Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – SUMMER 2013

Subject Code: 160505 **Date: 30-05-2013**

Subject Name: Computer Aided Process Synthesis

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 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 steam(ST) and C1region.Assume æT_m=20 ^{0}K 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 CAPS in chemical engineering. 4

For the data given below, carry out HENS and determine the best alternative solution.

(b) Assume value of Delta T. 10

Stream	Tin(deg.F)	Tout(deg.F)	FCp(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		medium

OR

(b) Prepare Transhipment model for the above data and prepare LP formulation. 10

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

b) Write a short note on Environmental factors in process design. 7

OR

(a) Discuss in brief for design opportunities and general steps in product and process design. 7

(b) Write a short note on Threshold approach temp. and optimum approach temp. for HENS. 7

4 (a) 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 following cases: 7

a. Zero-Wait policy with sequence AABC.
b. Same as (a) but with no intermediate storage policy (NIC)
c. Same as (a) but with unlimited intermediate storage policy (UIS)

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

OR

(a) Explain in detail various transfer policies for batch process scheduling. 7

(b) Discuss T-Q diagram of inter cooling and inter heating. 7

5 (a) Discover the best sequence among those possible for the following problem based on minimizing the total of the estimated vapour flows in the columns. 7

Species	Relative Volatility	Feed Flow, mol/s
A	2	10
B	1.5	20
C	1.2	10
d	1	60

Is the answer consistent with any of the heuristics? Explain.

(b) Discuss vapour recompression and heat pump w.r.t heat integrated distillation column. 7

OR

(a) Write a short note on heuristics for designing separation processes. 7

(b) Find the best distillation based separation sequence if the following data hold for marginal vapour flows. The components behave relatively ideally. 7

	A	B	C	D	E
A/B	-	-	100	1	1
B/C	1	-	-	1	1
C/D	1	100	-	-	1
D/E	1	1	100	-	-

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