4th Sem / Chemical Engineering

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   Steady state heat transfer means.   (CO1)

   a)   Variable heat transfer

   b)   Transient heat transfer

   c)   Periodic heat transfer

   d)   Constant rate of heat transfer

Q.2   The ratio of inertial force to viscous force is known as   (CO3)

   a)   Reynold's number   b)   Prandtl number

   c)   Nusselt number   d)   Peclet number

Q.3   Heat flow by conduction is given by   (CO1)

   a)   Wein's law   b)   Fourier's law

   c)   Newton's law   d)   Kirchhoff's law

SECTION-D

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

Q.23   Explain the three modes of heat transfer in detail with one example each. Also draw neat and clean diagram.   (CO1)

Q.24   Calculate the rate of heat transfer per unit area through a sphere whose internal and external diameters are 40cm and 60cm respectively. The internal and external temperature are 200^0C and 100^0C respectively. The thermal conductivity of the material is 10 W/m^{0}K.   (CO2)

Q.25   Write short note on any two of following   (CO4)

   (a)   Total emissive power.

   (b)   Stefan's Boltzmann law.

   (c)   Radiation Shield.

   (d)   Planck's law.

Q.4 Which of the following has lowest thermal conductivity (CO2)

   a) Metal   b) Alloys

   c) Water   d) Air

Q.5 Driving force heat transfer is (CO1)

   a) Concentration difference

   b) Temperature difference

   c) Both a & b

   d) None of these

Q.6 The body which absorbs all radiations incident upon it is called as (CO4)

   a) Black Body   b) White Body

   c) Opaque Body   d) Transparent Body

SECTION-B

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

Q.7 Define conduction. (CO1)

Q.8 Write the S.I unit of thermal conductivity (CO2)

Q.9 Give two example of convective heat transfer.(CO1)

Q.10 Define view factor. (CO4)

Q.11 Write the formula of Grash off number. (CO3)

Q.12 Write the formula for critical radius of insulation for cylinder. (CO3)

SECTION-C

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

Q.13 Differentiate between steady state and unsteady state conduction heat transfer. (CO1)

Q.14 State and explain newton's law of cooling. (CO3)

Q.15 Define Absorptivity and Reflectivity. (CO4)

Q.16 Discuss the effect of temperature on thermal conductivity of solid and liquids. (CO2)

Q.17 State and explain wein's displacement law with respect to radiation heat transfer. (CO4)

Q.18 Derive the expression for critical thickness of insulation for sphere. (CO3)

Q.19 Write any two applications of dimensionless numbers. (CO3)

Q.20 What is black body? Define monochromatic emissivity of black body. (CO4)

Q.21 Derive the equation for steady state heat conduction through plane wall. (CO2)

Q.22 Define insulation. Name any four insulating materials. (CO3)