- |
- Q.3**
- (a) Calculate the minimum number of heat exchangers for heat exchanger network involving three different streams and two distinct utility sources. All the streams in process are connected directly or indirectly by heat exchangers. **03**
 - (b) Discuss the Engineering Ethics briefly. **04**
 - (c) We are having Heat Exchanger Network that has a four process streams with inlet temperature of 30 , 80 , 180 & 150°C & Respective Outlet Temperature of 135 , 140 , 60 & 30°C Use Temperature Interval Method to find out Minimum Utility Requirement. Value of heat capacity C (KW/°C) are 3 , 1 , 2 & 5 Respectively. Assume the value of Δt . **07**
- Q.4**
- (a) Explain Significance of GCC Curve in Finding Minimum Utility Requirement. **03**
 - (b) Explain The Role of Computers in Process Design. **04**
 - (c) Discuss the Pinch Design Approach for inventing a Heat Exchanger Network **07**
- Q.5**
- (a) What are the safety considerations in Process Design. **03**
 - (b) What is stream Splitting? Explain its significance. **04**
 - (c) Explain Separation of Solid fluid System. **07**

- Q.6 (a) List out methods for finding MER Target in Heat exchanger Network. 03
(b) Explain the concept of stream matching in Heat Exchanger Network. 04
(c) Explain Reactor Design for large adiabatic changes. 07
- Q.7 (a) Define Multi effect Distillation in brief. 03
(b) Compare Various transfer Policies in Batch Plant. 04
(c) Explain positioning of heat engines & heat pumps relative to pinch. 07
- Q.8 (a) Differentiate Flowshop & Jobshop Plant. 03
(b) Explain the concept of reboiler flashing & vapour recompression in distillation configuration 04
(c) Define overlapping and non overlapping operation and show by any suitable example that overlapping operation is more efficient. 07

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