21. A radiation of energy 'E' falls normally on a perfectly reflecting surface. The momentum transferred to the surface is
(c = velocity of light)

A. $\frac{E}{c}$
B. $\frac{2E}{c}$
C. $\frac{2E}{c^2}$
D. $\frac{E}{c^2}$

Ans-(B)

The radiation energy is given by

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

Initial momentum of the radiation is

$$P_i = -\frac{h}{\lambda} = -\frac{E}{c}$$

The reflected momentum is

$$P_r = -\frac{h}{\lambda} = -\frac{E}{c}$$

So, the change in momentum of light is

$$\Delta P_{light} = P_r - P_i = -\frac{2E}{c}$$

Thus, the momentum transferred to the surface is

$$\Delta P_{light} = \frac{2E}{c}$$