Q. 01

The resistance of a wire is 5 ohm at 50°C and 6 ohm at 100°C. The resistance of the wire at 0°C will be [2007]

(a) 3 ohm   (b) 2 ohm   (c) 1 ohm   (d) 4 ohm

Answer

(d) We know that

$R_t = R_0(1 + \alpha t)$,

where R_t is the resistance of the wire at t °C,
R_0 is the resistance of the wire at 0°C
and α is the temperature coefficient of resistance.

$\Rightarrow R_{50} = R_0(1 + 50\alpha)$ ... (i)

$R_{100} = R_0(1 + 100\alpha)$ ... (ii)

From (i), $R_{50} - R_0 = 50\alpha R_0$ ... (iii)

From (ii), $R_{100} - R_0 = 100\alpha R_0$ ... (iv)

Dividing (iii) by (iv), we get

$$\frac{R_{50} - R_0}{R_{100} - R_0} = \frac{1}{2}$$

Here, $R_{50} = 5\Omega$ and $R_{100} = 6\Omega$

$$\therefore \frac{5 - R_0}{6 - R_0} = \frac{1}{2}$$

or, $6 - R_0 = 10 - 2R_0$ or, $R_0 = 4\Omega$.