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**MMTP - 202**  
**M.E./M.Tech., II Semester**  
Examination, December 2014  
**Design of Heat Exchangers**

*Time : Three Hours*

*Maximum Marks : 70*

**Note :** Attempt any five questions. All questions carry equal marks.

1. a) Classify heat exchangers on the basis of transfer process and construction features.  
b) Discuss the importance of heat exchanger for industrial use.
2. a) Define logarithmic mean temperature difference. When is it approximately equal to the arithmetic mean temperature difference?  
b) Discuss the importance of pressure drop in heat exchanger design.
3. a) Explain selection criteria of a heat exchanger on the basis of major operating parameters.  
b) Explain geometrical variable of a shell and tube heat exchanger.
4. a) How are evaporators classified? What are the characteristics of the solution which are important in design and operation of evaporation process? rgpvonline.com

- b) The tube of an oil cooler is submerged in a large pool of stagnant water at a temperature of  $25^{\circ}\text{C}$ . The inside diameter of tube is 30 mm and its length is 40 mm. Estimate the overall heat transfer coefficient of this system if the temperature of oil drops from  $90^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  and the average velocity of oil is 0.6 m/sec. Assume specific heat for oil 2.5 kJ/kg-K and specific gravity 0.8. rgpvonline.com
5. a) Explain various fouling mechanism that may occur on the liquid side of a heat exchanger.  
b) What is corrosion? What are its effects on heat exchanger? Discuss the remedial measures to be used to avoid it in a heat exchanger?
6. a) Explain heat pipe heat exchanger for gas-to-gas application with the help of a neat diagram.  
b) What is compact heat exchanger? Enlist their characteristic as compared to conventional shell-and-tube exchangers.
7. a) What is Number of Transfer Units (NTU)? What does it indicate? Derive the relationship between effectiveness and NTU for a counter flow single pass heat exchanger.  
b) What do you understand by thermal analysis of a heat exchanger? What are the advantages of using computer software for designing a heat exchanger?
8. Write short notes on any four of the followings:
  - a) Overall heat transfer coefficient
  - b) Fouling factor and its determination
  - c) TEMA standard
  - d) Testing of heat exchangers
  - e) Selection of materials for heat exchanger