4. Discuss in detail the heat integration of :

(a) Distillation Columns **8**

(b) Dryers. **7**

Unit III

5. What do you mean by Process Intensification and Process Integration ? **15**

6. Write a note on chemical process design and integration. Also, state the hierarchy involved. **15**

Unit IV

7. Discuss how to control the combustion emissions. **15**

8. How process changes can reduce water consumptions ? List them. **15**

18BB1360

M. Tech. EXAMINATION, May 2019

(Second Semester)

(C Scheme) (Main Only)

CHE

CHE566C

Process Integration

Time : 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Assume missing data, if any.

Unit I

1. For the given data, calculate the following :

Stream	FC_p (kW/ºC)	Supply Temp. (ºC)	Target Temp. (ºC)	Enthalpy Temp. (ºC)
1.	400	340	260	32000
2.	350	400	360	14000
3.	300	450	380	21000
4.	250	240	290	12500
5.	300	300	400	30000
6	450	350	400	22500

(a) Plot and Grand Composite Curve keeping $\Delta T_{min} = 10ºC$.

(b) From about evaluate hot and cold utilities requirement after heat integration. **15**

2. (a) To achieve the energy target set by the composite curves, state two rules how designer must not transfer heat across the pinch ? **4**

(b) Discuss in detail the Threshold problems. **6**

(c) State the guidelines necessary to keep in mind while doing data extraction. **5**

Unit II

3. The process stream data for a heat recovery network problem are given in the table :

Stream No.	Supply Temperature (ºC)	Target Temperature (ºC)	Enthalpy Temperature (ºC)
1.	400	60	0.3
2	210	40	0.5
3.	20	160	0.4
4	100	300	0.6

A problem table analysis on this data reveals that the minimum hot utility requirement for the process is 15 MW and the minimum cold utility requirement is 26 MW for a minimum allowable temperature difference of 20ºC. The analysis also reveals that the pinch is located at a temperature of 120ºC for hot streams and 100ºC for cold streams. Design a heat exchanger network for maximum energy recovery featuring the minimum number of units. **15**