Roll No .....

MMTP - 202

M.E./M.Tech., II Semester

Examination, July 2015

Design Of Heat Exchangers

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt five questions out of eight.

ii) All questions carry equal marks.

1. a) Classify Heat exchangers according to construction features.
   b) What do you mean by regenerator? Explain its working and application.

2. Derive an expression for logarithmic mean temperature difference in the case of counter flow heat exchanger. What is its value for the case when temperature difference at inlet and outlet of heat exchanger is equal? Discuss.

3. a) Define heat exchanger effectiveness. Why is NTU method of Heat exchanger analysis preferred over LMTD method?
   b) The air cooled condenser of a 1 ton window air conditioner has to remove 4200 W. Given are :
   Ambient air temperature = 35°C
   Temperature at which refrigerant condenser = 50°C
   UA of H.E. = 350 W/k
   Calculate the temperature rise of the air as it passes over the tules of heat exchangers.

4. A simple heat exchanger consisting of two concentric flow passages is used for heating 1110 kg/h of oil (sp. heat = 2.1 kJ/kg k) from a temperature of 27°C to 49°C. The oil flows through the inner pipe made of copper (O.D. = 2.86 cm) and (I.D. = 2.54 cm) and the surface heat transfer coefficient on the oil side in 635 W/m^2k. The oil is heated by hot water supplied at the rate of 390 kg/h and at an inlet temperature of 93°C. The water side heat transfer coefficient is 1270 W/m^2-k. Take thermal conductivity of copper to be 350 W/mk and fouling factor on the oil and water sides to be 0.0001 and 0.0004 m^2-k/W. What is the length of heat exchangers for parallel and counter flow arrangement?

5. a) Discuss the major factor considered during design of heat exchangers.
   b) Discuss the damage due to corrosion and its control measures in heat exchangers.

6. a) Discuss two common material of construction and their desirable property for use in heat exchangers.
   b) Discuss the inspection techniques of heat exchangers

7. What is a heat pipe? How is it different than heat exchanger? Discuss its operational characteristics.

8. Write short notes on any two:
   a) Fouling factor and its determination
   b) Design of Air washer
   c) Micro Heat exchanger

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