

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E –IIst SEMESTER–EXAMINATION – JULY- 2012****Subject code: 1721004****Date: 12/07/2012****Subject Name: Radiation Heating and Cooling System****Time: 10:30 am – 13:00 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) Define 'Thermal Comfort' as per ASHRAE Standard 55 (1992). Also Explain briefly the Gagge Model of thermal comfort. **07**
- (b) Explain the term "Control Volume". Also describe the important characteristics of control volume. **07**

- Q.2** (a) Distinguish between: **07**
- (i) Black body and grey body
 - (ii) Absorptivity and emissivity of a surface
 - (iii) Total emissive power and monochromatic emissive power.
- (b) State and explain any three laws as applied to radiation heat transfer. **07**

OR

- (b) Explain the concept of Mean Radiant Temperature and Operative temperature. **07**

- Q.3** (a) Define intensity of radiation and prove that the intensity of normal radiation is $1/\pi$ times the total emissive power. **07**
- (b) Establish a relation for the shape factor of a cavity with respect to itself. The cavity is closed on its outer surface with a flat surface. Explain with the help of taking example of cylindrical cavity of depth h and diameter d . **07**

OR

- Q.3** (a) A black body of 0.2 m^2 area has an effective temperature of 800K . Calculate (i) Total rate of energy emission (ii) Intensity of normal radiation (iii) Intensity of radiation along a direction 60° to the normal (iv) Wavelength of maximum monochromatic emissive power. **07**
- (b) Calculate shape factor for the following. **07**
- Diagonal partition within a long square duct.
 - End and side of circular tube of equal length and diameter.

- Q.4** (a) Briefly explain thermal comfort design methodology. **07**
- (b) Write a short note on Rohles-Nevin studies. **07**

OR

- Q.4** (a) Write a short note on ventilation with radiant heating and cooling systems. **07**
- (b) Compare and contrast radiant heating and cooling with that of convection. **07**

- Q.5** (a) Enlist various flow controls used for radiant heating and cooling systems. Explain briefly any one with a neat sketch. **07**
- (b) Write a short note on radiant heating panels. **07**

OR

- Q.5** (a) Explain the working of convective systems with radiant panels. **07**
- (b) Enumerate some salient features and characteristics of radiation. What position does thermal radiation occupy in the electromagnetic spectrum? **07**
