Q1: Surface of a certain metal is first illuminated with light of wavelength λ_1 = 350 nm and then by the light of wavelength λ_2 = 540 nm. It is found that the maximum speed of the photoelectrons in the two cases differ by a factor of 2. The work function of the metal (in eV) is close to (Energy of photon = (1240/ λ) eV)

(a) 5.6

(b) 2.5

(c) 1.4

(d) 1.8

Solution:

From Einstein's Photoelectric eqⁿ —

$$\frac{hc}{\lambda_1} = \phi + K_1 \quad \text{-(i)} \quad \& \quad \frac{hc}{\lambda_2} = \phi + K_2$$

$$\frac{hc}{\lambda_2} = \phi + 2K_1 \quad \text{-(iii)} \qquad [K_2 = 2K_1]$$

2 eq (i) - eq (iii)

$$hc \left(\frac{2}{\lambda_1} - \frac{1}{\lambda_2} \right) = \phi$$

Answer:(d) 1.8