

1) Calculate the Resistance of a 0.30m length of copper wire of cross-section area $5 \times 10^{-6} \text{ m}^2$ [Resistivity of Copper is $1.7 \times 10^{-8} \Omega \text{ m}$]

Soln.

$$L = 0.30 \text{ m}$$

$$A = 5 \times 10^{-6} \text{ m}^2$$

$$R = \rho \frac{L}{A} = \frac{1.7 \times 10^{-8} \times 0.3}{5 \times 10^{-6}}$$

$$R = 1.02 \times 10^{-3} \Omega = 1.02 \text{ m}\Omega$$

2) Repeat question one with Silicon.

$$\rho = 2300 \Omega \text{ m.}$$

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

$$R = \frac{2300 \times 0.3}{5 \times 10^{-6}}$$

$$R = 138 \times 10^6 \Omega$$

3) Calculate the Resistivity of a metal wire of cross-sectional diameter 0.4mm . If a 25cm length of this wire has a resistance of 6Ω .

Soln.



$l = ?$

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

$$\rho = \frac{RA}{L}$$

$$R = 6\Omega$$

$$L = 25\text{cm} = 0.25\text{m}$$

$$d = 0.4\text{mm}$$

$$d = 0.4 \times 10^{-3}\text{m}$$

$$1\text{m} = 100\text{cm}$$

$$1\text{cm} = 10\text{mm}$$

$$1\text{m} = 100 \times 10\text{mm}$$

$$1\text{m} = 1000\text{mm}$$

$$d = \frac{0.4}{1000} = 0.4 \times 10^{-3}\text{m}$$

Area of cross-section of

Cylinder.

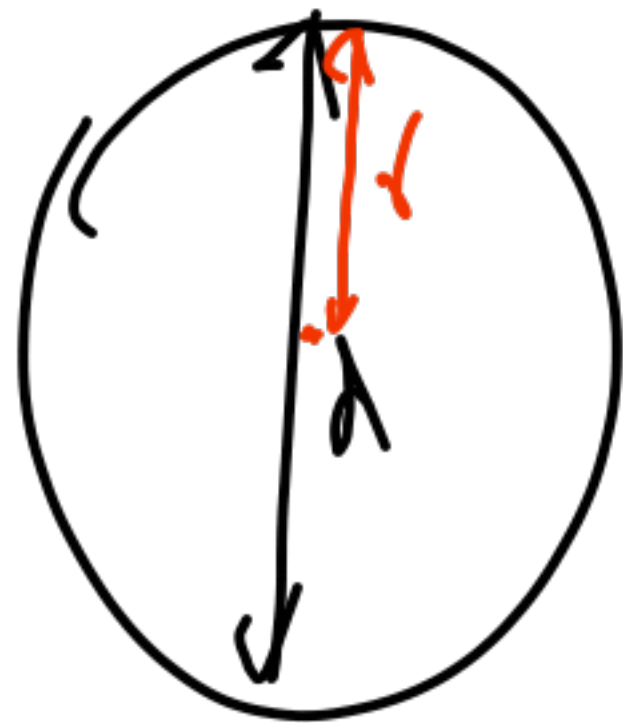
$$A = \pi r^2$$

$$A = \pi \left(\frac{d}{2} \right)^2$$

$$A = \pi \left(\frac{0.4 \times 10^{-3}}{2} \right)^2$$

$$A = 1.26 \times 10^{-7} \text{ m}^2$$

$$r = \frac{\text{diameter}}{2}$$



$$\rho = \frac{6 \times 1.25 \times 10^{-7}}{0.25}$$

$$\rho = 3.02 \times 10^{-6} \Omega \text{ m}$$

4) Calculate the resistivity of a material with the resistance of 2Ω , cross sectional area of 25cm^2 and length of 15cm .

Soln:

$$R = 2\Omega$$

$$A = 25\text{cm}^2$$

$$l = 15\text{cm} = 0.15\text{m}$$

$$A = 25 \times \frac{1}{100} \times \frac{1}{100} \text{ m}$$

$$A = 2.5 \times 10^{-3} \text{ m}^2$$

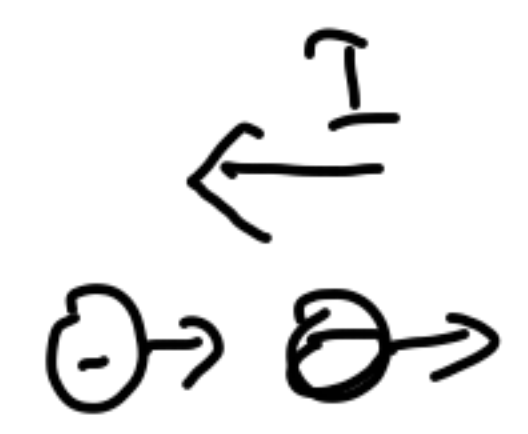
$$\rho = \frac{RA}{L}$$

$$\rho = \frac{2 \times 2.5 \times 10^{-3}}{0.15}$$

$$\rho = 0.033\Omega\text{m}$$

- # Electricity Generation
- law of conservation of energy.
 - Emf induced in conductn.
 - Faradays law.

Electronics	Electrics
DC	AC
Low voltage	High voltage.
Phone	Iron.

	unit	
I	Ampere	
V	Volts	Pot. differ. force, → charge
P	Watts.	Rate at which Elect energy Converted to another form

$Q \rightarrow C$
 $\rightarrow$ Experience fore in EMF

$$I \Rightarrow \frac{Q}{t}$$

$$V = \frac{W}{Q}$$

$$P = V \cdot I$$

$$P = \frac{W}{t}$$

Resistor - Ω .

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

$\rho \rightarrow \Omega \cdot m$

$$V = I R$$

$$P = V I, \quad V = I R$$

$$P = I R \cdot I$$

$$P = I^2 R$$

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

$$P = V \cdot \frac{V}{R}$$

$$P = \frac{V^2}{R}$$

