Q.1 A gray, diffuse opaque surface (Absorptivity = 0.8) is at 100°C and receives an irradiation 1000 W/m2. If the surface area is 0.1 m2, calculate
i. Radiosity of the surface
ii. Net radiative heat transfer rate from the surface
iii. Calculate above quantities if surface is black.

Q.2 Emissivity of two large parallel plates maintained at 800 °C and 300 °C are 0.3 and 0.5 respectively. Find the net radiant heat exchange per square meter for these plates.

Q.3 The flat floor of hemispherical furnace is at 800K and has an emissivity of 0.5. The corresponding values of hemispherical roof are 1200K and 0.25. Calculate net heat transfer between roof and floor.

Q.4 A cubical room 4 m × 4 m × 4 m is heated through the ceiling by maintaining it at uniform temperature of 350 K, while walls and the floor are at 300 K. Assuming that the all surfaces have an emissivity of 0.8, determine the rate of heat loss from ceiling by radiation.

Q.5 an enclosure measures 1.5m* 1.5m with a height of 2m under steady state conditions, the wall and ceiling are maintained at 525 K and floor is at 400K. Determine net radiation to floor. Take emissivity of ceiling and wall = 0.85 and Emissivity of floor = 0.75

Q.6 A spherical liquid oxygen tank 0.3 m in diameter is enclosed concentrically in a spherical container of 0.4 m diameter and the space in between is evacuated. The tank surface is at -183°C and has an emissivity 0.2. The container surface is at 15°C and has an emissivity of 0.25. Determine the net radiant heat transfer rate and rate of evaporation of liquid oxygen if its latent heat is 220 kJ/kg

Q.7 Determine the rate of heat loss by radiation from steel tube of outside diameter 70 mm and 3m long at a temperature of 227°C if the tube is located within a square brick conduit of 0.3 m side and at 27 °C take emissivity of steel=0.79 and emissivity of brick=0.93