

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 $\Delta T_m = 20^\circ\text{K}$ 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 Transshipment 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	-	-
