30/06/21

① $Q = ne \rightarrow n = \frac{Q}{e}$; $e = -1.6 \times 10^{-19}\ C$

② $I = \frac{Q}{t} \rightarrow Q = It$; $t = Q/I$

③ $V = \frac{W}{Q} \rightarrow W = VQ$; $Q = \frac{W}{V}$

④ $V = IR \rightarrow I = V/R$; $R = V/I$

⑤ $R = \frac{\rho l}{A} \rightarrow \rho = \frac{RA}{l}$

$\therefore 793.4 = 7.934 \times 10^{2}$

$\therefore 62.5 \times 10^{-7} = 6.25 \times 10^{-6}$

Q 19) $R = 10\ \Omega$; $d = 0.001\ m = 1 \times 10^{-3}\ m$; $l = 1\ m$; $\rho = ?$

$A = \frac{\pi d^2}{4} = \frac{3.14 \times (10^{-3})^2}{4} = \frac{3.14 \times 10^{-6}}{4} = 0.785 \times 10^{-6}$

$\rho = \frac{RA}{l} = \frac{10 \times 3.14 \times 10^{-6}}{4 \times 1}$; 7.85×10^{-7}

$= \frac{31.4}{4} \times 10^{-6}\ \Omega m$

$= 7.85 \times 10^{-6}\ \Omega m$

Ans.

Q.18 $l = 2\,m$ — (i)

$d = 0.6\,mm$

mm
cm
dm
m

$d = 0.6 \times 10^{-3}\,m$

$d = 6 \times 10^{-4}\,m$

$\therefore 1m = \frac{1}{1000}\,mm = 10^{-3}\,mm$

$Area = \pi r^2 = \frac{\pi d^2}{4}$

$A = \frac{3.14 \times (6 \times 10^{-4})^2}{4}$

$A = \frac{3.14 \times 36 \times 10^{-8}}{4}$

$A = 28.26 \times 10^{-8}$ — (ii)

$R = 50\,\Omega$ — (iii)

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

$\rho = \frac{250 \times 28.26 \times 10^{-8}}{2 \times 2}$

$\rho = 100 \times \frac{28.26 \times 10^{-8}}{4}$

$\rho = 7.065 \times 10^{-6}\,\Omega m$

28.26×10^{-8}

$2.826 \times 10^{1} \times 10^{-8}$

$2.826 \times 10^{-7}\,m^2$

$2.826 \times 10^{-8} \times$

$34.72 = 3.472 \times 10^{1}$

$= 0.3472 \times 10^{2}$

$= 3472 \times 10^{-2}$

$\frac{3472}{100} = 3472 \times 10^{-2}$

(20) $\rho = 10 \times 10^{-8}\ \Omega m$

$\rho = 10^{-7}\ \Omega m$

mm
cm
dm
m

$l = 2\ m$

$d = 0.3\ mm = 0.3 \times 10^{-3}\ m$

$= 3 \times 10^{-4}\ m$

$A = \frac{\pi d^2}{4} = \frac{3.14 \times (3 \times 10^{-4})^2}{4} = \frac{3.14 \times 9 \times 10^{-8}}{4}$

$= \frac{28.26}{4} \times 10^{-8}$

$= 7.065 \times 10^{-8}\ m^2$

$R = \frac{\rho l}{A} = \frac{10^{-7} \times 2}{7.065 \times 10^{-8}} = \frac{2}{7.065} \times 10^{-7+8}$

$= \frac{20}{7.065}$

$= 2.83\ \Omega$

$(10^{-4})^2 = 10^{-4} \times 10^{-4}$

$= 10^{-4-4} = 10^{-8}$

(21) Initial

Length → l

Area → A

$$R = \rho \frac{l}{A} \quad \text{—— (1)}$$

V. imp

Present

$2l$

$A/2$

$R \propto l$

$R \propto \frac{1}{A}$

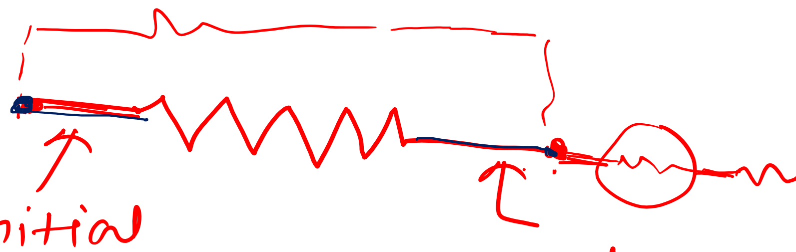
$$R' = \rho \frac{2l}{A/2}$$

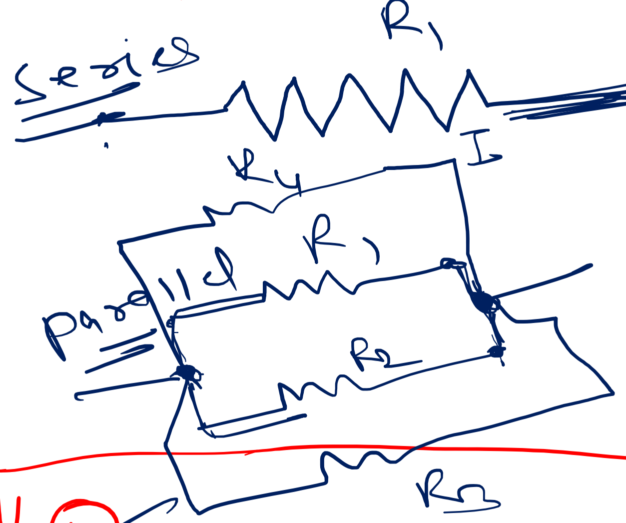
$$R' = \rho \frac{2l \times 2}{A}$$

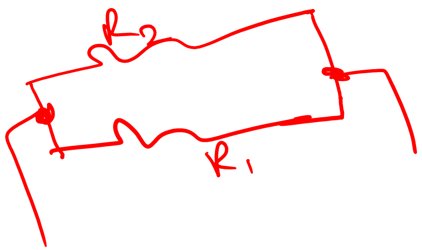
$$R' = 4 \frac{\rho l}{A} \quad \text{—— (1)}$$

$R' = 4R$ ← from (1)

Combination of Resistances → Resistors

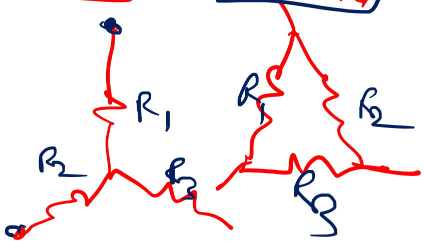






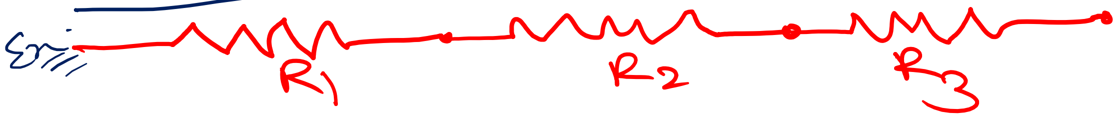
Parallel circuit

Step up → Step down



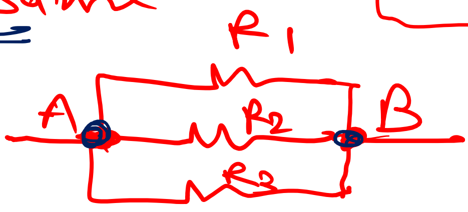
① Series Combination → series circuit

end II terminal of first resistor become the initial terminal of second resistor & so on



② Parallel Combination

Initial terminal of all resistors are same and end terminal of all resistors are same



③ Mixed = Combination