Roll No. ☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(AE) (2011 Onwards)   (Sem.–5)
HEAT TRANSFER
Subject Code : BTAE-503
M.Code : 70486

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

   a. Explain the mechanism of heat transfer in fluids.

   b. Write the Fourier's equation of conduction in spherical coordinates.

   c. What do you mean by critical thickness of insulation?

   d. What do you mean by thermal stresses?

   e. What is NTU?

   f. Why counter flow heat exchanger is more effective than parallel flow?

   g. What do you mean Gray bodies, how they are different from black bodies?

   h. What is characteristic length?

   i. Which dimensionless number is more significant in turbulent flow?

   j. What is Kirchhoff's law?

SECTION-B

2. What is thermal diffusivity? Discuss its significance.

3. Show that the temperature distribution in a plane wall without heat generation is linear.

4. A black body emits the radiation at 2000K calculate its monochromatic emissive power at 1 μm wavelength, wavelength at which emission is maximum and maximum emissive power.

5. Derive the relationship for the heat transfer from the fin insulated at tip.

6. What are Newtonian and non-Newtonian fluids? Give examples.

SECTION-C

7. The variation in the thermal conductivity of a material is given by $K=K_o (1 + \alpha T + \beta T^2)$, find the expression for the steady state heat transfer in wall of thickness L maintained at surface temperatures T_1 and T_2 $(T_1 > T_2)$.

8. Water is evaporated continuously at 100°C in an evaporator by cooling 500 kg of air per hour from 260°C to 150°C. Calculate the heat transfer surface area and steam evaporation per hour if liquid enters a 100°C. Take U_o= 46 W/m^{2}K, C_p= 1.005 KJ/Kg.K and h_{fg} = 2257 KJ/Kg(at 100 °C).

9. Discuss the various parameters that affects the engine heat transfer.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.