**Question Bank (I scheme)**

**Name of Course: Heat Transfer Operation Subject code: 22510**

**Semester : Fifth Programme: Chemical**

**Unit test I**

Unit 1- Conduction (12marks)

**2 marks question**

1. Define thermal conductivity and write its SI unit.
2. Define conduction with example
3. Define steady state and unsteady state conduction.
4. Define insulating materials and give two examples
5. Give the effect of temperature on thermal conductivity.

**4marks question**

1. Explain optimum thickness of insulation
2. Explain Fourier’s law with mathematical expression.
3. Derive an expression to calculate rate of heat flow through a cylinder.
4. A wall is made of brick(k= 1.0 W/mK) 230 mm thick. It is lined on the inner face with plaster (k= 0.4 W/mK) and of thickness 10 mm. If a temperature difference of 30 K is maintained between the two faces, what is the heat flow per unit area of wall?.

Unit 2- Convection (20 marks)

1. **marks question**
2. Define convection with example.
3. Differentiate natural and forced convection.
4. Define film wise condensation and drop wise condensation.
5. Give the unit of U in SI and MKS system.
6. Heat transfer coefficients are low in film wise condensation. Why?
7. Give the expression for LMTD for co current and counter current flow.
8. **marks question**
9. Write down the following equations and explain the terms: i) Sider Tate equation ii) Dittus Bolter equation.
10. Derive Q= U.A.ΔTLM
11. Calculate U from following data:

hi = 5800 W/m2K. ho = 1750 W/m2K

do = 30 mm di = 20 mm

k= 46.52 W/mK

1. Differentiate between co current and counter current flow .
2. Thermic fluid flowing at a rate of 5000 kg/h is to be cooled from 423 K to 363 K by circulating water at a rate of 15000 kg/h. If the water is available at 303K, find the outlet temperature of water. Cp for thermic fluid = 2.72 kJ/kg K.
3. A hot fluid enters a double pipe heat exchanger at a temperature of 423 K and is to be cooled to 367 K by a cold fluid entering at 311 K and heated to 339 K. Shall they be directed in parallel or co current flow?

Unit 3- Radiation (8 marks)

1. **marks question**
2. Define radiation with example.
3. Define black body and grey body.
4. Define absorptivity, reflectivity and transmissivity.

**4marks question**

1. Explain Kirchhoff’s law
2. Explain any two laws of black body radiation
3. Calculate the heat loss by radiation per unit area from an unlagged horizontal steam pipe 50 mm od at 377 K to air at 283K. Emissivity (ε)= 0.9