Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – WINTER • 2014

Subject Code: 160505 **Date: 03-12-2014**

Subject Name: Computer Aided Process Synthesis

Time: 02:30 pm - 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.**

Q.1 **(a)** Discuss in brief environmental issues and various safety considerations in product and process design. **07**

(b) Write a short note on geometric concepts for reactor attainable region. **07**

Q.2 **(a)** What is pinch point? Explain its importance in heat exchanger network synthesis giving step wise procedure to design heat exchanger network using pinch design approach. **07**

(b) Discuss in brief about design opportunities and general steps in product and process design. **07**

OR

(b) Explain the terms minimum approach temperature, optimum approach temperature and threshold approach temperature for heat exchanger networks. **07**

Q.3 **(a)** For the heat exchanger synthesis problem, following stream information is available: **07**

Stream	T_{in}, K	T_{out}, K	FC_p, kW/K
H_1	430	340	15
C_1	310	395	7
C_2	370	460	32

Find out minimum utility targets and pinch point for ΔT_{min} = 20K using temperature interval method.

(b) Prepare transshipment model for the above data and prepare LP formulation. **07**

OR

Q.3 **(a)** Discuss in detail for phase separation of reactor effluent. **07**

(b) Explain marginal vapor flows and show how it is useful for predicting the best sequence of distillation columns. **07**

Q.4 **(a)** Explain the concepts of heat Engine and heat pump. Discuss scope of heat and power integration in chemical process plant using it. **07**

(b) Discuss heuristics for selection of a separation method. **07**

OR

Q.4 **(a)** Discuss design of single product processing sequences. **07**

(b) Write importance of CAPS in chemical engineering. **07**

Q.5 **(a)** Explain the cycle time and transfer policies (zero wait, unlimited intermediate storage and no intermediate storage). With example show how transfer policy affects the cycle time. **07**

(b) Given the processing times for two products A and B, determine make span and cycle time for manufacturing one batch of A and one batch of B using (i) Zero wait policy (ii) No intermediate storage policy and (iii) Unlimited intermediate storage policy. **07**

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

OR

Q.5 **(a)** Explain the concept of multi effect distillation as possibility of energy integration. **07**

(b) With a neat sketch explain vapour recompression and reboiler flashing. **07**

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