

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 $\Delta T_{min} = 20K$ 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**
