**BBBDNITM, LKO**

**MECHANICAL AND AERONAUTICAL DEPARTMENT**

**SUBJECT-HEAT AND MASS TRANSFER**

**UNIT-4**

**ASSIGNMENT-4**

**SECTION-A**

**Short Questions :(2 Marks)**

1).What is black body and how does it differ from gray body?

2).Define geometrical or shape facto

3).Explain the concept of black body.

4).Explain the Kirchhoff’s law.

5). Explain the Stefan-Boltzmann law.

**SECTION-B**

**Questions upto 200 words :(10 Marks)**

6).The radiation shape factor of the circular surface of a thin hollow cylinder of 10cm diameter & 10cm length is 0.1716. What is the shape factor of the curved surface of the cylinder with respect to itself.

7).Two Rectangular black surface 2m long and 1m wide are placed to each there at a Radius 4m between them. If the surface are maintained at the temperature 100c and 200c respectively calculate the heat exchange by radiation b/w two surfaces ?

8). A truncated wire height 10 cm top and bottom diameters 8cm and 16cm respectively .The bottom surface stated to incept 15% radiation using the top surface .Determine the shape factor b/w (1)Top surface and conical side surface.(2)Shape factor b/w side and itself.

9).Find the shape factor F12 for the arrangement shown in the fig. Ares A1 & A2 are Perpendicular, but do not shear the common edge.

10).If two large parallel plate with emissivity 0.4 are maintained at different temperature and exchange heat only by radiation what % ne radiative heat transfer would occurif two equally large radiation shield with €=0.04 are included in parallel plate .

11).Consider radiative heat transfer b/w two large parallel plane of surface emissivity 0.8How many thin radiation shields of emissivity 0.05 be the placed b/w the surface to reduce the radiation heat transfer by a factor 75.

12).Discuss how the radiation from gases differ from that of solids.

**SECTION-C**

**Very Long Questions :(15 Marks)**

13). Define Emissivity of a surface.What is meant by Kirchhoff's law? Two large parallel planes with emissivities 0.35 and 0.85 exchange heat by radiation. Theplanes are respectively 1073K and 773K . A radiation shield having the emissivity of 0.04 isplaced between them. Find the percentage reduction in radiation heat exchange and temperature of the shield.

14).(a)Explain briefly the following:

(i) Specular and diffuse reflection

(ii) reflectivity and transmissivity

(iii) reciprocity rule and summation rule

(b)Two parallel, infinite grey surface are maintained at temperature of *127C*and *227C*respectively. If the temperature of the hot surface is increased to 327°C, by what factor is thenet radiation exchange per unit area increased? Assume the emissivities of cold and hotsurface to be 0.9 and 0.7 respectively.

15).(i) Radiation shape factor of a circular surface of a thin hollow cylinder of 10 cm diameter and 10 cm length is0.1716 . What is the shape factor of the curved surface of the cylinder with respect to itself.

(ii) (a) What is intensity of radiation? Show that--E=πI