

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. Sem. – IInd - Examination – June/July- 2011****Subject code: 1721004****Subject Name: Radiation Heating and Cooling System****Date: 29/06/2011****Time: 10:30 am – 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain the following laws as applied to radiation heat transfer : **07**
Planck's law , Wein's displacement law, Stefan Boltzmann law.
- (b) Explain Fanger and Gagge model for thermal comfort. **07**
- Q.2** (a) Explain surface Radiosity and Irradiation. Explain electrical network approach **07**
for heat exchange and the concept of surface resistance and gray body factor.
- (b) Explain the concept of Mean Radiant Temperature and Operative temperature. **07**
- OR**
- (b) Write a short note on Rohles-Nevin studies. **07**
- Q.3** (a) A thermos flask has a double walled bottle and the space between the walls is **07**
evacuated so as to reduce the heat flow. The bottle surfaces are silver plated
and the emissivity of each surface is 0.03. If the content of the bottle is at 100K,
find the rate of heat transfer from surrounding at 300 K to the thermos bottle.
- (b) Calculate shape factor for the following. **07**
- Long tube with cross section of an equilateral triangle.
 - Black body inside a black enclosure
- OR**
- Q.3** (a) The flat roof of a hemispherical furnace is at 800 K and has a emissivity of **07**
0.5. The corresponding values for the hemispherical roof are 1200 K and
0.25. Determine the net radiation heat transfer from the roof to floor.
- (b) Calculate shape factor for the following. **07**
- Sphere of diameter d inside a cubical box (l = d)
 - Hemispherical surface closed by a plane surface.
- Q.4** (a) Write a short note on convective systems with radiant panels. **07**
- (b) What are the requirements for ventilation with radiant heating and cooling **07**
systems? Describe various methods of arrangements for providing ventilation.
- OR**
- Q.4** (a) Write a short note on electric radiant heating panels. **07**
- (b) Explain measurement technique for thermal comfort. **07**
- Q.5** (a) Enlist various flow controls used for radiant heating and cooling systems. **07**
Explain briefly down stream flow control.
- (b) Write a short note on Safety controls. **07**
- OR**
- Q.5** (a) Explain the working of hybrid system for radiant heating and cooling system. **07**
- (b) Write a short note on motorized mixing valves. **07**
