

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  $\Delta T$ .
- | Stream    | $T_{in}$ (deg.F) | $T_{out}$ (deg.F) | $FC_p$ (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) 4  
with each of the following cases. (a) 4 HXs and (b) 3 HXs .  
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. 7

5 (a) Estimate the fewest number of heat exchangers required above and below pinch for the data given below. 7

Stream	T <sub>in</sub> (deg.F)	T <sub>out</sub> (deg.F)	FC <sub>p</sub> (BTU/Deg. F)	Comment
C1	310	395	7	liquid
C2	370	460	32	vapor
H1	430	340	15	liquid

(b) 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 ? 7

5 (a) **OR** 7

(b) Write a short note on side stripper and side enrichers. 7

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

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