Module 9: Short questions

1. What is thermal radiation? How does it differ from other forms of electromagnetic radiation?

2. What is a black body? Does a black body actually exist?

3. Define the total and spectral black body emissive powers. How are they related to each other?

4. Consider two identical bodies, one at 1000K and the other at 1500 K. Which body emits more radiation in the shorted wavelength region?

5. What does the solid angle represent, and how does it differ from a plane angle? What is the value of solid angle associated with a sphere?

6. For a diffusely emitting surface, how is the emissive power related to the intensity of the emitted radiation?

7. For diffusely incident radiation, how is irradiation on a surface related to the intensity of the incident radiation?

8. Explain what is the greenhouse effect.

9. What does the view factor represent? When is the view factor form a surface to itself not zero?

10. Consider an enclosure consisting of five surfaces. How many view factors does this geometry involve? How many of these view factors can be determined by the application of reciprocity and the summation rules?

11. How does radiosity for a surface differ from the emitted energy? For what kind of surfaces are these two quantities identical?

Multiple choice questions:

1) Radiosity is
a) The sum of the emissive power and the irradiance
b) The difference between the emissive power and the irradiance
c) The sum of the emissive power with the product of the reflectivity and irradiance
d) The difference between the emissive power and the product of the reflectivity and irradiance
e) None of the above

2) The irradiance to a small non-black body at equilibrium in a large evacuated isothermal cavity is equal to its
a) Radiosity
b) Emissive power
c) Black emissive power
d) Intensity
e) None of the above

3) Given a surface of known temperature, the Planck spectrum can be integrated to obtain
a) Transmissivity
b) View Factor
c) Mean path length
d) TNRR (total normal radiative reflection)
e) None of the above

4) If the spectral emissivity of a surface decreases with increasing wavelength, then for increasing temperature its overall emissivity will
a) Decrease
b) Remain equal
c) Increase
d) Depend on other factors
e) None of the above

5) The sum of the reflectivity, absorptivity and transmissivity is equal to
a) Emissivity
b) Planck's constant
c) 0
d) 1
e) None of the above

6) For a surface i, surrounded by N surfaces, the sum $\sum_{1}^{N} F_{ji}$ is equal to
a) 0
b) 1
c) $\sum_{1}^{N} F_{ij}$
d) G
e) None of the above