

FACULTY OF ENGINEERING

B.E. 3/4 (Mech.) II-Semester (Supplementary) Examination, December 2010

HEAT TRANSFER

Time : Three Hours]

[Maximum Marks : 75

*Answer ALL questions from Part A. Answer any FIVE questions from Part B.*

**PART—A** (Marks : 25)

1. Mention an example of composite slab.
2. Write the two dimensional steady state conduction heat transfer governing equation in finite difference form.
3. Define infinite cylinder.
4. What is the condition for use of Grober and Heisler charts ?
5. Write equation for mass flow rate of fluid in Von-Karman's method.
6. What is Reynold's Analogy ?
7. Define Kirchoff's law.
8. What is the applicability of monochromatic emissive power ?
9. Using a flow chart, classify heat exchangers.
10. What is bubble contact angle ?

**PART—B** (Marks : 50)

11. Consider an Aluminum fin of 20 cm long attached to a surface at 1000°C. The diameter of the fin is 20 mm. Calculate rate of heat transfer under  $h = 30 \text{ W/m}^2\text{K}$  using all boundary conditions. State whether 20 cm length is infinite length or not.
12. Consider a steam pipe of diameter 5 cm at a temperature of surface of 300°C. Considering any three insulating materials, find the critical radius of insulation and decrease in rate of heat transfer in all the three cases.
13. What is the effect of skin friction factor on convection heat transfer ?
14. Consider a 20 cm diameter spherical ball at 800 K suspended in air. Assuming the ball closely approximates a black body, determine (a) total black body emissive power, (b) the total amount of radiation emitted by the ball in 5 min., (c) the spectral black body emissive power at a wave length of  $3 \mu\text{m}$ .
15. What is the role of "bubble" in boiling ?
16. Derive an expression for rate of heat transfer in case of fluid flowing over a flat plate using Buckingham  $\pi$  theorem.
17. Write a note on applications of heat exchangers.