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4th Sem / Chemical

Subject : Heat transfer Operations- I

Time : 3 Hrs. M.M. : 60

SECTION-A

Note: Multiple choice questions. All questions are compulsory (6x1=6)

Q.1 Ratio of momentum diffusivity of thermal diffusivity is known as . (CO3)

a) Reynold's number b) Prandtl number

c) Nusselt number d) Peclet number

Q.2 For solid metals, with increase in temperature thermal conductivity (CO2)

a) Increase

b) Decrease

c) Remain constant

d) May increase or Decrease

Q.3 View factor is important in heat transfer for (CO4)

a) Steady state conduction

b) Natural convection

c) forced convection

d) Radiation

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x8=16)

Q.23 Write short notes on any two. (Co1)

a) Steady state heat Conduction.

b) Unsteady state heat Conduction.

c) Newton's law of cooling

d) Stefan's Boltzman law.

Q.24 A furnace wall is made up of three layers of thickness 150 mm, 100 mm and 50 mm with thermal conductivity 2,6,10 W/M°C respectively. The inner side of furnace is exposed to gases at 1000°C (inner side 50 mm thickness side) and outer surface of furnace is at 25°C (outer side of 150 mm thickness layer). Find the heat flux through the Composite wall. (CO2)

Q.25 Explain the terms Absorptivity, Reflectivity and transmissivity with respect to radiation heat transfer along with one example each. (CO4)

Q.4 Which mode of heat transfer does not necessarily require the presence of a medium. (CO1)

a) Conduction b) Convection

c) Radiation d) None of these

Q.5 The absorptivity of black body equal to (CO4)

a) 1 b) 2

c) 3 d) 4

Q.6 According to Stefan Boltzman low. (CO4)

a) EaT b) EaT^2

c) EaT^3 d) EaT^4

SECTION-B

Note: Objective/ Completion type questions. All questions are compulsory. (6x1=6)

Q.7 Define Radiation. (CO1)

Q.8 Name any two insulating material used in industry. (CO3)

Q.9 Give two examples of conduction heat transfer. (CO1)

Q.10 Define emissive power. (CO4)

Q.11 Write the formula of Nusselt number. (CO3)

Q.12 Write the formula for critical Radius of insulation for sphere. (CO3)

SECTION-C

Note: Short answer type questions. Attempt any eight questions out of ten questions. (8x4=32)

Q.13 Differentiate between free convection and forced convection. (CO3)

Q.14 State and Explain Fourier's law of conduction. (CO2)

Q.15 Define total emissive power and monochromatic emissive power. (CO4)

Q.16 Discuss any four physical properties of insulating materials. (CO3)

Q.17 State and Explain Kirchoff's law with respect to radiation heat transfer. (CO4)

Q.18 Explain three modes of heat transfer with one explain each. (CO1)

Q.19 Derive the expression for critical radius of insulating for Cylinder. (CO3)

Q.20 Explain Radiation shield and view factor with reference to radiation heat transfer. (CO4)

Q.21 Derive the equation for steady heat Conduction through hollow Cylinder. (CO2)

Q.22 What is dimensionless number? Write the formula for Reynold's number and Prandtl number. (CO3)