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Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, May 2012
(2008 Scheme)
08.604 : HEAT AND MASS TRANSFER (MU)

Time : 3 Hours Max. Marks : 100

Instructions *: 1) Answer* ***all*** *questions from Part* ***A****.*
2) HMT Data book is ***permitted****.*

PART – A

1. What is thermal diffusivity ? Explain its significance.
2. What is heat generation in a solid ? Give examples.
3. Explain the concept of over all heat transfer coefficient.
4. What is a thermal boundary layer ?
5. Where is fin used ?
6. Define :
   i) Prandtl Number and
   ii) Nusselt Number.
7. What is monochromatic emissive power ?
8. Define radiation shape factor.
9. State Fick's law of diffusion.
10. Define :
    i) Sherwood Number and
    ii) Schmidt Number.

P.T.O.

PART – B

MODULE – I

11. Derive the most general heat conduction equation in Cartesian coordinates. 20

OR

12. Steam at a temperature of 300°C flows through a steel pipe of 50 mm inside dia. and 70 mm outside dia. The heat transfer coefficient between steam and inner surface of pipe is 300 W/m^2-k and that between outer surface and the surrounding is 10 W/m^2-k. If the surrounding air temperature is 30°C, what is the heat loss per unit length of pipe ? 20

MODULE – II

13. Water at 20°C is flowing in a 20 mm diameter pipe with a surface temperature of 60°C at a velocity of 1.2 m/s. Determine the rate of heat transfer to the water from pipe surface per unit length of the pipe. 20

OR

14. Derive an expression for temperature profile along the length of a rectangular Fin. 20

MODULE – III

15. Two parallel plates of emissivity 0.5 are maintained at uniforms temperatures 900 K and 600 K. A radiation shield of emissivity 0.2 is inserted between the plates. Determine the radiation heat transfer per unit area between the two plates. 20

OR

16. State the analogy between heat and mass transfer. 20