National Program on Technology Enhanced Learning

CONDUCTION AND RADIATION

Self Assessment Test - 2

Duration: 50 min

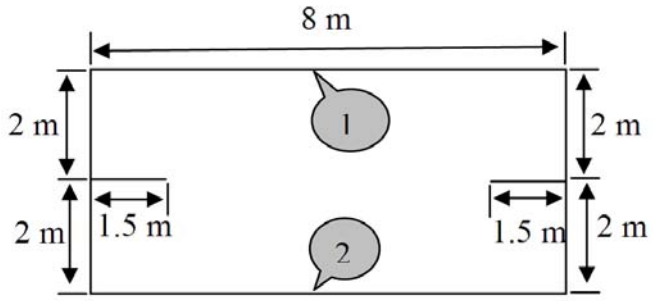
Max. Marks: 40

1. Make suitable assumptions wherever required with justification
2. Assume any missing data

(1) In a rectangular box type enclosure consisting of 6 surfaces how many how factors are there in total? How many independent view factors need to be determined? (2)

(2) A long duct has a regular hexagonal cross section. Determine the view factor between the opposite sides by view factor algebra? Cross check your answer with the direct application of crossed string method to determine the same view factor. (8)

(3) The arrangement shown below is very long in the direction perpendicular to the plane of the figure. Calculate the view factor F_{12}.



(6)

(4) A spherical tank of diameter D_1=0.50m containing liquid oxygen is enclosed inside another spherical tank of diameter D_2=0.80 m and the space between them is evacuated. The inner and outer spheres are maintained at T_1= 100 K and T_2= 0 300 K respectively. Both spheres have an emissivity of 0.07. Calculate the rate of transfer of heat transfer to the inner sphere and the rate of evaporation if the latent heat of vaporization of oxygen is 2.1 x 10^5 Ws/kg. (24)