CHE 4253

ASSIGNMENT 3

Due Sep 10

PROBLEM (Group)

Consider the following data corresponding to a Crude Unit

Hot Streams

	TCR	MCR	LCR	KER	LGO	HGO	LR1	LR2	LR3	LR4	NAP
Fcp [kW/C]	1197.80	396.19	447.31	136.03	48.43	76.57	159.55	78.65	263.3	85.23	160.04
Tin [C]	134.0	224.7	268.1	232.7	238.2	279.3	335.9	335.9	235.4	176.2	115.2
Tout [C]	108.2	190.8	198.8	40	45	68	262.7	186.1	176.2	90.00	56.00

Cold Streams

	C1	C2	C3	C4
Fcp [kW/C]	583.35	689.8	635.68	194.8
Tin [C]	39.00	153	155.3	150
Tout [C]	153	165.2	348	270

a) Use super-targeting to get the right minimum heat recovery approach temperature (HRAT) for the data of problem 2. Use the following cost data.
   - COST OF HOT UTILITY =100.7 ($/yr)/Kw, Hot utility T change 600 ^oC → (your choice)
   - COST OF COLD UTILITY =12.8 ($/yr)//Kw-yr , Cold utility T change 20 ^oC →40 ^oC
   - FIXED COST PER UNIT: 148,572 $; COST OF AREA= 800.63 $/m^2
   - U=0.25 kW/(^oC m^2)

To calculate total **annualized cost**, simply multiply the cost of utility by the amount (in Kw), plus the number of exchanger times the cost per unit, plus the cost of area times the total area.

a) Assume that hot oil at 390^oC is available as utility. Determine the outlet temperature of this oil, if its usage is minimum. Discuss the costs associated with the usage of heating oil. Is it always advisable using the lowest possible flowrate? Why?

b) Assume that all hot utility has to be satisfied using a furnace. What are your stack losses? What is the real utility consumption? Discuss what would be a suitable flame temperature to use.