

**Q 01.**

A 2 mW laser operates at a wavelength of 500 nm. The number of photons that will be emitted per second is :

[Given Planck's constant  $h = 6.6 \times 10^{-34}$  Js, speed of light  $c = 3.0 \times 10^8$  m/s] **[Main 10 Apr. 2019 (II)]**

(a)  $5 \times 10^{15}$

(b)  $1.5 \times 10^{16}$

(c)  $2 \times 10^{16}$

(d)  $1 \times 10^{16}$

**Ans**

(a) Energy of photon (E) is given by

$$E = \frac{hc}{\lambda}$$

Number of photons of wavelength  $\lambda$  emitted in t second from laser of power P is given by

$$n = \frac{Pt\lambda}{hc}$$

$$\Rightarrow n = \frac{2 \times \lambda}{hc} = \frac{2 \times 10^{-3} \times 5 \times 10^{-7}}{2 \times 10^{-25}} \quad (\because t = 1\text{S})$$

$$\Rightarrow n = 5 \times 10^{15}$$