815.

Problem 53.47 (RHK)

We have to calculate (a) *the maximum wavelength that will produce photoconduction in diamond*. (b) *We have to identify the region of the electromagnetic spectrum in which this wavelength lies*.

Solution:

The minimum energy of the photon required to produce photoconduction in diamond will have to be equal to the band gap between its valence and conduction bands, which is 5.5 eV. The photon of energy 5.5 eV will have the longest wavelength of electromagnetic waves which can produce photoconduction in diamond. We thus have

$$\frac{hc}{\lambda} = E_{\text{gap}} = 5.5 \text{ eV},$$

or

$$\lambda = \frac{6.63\times10^{-34}\times3\times10^{8}}{5.5\times1.6\times10^{-19}} \text{ m}$$

$$= 2.26\times10^{-7} \text{ m} = 226 \text{ nm}.$$

The wavelength lies in the ultraviolet region of the electromagnetic spectrum.