

At which height above the surface of the earth of radius R , will the acceleration due to gravity decrease by 0.1%?

A $\frac{R}{100}$

B $\frac{R}{200}$

C $\frac{R}{1000}$

D $\frac{R}{2000}$

Solution

④ Density of earth $\rho = \frac{M}{\frac{4}{3}\pi R^3}$

Solution

Gravity at any height $\Rightarrow g' = g\left(1 - \frac{2h}{R}\right)$

Decreasing by 0.1% $\Rightarrow g' = 0.999g$

$$0.999g = g\left(1 - \frac{2h}{R}\right)$$

$$\frac{2h}{R} = 1 - \frac{999}{1000}$$

$$2h = \frac{R}{1000}$$

$$h = \frac{R}{2000}$$

\Rightarrow Option (D)