**Q. 06** The length of a given cylindrical wire is increased by 100%. Due to the consequent decrease in diameter the change in the resistance of the wire will be **[2003]**

(a) 200%   (b) 100%   (c) 50%   (d) 300%

06 **(d)** The total volume remains the same before and after stretching.

Therefore $A \times \ell = A' \times \ell'$

Here $\ell' = 2\ell$

$$\therefore \quad A' = \frac{A \times \ell}{\ell'} = \frac{A \times \ell}{2\ell} = \frac{A}{2}$$

Percentage change in resistance

$$= \frac{R_f - R_i}{R_i} \times 100 = \frac{\rho\left(\dfrac{\ell'}{A'} - \dfrac{\ell}{A}\right)}{\rho\dfrac{\ell}{A}} \times 100$$

$$= \left[\left(\frac{\ell'}{A'} \times \frac{A}{\ell}\right) - 1\right] \times 100 = \left[\left(\frac{2\ell}{A/2} \times \frac{A}{\ell}\right) - 1\right] \times 100$$

$$= 300\%$$