Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – II • EXAMINATION – WINTER 2012

Subject code: 1722101   **Date: 29-12-2012**
Subject Name: Design of Heat Exchange Equipments
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)** Explain classification of heat exchangers in detail.   07
 (b) Explain the following approach used for analysis and design of heat 07
exchanger.
(i) LMTD
(ii) ε - NTU

Q.2 **(a)** List and Explain the basic principles of heat transfer in detail.   07
 (b) List and explain the factors to be considered while selecting heat exchangers. 07
OR
 (b) Answers the following .(Any Two)   07
1.Why are the counter flow heat exchangers the most efficient?
2.Under what conditions can a double pipe heat exchanger replace a shell
and table heat exchanger?
3.What is the need for multi-pass heat exchanger?
4.Why should a shell and tube heat exchange be preferred over a newer type
of heat exchanger for common applications?

Q.3 **(a)** State and explain the advantages and disadvantages of plate heat exchangers. 07
 (b) Explain evaporator (any ONE) in detail with neat sketch.   07
OR
Q.3 **(a)** Explain the construction of plate heat exchangers with neat sketch.   07
 (b) Explain evaporator design.   07

Q.4 **(a)** Explain the general design considerations for shell and tube exchangers 07
design.
 (b) In a single pass shell and tube exchanger 2000 kg / hr service fluid is cooled 07
from 120^0C to 60 ^{c} by using at 25 ^{0}C .The mass flow rate of water is 1500
kg/hr. Find the effectiveness of the heat exchanger and the area required. The
overall heat transfer coefficient is 1000 W/m^2 K. The Specific heat capacity
of service fluid is given as 3 kJ/kg. If the diameter of tube is 12 mm ,find the
numbers of tube required such that shell length is 4 m.
OR
Q.4 **(a)** Find the heat transfer coefficient for the shell and tube exchanger with the 07
following specifications by using Kern's method:
Length of shell = 5 m   Shell diameter = 1.2 m
Outside diameter of tube = 32 mm   Tube pitch (triangular) = 50 mm
Baffle spacing = 150 mm   Baffle thickness = 4 mm

Fluid specifications :
Mass flow rate = 6 kg/sec   density = 840 kg/m^3

Specific heat capacity = 2.55 kJ/kg
Dynamic viscosity = 0.482 x 10^{-3} Ns/m^2
Thermal conductivity = 0.11 W/m K

(b) Explain the design of furnace in detail. **07**

Q.5 (a) Explain the step by step design procedure of shell and tube condenser design? **07**

(b) Explain the advantages and disadvantages of double pipe heat exchangers. **07**

OR

Q.5 (a) Explain the classification of condensers and its applications. **07**

(b) Explain the design of double pipe heat exchangers by approximate method. **07**

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