Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

M.Tech. Summer 2017 - 18 Examination

Semester: 2 **Date: 28/05/2018**
Subject Code: 03210182 **Time: 2.00 pm to 4.30 pm**
Subject Name: Design of Heat Exchangers **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 A) List classification of Heat Exchanger. **(05)**
B) Derive the LMTD for Parallel flow Heat Exchanger. **(05)**
C) Explain Water-Cooling Evaporators. **(05)**

Q.2 **Answer the following questions**. (Attempt any three) (Each five mark) **(15)**
A) Why Compact Heat Exchangers are more suitable for Gaseous Fluid?
B) What is Fouling? Explain types & Mechanism of Fouling.
C) Explain basic Design Procedure of Shell and Tube Heat Exchanger.
D) Explain basic criteria for Selection of Heat Exchanger.

Q.3 A) Explain Various "TEMA Standard" shell Design's for the Shell & Tube Heat Exchangers. **(07)**

B) In a shell and tube heat exchanger, the water passes through the tube and steam passes into the shell. Dry saturated steam is condensed at a 400 °C while the water is heated from 30 ^{0}C to 70 ^{0}C. If the overall heat transfer coefficient is 800 W/m^{2}k and surface area 1.2 m^2 ,find the rate of heat transfer in the following arrangement of flow i) Parallel flow ii) Counter flow iii) Cross Flow (Take Correction Factor F=1) **(08)**

OR

B) What is Hairpin Heat Exchanger? Explain Thermal & Hydraulic Analysis of Inner tube & annulus. **(08)**

Q.4 A) State & Explain the Advantages & Limitations of Plate Heat Exchanger. Also state its different application in various industries with reasons. **(07)**

OR

A) Explain Evaporative Condenser. **(07)**

B) Hot oil enters into a counter flow heat exchanger at 150 ^{0}C and leaves at a 40 ^{0}C. The mass flow rate of is 4800 kg/hr of specific heat 2kJ/kg k. The pill is cooled by water which enters Exchanger at 20 ^{0}C. The overall heat transfer coefficient is 1400 W/m^{2}K. The exit temperature of water is not to exceed 80 °C. Using effectiveness-NTU method, find: 1) Mass flow rate of water. 2) Surface area required. 3) Effectiveness of heat exchanger. **(08)**