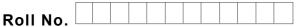


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Total No. of Questions : 18

Total No. of Pages : 02

B.Tech. (ME) (2012 Onwards) (Sem.–6) HEAT TRANSFER Subject Code : BTME-602 M.Code : 71186

Time: 3 Hrs.

Max. Marks : 60

INSTRUCTIONS 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 have to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- 1. Define Thermal conductivity.
- 2. What are the different assumptions applied while doing heat conduction analysis?
- 3. In case of insulating an electric wire, should the outer radius of insulation be more or less than the critical radius, briefly explain with reason.
- 4. Why thin fins are preferred over a thick fin?
- 5. Define the term NTU. What does it interpret?
- 6. Define the term intensity of radiation.
- 7. Define Grashoff Number. What are the forces associated with it?
- 8. In which type of condensation heat transfer coefficient remains more and why?
- 9. What is Newtonian heating of solids?
- 10. What is the limitation of Rayleigh's method of dimensional analysis?

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SECTION-B

- 11. What are the three dimensions in case of spherical coordinate system? How they are obtained?
- 12. Derive the relation of temperature distribution and heat transfer for rectangular fin losing heat at the tip.
- 13. Prove by dimensional analysis for natural convection that Nusselt no. is a function of Grashoff no. and Prandtle no.
- 14. Explain different theories of nucleation.
- 15. State and explain Kirchoff's law.

SECTION-C

- 16. An electric wire with 2mm diameter is covered with 2.5mm thick layer of insulation with k = 0.5 W/mK. Heat is dissipated to the atmosphere at 25°C with h=10W/m²K. The wire is maintained at temperature of 120°C. Estimate the heat dissipation from the wire with and without insulation. Calculate the thickness of insulation when the heat dissipation rate is maximum, also maximum value of heat dissipation rate.
- 17. The A parallel flow, heat exchanger has hot and cold water streams running through it and has the following data : $m_h = 10 \text{kg/min}$, $m_c = 25 \text{kg/min}$, $C_{ph} = C_{pc} = 4.18 \text{ kJ/kg}^\circ\text{C}$, $t_{h1} = 70^\circ\text{C}$, $t_{h2} = 50^\circ\text{C}$, $t_{c1} = 25^\circ\text{C}$. Heat transfer coefficients on both sides are 50 W/m². Calculate:
 - a) The area of heat exchanger
 - b) The exit temperatures of hot and cold fluids if hot water flow rate is doubled.
- 18. Write short notes on :
 - a) Hydrodynamic and thermal boundary layer
 - b) Variable thermal conductivity

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC against the Student.

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