

**Q 06** Two satellites, A and B, have masses  $m$  and  $2m$  respectively. A is in a circular orbit of radius  $R$ , and B is in a circular orbit of radius  $2R$  around the earth. The ratio of their kinetic energies,  $T_A/T_B$ , is : **[Main 12 Jan. 2019 II]**

- (a)  $\frac{1}{2}$       (b) 1      (c) 2      (d)  $\sqrt{\frac{1}{2}}$

(b) Orbital, velocity,  $v = \sqrt{\frac{GM}{r}}$

Kinetic energy of satellite A,

$$T_A = \frac{1}{2} m_A v_A^2$$

Kinetic energy of satellite B,

$$T_B = \frac{1}{2} m_B v_B^2 \quad \Rightarrow \quad \frac{T_A}{T_B} = \frac{m \times \frac{GM}{R}}{2m \times \frac{GM}{2R}} = 1$$