Total No. of Questions :8] *[Total No. of Printed Pages :2*

Roll No .....

MMTP - 202

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

Examination, June 2016

Design of Heat Exchangers

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions. All questions carry equal marks.

ii) Use of Heat and Mass transfer data book is permitted.

1. a) What do you understand by regenerative heat exchanger? Explain working principle of a rotary regenerator.
   b) Describe a plate heat exchanger. Explain where we get better advantage of using this heat exchanger.

2. a) What do you understand by overall heat transfer coefficient? Does it remain uniform all through the exchanger? Does it remain invariant with time?
   b) What do you understand by micro heat exchangers? Where such heat exchangers are used? What are the demerits of such heat exchangers?

3. In a heat exchanger, it is desired to cool 50,000kg/h of alcohol from 60°C to 36°C using 25,000kg/h of water entering at 6°C. The overall heat transfer coefficient based on the outer tube is 600 W/m^{2}K. The specific heat of alcohol is 3.768kJ/kgK. Calculate the surface area required for the following cases (i) counter flow shell and tube type (ii) counter flow with 2 shell and 72 tube passes, alcohol flows through the shell (iii) cross flow with one tube pass and one shell pass with water unmixed and alcohol mixed.

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4. a) What is number of transfer units (NTU)? What does it indicate? Derive an expression for effectiveness by NTU method for the counter flow heat exchanger.
   b) How testing and inspection of heat exchangers is carried out before installation? Discuss.

5. a) What is Corrosion? What are its effects on heat exchanger? Discuss the remedial measures to be used to avoid it in a heat exchanger?
   b) How is heat pipe rated? Why are fins used in a heat pipe? What is the maximum heat transport capacity of a heat pipe? State the four limitations which restrict its performance.

6. a) How is tube thickness designated? What is tube pitch? Explain briefly different layouts of the tube recommended by TEMA.
   b) What are the types of baffles used in shell and tube heat exchangers? Explain various types of segmental baffles used in the heat exchanger.

7. a) List the steps in the design of a heat exchanger.
   b) What are the future trends in heat exchanger design?

8. Write short notes on any two of the followings:
   a) Desert coolers
   b) Cooling towers
   c) Fouling in heat exchanger
   d) Various approaches used in heat exchanger design

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