Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –IIst SEMESTER–EXAMINATION – JULY- 2012

Subject code: 1723002 **Date: 09/07/2012**

Subject Name: Advance Computer Aided Design

Time: 10:30 am – 13:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

1 Prepare the table for HCC and GCC. Explain the significance of GCC Curve with reference to utilities requirement. Show the heat exchanger area calculation for H1 and C1 region. Assume $\Delta t_m = 20\ ^0K$ 14

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

2 (a) Write the importance of ACAD in chemical engineering. 4

(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 formulation. 10

3 (a) Determine the size of the vessels of a multi product batch plant that consists of three stages for manufacturing products A and B. Only one vessel is to be used in each stage. Production cycles of 1000 hrs consisting of two campaigns : one for A and one for B. 8

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 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 2 hours ? 6

OR

(a) Given the processing times for three products A,B,C, below, determine with a Gantt chart the makespan and cycle time for manufacturing two batches of A, 1 of B, 1 of C for the following cases 8

Unlimited intermediate storage 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. 6

4 (a) Write a short note on Graphical Techniques for simple reacting systems. 7

(b) Explain in detail Various transfer policies for batch process scheduling. 7

OR

(a) Write a short note on Geometric concepts for Reactor attainable region. 7

(b) Write a short note on simple sharp separator. 7

5 (a) Discover the best sequence among those possible for the following problem of the mixture of five component label A, B, C ,D, E system. 7

Sr. No.	Alcohol	Flow : mol/s	Relative volatilities
1	A	1	4.31
2	B	0.5	3.95
3	C	1	3
4	D	7	2.1
5	E	10	1

(b) Explain the positioning of heat engine and heat pump. 7

OR

(a) Discuss T-Q diagram of four component species A,B, C and D for which ease of separation is given below in the table. 7

Sr. No.	Species	Amount	Ease of separation
1	A	lots	
2	B	Moderate amount	difficult
3	C	Moderate amount	Very easy
4	D	lots	Very very difficult

(b) Discuss the method for discovering the amount of heat to remove from the condenser and the reboiler. 7