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= 6.6×10^{-34} Js, speed of light c= 3.0×10^8 m/s] **[Main 10 Apr. 2019 (II)]**

(a) 5×10^{15}

(b) 1.5×10^{16}

(c) 2×10^{16}

(d) 1×10^{16}

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

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

Number of photons of wavelength λ emitted in t second from laser of power P is given by

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

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

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