

4/12/2024 CHEMICAL SEM-VIII C SCHEME DLOC-V ESD QP CODE: 10068614

[3 Hours]

[Total Marks: 80]

- N.B.:** (1) Question No 1 is compulsory
 (2) Attempt any three questions out of remaining five questions
 (3) Assume suitable data if necessary and indicate it clearly.
 (4) Figures to the right indicate full marks.

- Q.1. Solve the following (Any Four) 20
- Explain any two energy efficient techniques for steam system in industry.
 - What is pinch temperature and how its knowledge is useful during energy integration?
 - Explain reboiler flashing in distillation column.
 - Which different energy sub audits are carried out in industry?
 - Discuss advantages of waste heat recovery in process industries.
 - What are the merits of wind energy?

- Q.2. (a) Consider the system where heat is being exchanged among hot & cold streams to meet MER target for which data is given below. If $\Delta T_{\min} = 20^{\circ}\text{C}$, find the minimum hot & cold utility requirements as well as the pinch temperatures for this system. 10

Stream No.	Ts ($^{\circ}\text{C}$)	Tt ($^{\circ}\text{C}$)	mCp (kW/ $^{\circ}\text{C}$)
1	180	40	10
2	160	40	20
3	60	220	15
4	30	180	11

- (b) Discuss various techniques to improve energy efficiency of “Compressed Air system”. 10
- Q.3. (a) Explain working of any two waste heat recovery equipments. 10
- (b) Explain various thermodynamic cycles supporting working of cogeneration system. 10

- Q.4. (a) Consider a process for which hot and cold stream data is given below: 12

Stream No.	Ts ($^{\circ}\text{C}$)	Tt ($^{\circ}\text{C}$)	mCp (kW/ $^{\circ}\text{C}$)
1	150	60	5
2	90	60	16
3	25	100	6
4	20	125	5

Design a feasible HEN for this system at $\Delta T_{\min} = 20^{\circ}\text{C}$ if $Q_{H,\min} = 155\text{ kW}$; $Q_{C,\min} = 110\text{ kW}$; $\Delta T_{\min} = 20^{\circ}\text{C}$; Hot Pinch temperature = 90°C

- (b) Describe the rules of heat exchanger networking. 08

- Q.5. (a) Write in detail about energy from waste and biomass **10**
(b) Explain energy audit methodology. **10**
- Q.6. Write short notes on **any four** of the following: **20**
(a) Energy profile
(b) Effect of waste heat recovery on pollution
(c) Pros and cons of solar energy
(d) Need of energy conservation
(e) Benefits of HEN
