GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. Sem. – IInd - Examination – June/July- 2011
Subject code: 1723002
Subject Name: Advance Computer Aided Design

Date:24/06/2011   **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.**

Q.1 **(a)** Prepare the table for HCC and GCC. Explain the significance of GCC Curve **14**
with reference to utilities requirement. Show the heat exchanger area
calculation for steam(ST) and C1 region. Assume Δt_m= 20 ^{0}K

Stream	FCp (KW/K)	Tin, K	Tout, K	Q available KW	h W/m^{2}K
H1	10000	600	450	15,00,000	800
H2	10000	500	400	10,00,000	700
ST		650	650		5000
C1	15000	450	590	-21,00,000	600
CW		300	325		600

Q.2 **(a)** Write the importance of ACAD in chemical engineering. **04**
(b) Determine pinch point using Transshipment Model for the data given below. **10**
Take Delta T = 10 deg. F.

Stream	Tin(deg.F)	Tout(deg.F)	FCp(BTU/Deg. F)
C1	60	180	3
C2	30	130	2.6
H1	180	40	2
H2	150	40	4

OR

(b) Prepare Expanded transhipment model for the above data and prepare MILP **10**
formulation.

Q.3 **(a)** Determine the size of the vessels of a multi product batch plant that consists of **08**
three stages for manufacturing products A and B. Only one vessel is to be used
in each stage. Production cycles of 500 hrs consisting of two campaigns : one
for A and one for B.
Data : Demands : A; 600000 kg/yr and B : 300000 kg/yr
Horizon time : 6000 hrs

Processing times : [hr]				Size factors		
	Stage 1	Stage 2	Stage 3	Stage 1	Stage 2	Stage 3
A	4	2	3	2	5	3
B	3	2	5	1.5	6	2

(b) A given batch plant produces one single product for which stage 1 requires 8 **06** hours/batch, stage 2, 4 hours /batch and stage 3, 7 hours/batch. If zero-wait transfer is used, what is the cycle time ? How many parallel units should be placed in each stage to reduce the cycle time to 4 hours ?

OR

Q.3 (a) Given the processing times for three products A,B,C, below, determine with a **08** Gantt chart the make span and cycle time for manufacturing two batches of A, 1 of B, 1 of C for the following cases
Zero wait policy with sequence AABC and sequence BAAC.

	Processing times [hr]		
	Stage 1	Stage 2	Stage 3
A	5	4	3
B	3	1	3
C	4	3	2
Zero-clean up times			

(b) Explain in detail Parallel units and intermediate storage with example **06**

Q.4 (a) Write a short note on Graphical Techniques for simple reacting systems. **07**
(b) Explain in detail Various transfer policies for batch process scheduling **07**

OR

Q.4 (a) Write a short note on Geometric concepts for Reactor attainable region. **07**
(b) Discuss vapour recompression and heat pump w.r.t heat integrated distillation **07** column.

Q.5 (a) Discover the best sequence among those possible for the following **07** problem of the mixture of five component label A, B, C ,D, E system.

Sr. No.	Alcohol	Flow :mol/s	Relative volatilities
1	A	1	4.3
2	B	0.5	3.95
3	C	1	3.1
4	D	6.8	2.1
5	E	10	1

(b) Write a short note on side stripper and side enrichers. **07**

OR

Q.5 (a) Discuss T-Q diagram of inter cooling and inter heating. **07**
(b) Write a short note on heuristics for designing separation processes **07**

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