Q 01 In a photoelectric experiment ultraviolet light of wavelength 280 nm is used with lithium cathode having work function $\phi = 2.5$ eV. If the wavelength of incident light is switched to 400 nm, find out the change in the stopping potential. ($h = 6.63 \times 10^{-34}$ Js, $c = 3 \times 10^{8}$ ms^{-1}) [Aug. 26, 2021 (I)]

(a) 1.3 V (b) 1.1 V

(c) 1.9 V (d) 0.6 V

ANS

(a) From photoelectric effect maximum kinetic energy = eV_s

$$eV_s = \frac{hc}{\lambda} - \phi$$

$$\Rightarrow eV_s = \frac{1240}{280} - 2.5 = 1.93eV$$

$$\Rightarrow V_{s_1} = 1.93V$$

$$\rightarrow eV_{s_2} = \frac{1240}{400} - 2.5 = 0.6eV$$

$$\Rightarrow V_{s_1} - V_{s_2} = 1.93 - 0.6 = 1.33V$$