Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2022

Subject Code:3170507 Date:16-01-2023

Subject Name:Computer Aided Process Synthesis

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Explain overlapping and non overlapping operation.	**03**
	(b)	Explain the algorithm for establishing distillation column pressure and condenser type.	**04**
	(c)	Discuss in brief about design opportunities and general steps in product and process design.	**07**
Q.2	**(a)**	Explain Threshold approach temperature.	**03**
	(b)	Draw the possible sequences for 3 number of products and explain heuristics for determining favorable sequences.	**04**
	(c)	Discuss the Pinch Design Approach for inventing a Heat Exchanger Network.	**07**
		OR	
	(c)	Explain the generalized rules for stream splitting on both sides of the pinch to satisfy MER requirements.	**07**
Q.3	**(a)**	Describe the criteria for selection of separation methods.	**03**
	(b)	Explain marginal vapor rate method.	**04**
	(c)	Given the processing times for two products A, B determine make span and cycle time for manufacturing one batch of A, one of B using (a) Zero wait policy (b) No intermediate storage policy (c) Unlimited intermediate storage policy.	**07**

	Processing time(hr)		
	Stage 1	Stage 2	Stage 3
A	6	4	3
B	3	2	2
Zero cleanup times			

OR

Q.3	**(a)**	Discuss the role of computers in product and process design.	**03**
	(b)	Explain separation sequencing for Solid-Fluid systems.	**04**
	(c)	Discuss sizing of vessels in single product batch plant with example.	**07**
Q.4	**(a)**	Discuss the residue curve map.	**03**
	(b)	With example show how transfer policy affects the cycle time.	**04**
	(c)	Explain positioning of heat engines & heat pumps relative to pinch.	**07**
		OR	
Q.4	**(a)**	Explain Significance of GCC Curve in Finding Minimum Utility Requirement.	**03**
	(b)	With a neat sketch explain vapour recompression.	**04**

(c) For the Heat Exchanger Network Synthesis (HENS) problem following stream information is available. Determine the minimum utility target and pinch point. **07**

Stream	T_{in} (^{o}C)	T_{out} (^{o}C)	Cp (kW/^{o}C)	Q (kW)
H1	300	200	1.5	150
H2	300	250	2	100
C1	30	200	1.2	204

Take ΔT min=10 ^{o}C

Q.5 **(a)** Explain flowshop and Jobshop plant. **03**

(b) Discuss intermediate storage policy with example. **04**

(c) Rank the sequence to separate four components using marginal vapor rate method with the following details **07**

Separation	MV	Separation	MV
A/B	0	ABC/D	613
A/BC	163	B/C	0
A/BCD	340	B/CD	227
AB/C	231	BC/D	385
AB/CD	435	C/D	0

OR

Q.5 **(a)** Discuss in brief about environmental issues. **03**

(b) Explain multi effect distillation. **04**

(c) Discuss reactor designs used for handling large adiabatic changes in temperature. **07**

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