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

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech.Winter 2018 - 19 Examination

Semester: 1 **Date: 04/12/2018**
Subject Code: 203116101 **Time: 02:00pm to 4:30pm**
Subject Name: Heat & Mass Transfer **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 Objective Type Questions - (All are compulsory) (Each of one mark) **(15)**

1. Which material has highest conductivity?
   a) Water b) Silver c) Air d) Wood

2. Unit of rate of heat transfer is
   a) Joule b) Newton c) Pascal d) Watt

3. Mode of heat transfer does not require any medium for transfer of heat is known as
   a) conduction b) convection c) radiation d) none of this

4. What is the correct formula for The Biot number?
   a) hl/k b) k/hl c) l/hk d) hk/l

5. Which type of heat transfer mostly occur in liquids?
   a) Conduction b) Convection c) Radiation d) All

6. Units of Convective Heat transfer coefficient _____.

7. Fourier's law applies to the heat transfer by_____.

8. The most effective heat exchanger is _____(parallel flow or counter flow)

9. The Stefan Boltzmann law states that, E α _____.

10. Equation/ Formula for Newton's law of cooling _____.

11. Fins are the extended surfaces. True or False

12. In forced convection motion of the fluid takes place naturally. True or False

13. Heat transfer can occurs in any medium. True or false

14. Black body is also perfect emitter. True or False

15. Condenser is a heat transfer device. True or False

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) Explain Newton's law of cooling.
B) What do you mean by Fourier's law of Conduction Explain with formula?
C) Define Emissive power With suitable Formula.
D) Define fin effectiveness and efficiency of fin.

Q.3 A) Explain classification of heat exchanger with suitable example. **(07)**

B) Write difference between steady and unsteady state. Derive the equation for thermal resistance for heat conduction in composite wall. **(08)**

OR

B) A rectangular fin of length 30 cm, width 30 cm, and thickness 2 mm, is attached to a surface at 3000C. The fin is made of Aluminum (K= 204 W/mk) and is exposed to air at 300C. The fin is un-insulated and can loss heat at end also. Take convective heat transfer coefficient as 15 W/m2K. Determine - **(08)**

1- The temperature of the fin at 30 cm from the base.
2- Rate of H.T. from the fin.
3- Fin efficiency.

Q.4 A) Derive L.M.T.D for counter flow heat exchanger. **(07)**

OR

A) Define mass transfer. Explain Fick's law of mass diffusion. **(07)**

B) Sketch the temperature variations in (i) counter-flow heat exchangers (ii) Condenser (iii) Parallel-flow heat exchangers **(08)**