

Quiz

Chapter # 26 (Current & Resistance)

Topics Included:

- ① Electric Current
- ② Current Density
- ③ Drift + speed
- ④ Resistance & Resistivity
- ⑤ Ohm's Law.

QUIZ 7

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CLO 4 | explain the interaction between electric & magnetic fields with different applications.

Q1: A cylindrical wire has a radius r and length l . If both r and l are doubled, does the resistance of the wire (a) increase, (b) decrease, or (c) remain the same? Reasoning? [4 Marks]

$$R = \rho \frac{L}{A} = \rho \frac{2L}{\pi (2r)^2} = \frac{\rho L}{\pi r^2} \times \frac{2}{4} = \frac{\rho L}{2\pi r^2} \Rightarrow R' = \frac{R}{2}$$

Answers Resistance of the wire will decrease to half.Reason: As we know that:

$$R = \frac{\rho L}{A}$$

$$R' = \rho \frac{2L}{\pi (2r)^2} = \frac{\rho L}{\pi r^2} \times \frac{2}{4} = \frac{\rho L}{\pi r^2} \cdot \frac{1}{2} = \frac{R}{2}$$

$$R' = \frac{R}{2}$$

Q2: The radius of 22-gauge Nichrome wire is 0.321 mm ($\rho = 1.5 \times 10^{-6} \Omega m$).

(A) Calculate the resistance per unit length of this wire.

(B) If a potential difference of 10 V is maintained across a 1.0-m length of the Nichrome wire, what is the current in the wire? [6 Marks]

$$(A) R = \frac{\rho L}{A} = \frac{\rho (1)}{\pi r^2}$$

$$R = \frac{(1.5 \times 10^{-6})}{\pi \cdot (0.321 \times 10^{-3})^2}$$

$$R = \frac{(1.5 \times 10^{-6})}{3.2371 \times 10^{-7}}$$

$$R = \frac{4.6337}{10^{-1}} \Omega$$

$$R = 4.6337 \text{ ohm}$$

$$B) V = IR$$

$$I = \frac{V}{R}$$

$$I = \frac{10}{4.6337}$$

$$I = 2.158 \text{ ampere}$$