Q. 02 When 5V potential difference is applied across a wire of length 0.1 m, the drift speed of electrons is 2.5×10^{-4} ms^{-1}. If the electron density in the wire is 8×10^{28} m^{-3}, the resistivity of the material is close to : **[2015]**

(a) $1.6 \times 10^{-6}\Omega m$ (b) $1.6 \times 10^{-5}\Omega m$

(c) $1.6 \times 10^{-8}\Omega m$ (d) $1.6 \times 10^{-7}\Omega m$

2. (b) $V = IR = (neAv_d)\rho\frac{\ell}{A}$

$$\therefore \quad \rho = \frac{V}{V_d l n e}$$

Here V = potential difference

l = length of wire

n = no. of electrons per unit volume of conductor.

e = no. of electrons

Placing the value of above parameters we get resistivity

$$\rho = \frac{5}{8\times10^{28}\times1.6\times10^{-19}\times2.5\times10^{-4}\times0.1}$$

$= 1.6 \times 10^{-5}\Omega m$