

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – WINTER 2012****Subject code: 1723002****Date: 31-12-2012****Subject Name: Advance Computer Aided Design****Time: 10.30 am – 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.

- 1 _____ 14
- Draw superstructure network for matches H1-C1 and H1-C2 and write constraint equations. Draw all possible network configurations from superstructure.
- 2 (a) _____ 7
- (b) Write a short note on Threshold approach temp. and optimum approach temp. for HENS. _____ 7
- Write steps for pinch design approach to invent a heat exchanger network.
- (b) **OR** _____ 7
- For a three component system ABC with a feed flow rate of 10 kmol/sec and the composition of A, B and C, respectively 0.2, 0.3 and 0.5. Relative volatility of A, B and C is 0.6, 0.8 and 1. Find the V_{min} for the direct sequence.
- 3 (a) _____ 10
- For the data given below, carry out HENS and determine the best alternative solution. Assume value of ΔT .
- | Stream | $T_{in}(\text{deg.F})$ | $T_{out}(\text{deg.F})$ | $FC_p(\text{BTU/Deg. F})$ | cost |
|-----------|------------------------|-------------------------|---------------------------|----------|
| C1 | 100 | 580 | 1 | ----- |
| C2 | 100 | 580 | 2 | ----- |
| H1 | 600 | 200 | 3 | ----- |
| Steam | 650 | 650 | | high |
| Hot water | 250 | >130 | | low |
| Cooling W | 80 | <125 | | moderate |
- (b) _____ 4
- Explain in detail Various transfer policies for batch process scheduling.
- 3 (a) **OR** _____ 10
- For three component W, X and Y, with W being the highest volatile and Y being the least volatile component, Get all possible sequences and show corresponding STN
- (b) with each of the following cases. (a) 4 HXs and (b) 3 HXs. _____ 4
- Discuss T-Q diagram of inter cooling and inter heating.
- 4 (a) _____ 7
- Given the processing times for these products A, B, C, below. Determine with a Gantt Chart the make span and cycle time for manufacturing two batches of A, 1 of B and 1 of C for the case unlimited intermediate storage policy with sequence AABC and BAAC.

Processing Times (hr)			
	Stage 1	Stage 2	Stage 3
A	5	4	3
B	3	1	3
C	4	3	2
Zero Cleanup Times			

- (b) _____ 7
- Discuss vapour recompression and heat pump w.r.to heat integrated distillation column.
- 4 (a) **OR** _____ 7
- (b) Explain: overlapping, non-overlapping operation, flowshop plant, jobshop plant. diagram.

Discuss the method for discovering the amount of heat to remove from the condenser and the reboiler.

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5 (a)

Estimate the fewest number of heat exchangers required above and below pinch for the data given below.

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Stream	T _{in} (deg.F)	T _{out} (deg.F)	FC _p (BTU/Deg. F)	Comment
C1	310	395	7	liquid
C2	370	460	32	vapor
H1	430	340	15	liquid

(b)

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A given batch plant produces one single product for which stage 1 requires 8 hours/batch, stage 2, 4 hours /batch and stage 3, 7 hours/batch. If zero-wait transfer is used, what is cycle time ? How many parallel units should be placed in each stage to reduce the cycle time to 2 hours ?

5 (a)

OR

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(b)

Write a short note on side stripper and side enrichers.

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Write a short note on importance of Advance Computer aided design. What data should be known before handling HENS problem.
