

Q. 08 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%

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

$$\text{Therefore } A \times \ell = A' \times \ell'$$

$$\text{Here } \ell' = 2\ell$$

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

Percentage change in resistance

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

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

$$= 300\%$$