Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VI • EXAMINATION – WINTER 2012

Subject code: 160505 **Date: 07/01/2013**

Subject Name: Computer Aided Process Synthesis

Time: 02.30 pm - 05.00 pm **Total Marks: 70**

Instructions:

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

Q.1 **(a)** For the process fluids as shown in below Table, find minimum utility requirements and pinch temperature. Also show the cascade heat flow diagram. Consider ΔT_{min}= 10°C. **07**

Streams	SourceT_s(°C)	TargetT_t (°C)	MC_p(KW/°C)
H_1	180	40	20
H_2	160	40	40
C_1	60	220	30
C_2	30	180	22

(b) Explain the threshold approach temperature and optimum approach temperature. **07**

Q.2 **(a)** Discuss in brief the Environmetal issues and various safety considerations in product and process design **07**

(b) Explain in brief general steps in product and process design **07**

OR

(b) Discuss importance of design, equipment sizing and optimization in process design. **07**

Q.3 **(a)** Discuss various reactor models in detail. **07**

(b) Discuss steps involve in construction of attainable region using CSTRs and PFRs. **07**

OR

Q.3 **(a)** Explain reactor design for complex configurations. **07**

(b) Discuss criteria for selection of separation methods. **07**

Q.4 **(a)** Develop Expanded Transshipment model for the data given below. Also draw the cascade heat flow diagram. (Assume ΔT_{min}= 15°C) **07**

Streams	SourceT_s(°C)	TargetT_t (°C)	MC_p(KW/°C)
H_1	430	340	15
C_1	310	395	7
C_2	370	460	32

(b) Explain in detail common industrial separation methods **07**

OR

Q.4 (a) Use the marginal vapor rate (MV) method to determine a sequence for the separation of alcohol mixture. Give rank to various sequences. **07**

Separation	MV (mol/sec)	Separation	MV (mol/sec)
A/BCDE	12.3	AB/CD	14.6
AB/CDE	18.6	ABC/D	3.7
ABC/DE	10.4	C/DE	6.7
ABCD/E	4.3	CD/E	2.0
B/CDE	13.3	B/CD	9.3
BC/DE	8.0	BC/D	1.3
BCD/E	2.8	A/BC	2.6
A/BCD	9.1	AB/C	5.4
A/B	0	B/C	0
C/D	0	D/E	0

Q.4 (b) Discuss in detail separation sequences for solid-fluid system. **07**

Q.5 (a) Draw the stream matching diagram above pinch temperature by considering pinch temperature in hot stream 125°C from the data given as follows. Assume ΔT_{min}= 13°C **07**

Streams	Source T_s(°C)	Target T_t (°C)	MC_p(KW/°C)
H_1	175	45	10
H_2	125	65	40
C_1	20	155	20
C_2	40	112	15

(b) Explain detail flow shop and job shop plant with neat diagram. **07**

OR

Q.5 (a) What is Gantt chart? Draw Gantt chart recipe ABAB for zero wait transfer and unlimited storage transfer policies from following processing times. **07**

Product	Stage-1	Stage-2	Stage-3
A	6 hrs	4 hrs	3 hrs
B	3 hrs	2 hrs	2 hrs

(b) Discuss design of single product processing sequences. **07**

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