GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 713903N   **Date: 03-12-2014**

Subject Name: Optimum Utilization of Heat and Power

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.**

Q.1	**(a)**	With example describe the basic concept of combined heat and power.	**07**
	(b)	Describe the benefits and problems with combined heat and power.	**07**
Q.2	**(a)**	What is pinch point? Explain step by step procedure to design heat exchanger network using pinch approach.	**07**
	(b)	Two cold streams C1 and C2 are to be heated and two hot streams H1 and H2 are to be cooled without phase change. Find out minimum utility targets using temperature interval method. Use $\Delta T_{min} = 10\,°C$.	**07**

Stream	T^s (°C)	T^t (°C)	$m\,C_p \left(\dfrac{kJ}{s\,°C} \right)$
C1	120	235	2
C2	180	240	4
H1	260	160	3
H2	250	130	1.5

OR

	(b)	For above data given in Q.2 (b) formulate linear programming problem.	**07**
Q.3	**(a)**	Describe the concept of threshold approach temperature and optimum approach temperature.	**07**
	(b)	List out the methods to find out minimum utility targets and explain any one in detail.	**07**

OR

Q.3	**(a)**	Describe the concept of heat engine and heat pump.	**07**
	(b)	Explain grand composite curve with reference to utilities requirement.	**07**
Q.4	**(a)**	Briefly explain the topping cycle, bottoming cycle and combined cycle.	**07**
	(b)	Describe the sources of waste heat. How it can be recovered?	**07**

OR

Q.4	**(a)**	Describe the site composite curves.	**07**
	(b)	Write a short note on application and advantages of cogeneration technology.	**07**
Q.5	**(a)**	Describe the heat integration of evaporators.	**07**
	(b)	Compare energy efficiency of compression refrigeration and adsorption refrigeration systems.	**07**

OR

Q.5	**(a)**	Compare Rankine cycle and Kalina cycle.	**07**
	(b)	Explain the energy losses and waste heat recovery in recuperative heat exchanger.	**07**

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