Sheat-1

1. Iron plate of thickness 0.05m and thermal conductivity of 70W/m.^{o}C, has temperatures on its surfaces 65^{o}C and 20^{o}C respectively. Find the heat flux and the total heat transfer rate through the plate if plate area is 1.5m^{2}.

   Ans.: 63kW/m^{2}, 94.5kW
2. The temperature difference of 120^{o}C is applied across a slab of thickness 5cm. The Thermal conductivity of the slab material is 0.04W/m.^{o}C. Determine the heat transfer through 2.5m^{2} per hour.

   Ans.: 864kJ/h
3. Two large plates are 10cm apart. One of them is at 80^{o}C and the other at 220^{o}C. The space between them is filled with packed rock wool of thermal conductivity 0.08W/m.^{o}C. Find the heat flux between the plates.

   Ans.: 112W/m^{2}
4. A glass of window of 0.6cm thickness and 0.8W/m.^{o}C thermal conductivity is maintained at 30^{o}C at one surface and the other surface is at 22^{o}C. Determine the heat transfer rate through 1.2m^{2} area of the glass.

   Ans.: 1.28kW
5. The heat transfer coefficient of convection between the flat plate and water flow over it is 200W/m^{2}.^{o}C. The water temperature is 20^{o}C. The flat plate temperature is 80^{o}C. Determine heat transfer rate from 2m^{2} area of the flat plate. Ans.: 24kW
6. A sphere of 20cm diameter with surface temperature is at 50^{o}C. It suspended in a water of temperature 28^{o}C. The coefficient of free convection heat transfer is 50W/m^{2}.^{o}C. Estimate the heat transfer between the sphere and water. Ans.: 138.23W
7. Cold air at 0^{o}C is to be forced to flow over a flat plate. The plate is at temperature of 30^{o}C. The mean heat transfer coefficient is 50W/m^{2}.^{o}C. Find the heat transfer to the air per unit area of the plate.

   Ans.: 1.5kW/m^{2}
8. 0.25m^{2} vertical square plate with a surface maintained at temperature of 60^{o}C is exposed to air at temperature 27^{o}C. The free heat transfer

coefficient is 40W/m^2.^oC. Determine the heat transfer by free convection by one face of the plate. Ans.: 330W

9. The temperature of the hot surface is 500K. The surface emissivity is 0.88. Find the radiation flux emitted from this surface.
   Ans.:3118.5W/m^2
10. A radiation heat flux of 1000W/m^2 is incident on a surface. The surface absorbs 80% of incident radiation. Determine the radiation by 4m^2 area of the surface during a period of two hours. Ans.: 6.4kW.hr
11. The black body is heated from 27^oC to 87^oC. Calculate the increase in its emissive power. Ans.: 493.072W/m^2
12. A surface of temperature 700K, area 0.5m^2 and emissivity of 0.9 is facing totally anther surface of temperature 500K. Find the heat transfer by radiation between these two surfaces. Ans.: 4531.464W