

ANSWER ALL QUESTIONS (Choose the right answer where applicable)

1. Thermal radiation spectrum is—
  - (a)  $10^{-1}$  to  $10^2$   $\mu\text{m}$
  - (b)  $10^{-2}$  to  $10^{-4}$   $\mu\text{m}$
  - (c) 0.4 to 0.8  $\mu\text{m}$
  - (d) None of the above
2. Visible radiation spectrum is—
  - (a)  $10^{-1}$  to  $10^2$   $\mu\text{m}$
  - (b)  $10^{-2}$  to  $10^{-4}$   $\mu\text{m}$
  - (c) 0.4 to 0.8  $\mu\text{m}$
  - (d) None of the above
3. For radiation incident on a metal, which of the following statements is true?
  - (a)  $\alpha + \tau = 1$ , and  $\rho = 0$
  - (b)  $\alpha = 1$ ,  $\rho = 0$ , and  $\tau = 0$
  - (c)  $\alpha + \rho = 1$ , and  $\tau = 0$
  - (d) None of the above
4. For radiation incident on a black car, which of the following statements is true?
  - (a)  $\alpha + \tau = 1$ , and  $\rho = 0$
  - (b)  $\alpha = 1$ ,  $\rho = 0$ , and  $\tau = 0$
  - (c)  $\alpha + \rho = 1$ , and  $\tau = 0$
  - (d) None of the above
5. For a blackbody, which of the following statements is true?
  - (a)  $\alpha = 1$ ,  $\tau = 0$ ,  $\rho = 0$ , and  $\epsilon = 0$
  - (b)  $\alpha = 1$ ,  $\tau = 0$ ,  $\rho = 0$ , and  $\epsilon = 1$
  - (c)  $\alpha = 1$ ,  $\tau = 0$ ,  $\rho = 1$ , and  $\epsilon = 0$
  - (d) None of the above
6. Irradiation is—
  - (a) rate of radiation leaving a surface due emission and reflection in all direction per unit area of that surface
  - (b) rate of radiation incident on a surface from all direction per unit area of that surface
  - (c) radiation that is transmitted from a surface per unit area of that surface
  - (d) radiation that is absorbed on a surface per unit area of that surface
7. View factor (Shape factor)  $F_{ij}$  is the —
  - (a) fraction of radiation leaving surface-i and absorbed in surface-j
  - (b) fraction of radiation leaving surface-j and absorbed in surface-i
  - (c) fraction of radiation leaving surface-i and intercepted by surface-j
  - (d) none of the above
8. For N-surface enclosure, the number of view factors are —
  - (a)  $N(N-1)/2$
  - (b)  $N^2$
  - (c)  $N$
  - (d) none of the above

9. For  $F_{ij}$  to be zero, the radiating surface is of —
- (a) either convex or concave shaped
  - (b) either plane or concave shaped
  - (c) either plane or convex shaped
  - (d) none of the above
10.  $\sum F_{ij} = 1$  is the summation rule applicable exclusively for—
- (a) radiation exchanging between any two surfaces
  - (b) radiation exchanging between surfaces in an enclosure
  - (c) radiation exchanging between two parallel disks
  - (d) none of the above
11. Find the wavelength of maximum radiation emitted from sun, whose surface temperature may be taken as 5800K.
12. Consider an enclosure consisting of a hemisphere of diameter  $D$  and a flat circular surface of the same diameter. Determine the relevant view factors and the total radiation resistances if the surfaces have an emissivity of 0.8.