1. Find the wavelength and frequency of a 120-MeV photon.

2. Under favorable circumstances the human eye can detect 1.0×10^{18} J of electromagnetic energy. How many 600-nm photons does this represent?

3. A surface of zinc is illuminated and photoelectrons are observed. (a) What is the largest wavelength that will cause photoelectrons to be emitted? (b) What is the stopping potential when light of wavelength 252.0 nm is used? The work function of zinc is 4.31 eV.

4. (a) The energy required to remove an electron from sodium is 2.3 eV. Does sodium show a photoelectric effect for yellow light, with $\lambda = 5890$Å? (b) What is the cutoff wavelength for photoelectric emission from sodium?

5. The stopping potential for photoelectrons emitted from a surface illuminated by light of wavelength $\lambda = 4910$Å is 0.71 V. When the incident wavelength is changed the stopping potential is found to be 1.43 V. What is the new wavelength?

6. Obtain Stefan's law using the Planck's radiation law, i.e., starting from the formula for the spectral energy density in the cavity

$$u(\nu)d\nu = \frac{8\pi h}{c^3}\frac{\nu^3}{\exp(h\nu/kT) - 1}d\nu, \tag{1}$$

show that the radiancy $R_T = \sigma T^4$. Use the formula

$$\int_0^\infty \frac{y^3}{\exp(y) - 1}dy = \frac{\pi^4}{15}. \tag{2}$$

7. Use the numerical value of the Stefan–Boltzmann constant σ to find the numerical value of Planck's constant h.

8. Express the Planck's formula for the spectral energy density (equation 1) in the form of wavelength λ, i.e., find $u(\lambda)d\lambda$.

9. At what wavelength and frequency does a cavity at 7350 °K radiate most per unit wavelength?

10. The cavity in the above problem has a hole 1 cm in diameter drilled in its wall. Find the power radiated through the hole in the range (a) 430-440 nm and (b) 860-870 nm.

11. At a given temperature, $\lambda_{\max} = 6500$Å for a blackbody cavity. What will $\lambda_{\max}$ be if the temperature of the cavity walls is increased so that the rate of emission of spectral radiation is tripled?

12. An analyzer for thermal radiation is set to accept wavelengths in an interval of 1.74 nm. What is the intensity of the radiation in that interval at a wavelength of 932 nm emitted from a glowing object whose temperature is 1546 °K?