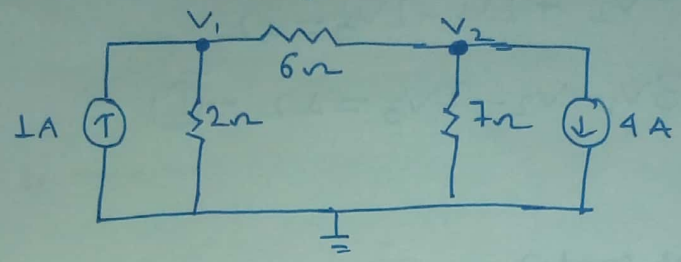
Lec 06

18/2/2021.

(Q) Determine node voltage in the ckt



Apply KCL at node-1

$$\frac{V_1}{2} + \frac{V_1 - V_2}{6} - 1 = 0$$

$$0.667V_1 - 0.167V_2 = 1$$

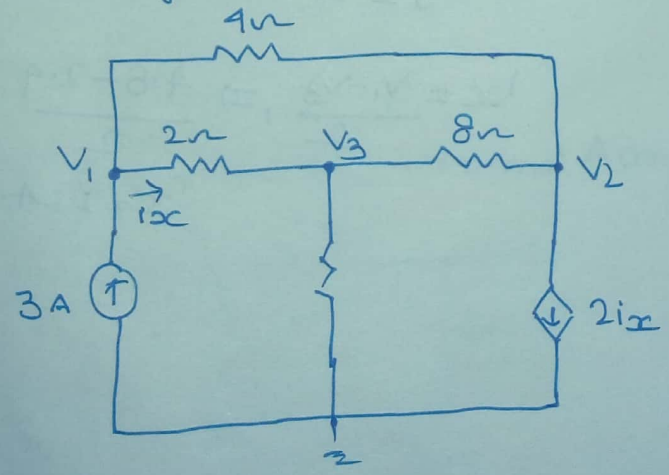
Apply KCL at node-2

$$\frac{V_2 - V_1}{6} + \frac{V_2}{7} + 4 = 0$$

$$-0.167V_1 + 0.309V_2 = -4$$

$$V_1 = -2V, \quad V_2 = -14V$$

(Q) Determine Voltage at nodes



$$i_x = \frac{V_1 - V_3}{2}$$

Apply KCL at node 1,

$$\frac{V_1 - V_2}{4} + \frac{V_1 - V_3}{2} = 3$$

$$V_1 - V_2 + 2V_1 - 2V_3 = 12$$

$$3V_1 - V_2 - 2V_3 = 12 \quad -(1)$$

Apply KCL at node 2,

$$\frac{V_2 - V_1}{4} + \frac{V_2 - V_3}{8} + 2i_x = 0$$

$$6V_1 + 3V_2 - 9V_3 = 0 \quad -(2)$$

Apply KCL at node 3,

$$\frac{V_3 - V_1}{4} + \frac{V_3 - V_2}{8} + \frac{V_3}{4} 20$$

$$-4V_1 - V_2 + 7V_3 \; 20$$

$$V_1 = 9.8V$$

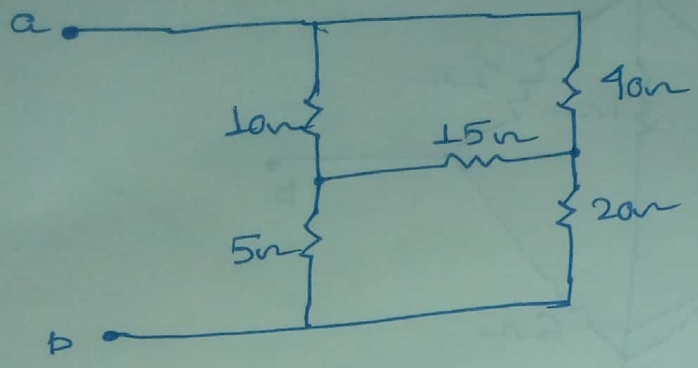
$$V_2 = -2.4V$$

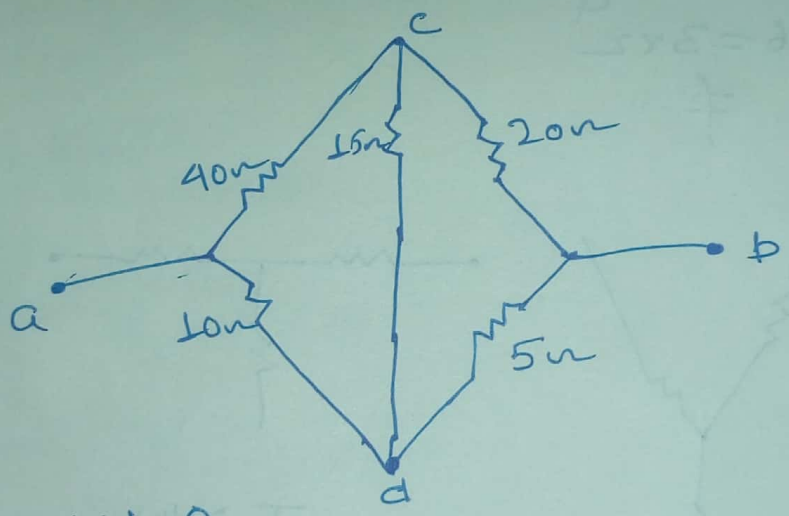
$$V_3 = 2.4V$$

$$i_x = \frac{V_1 - V_3}{2}, \Rightarrow \frac{4.8 - 2.4}{2}$$

$$i_x = 1.2A.$$

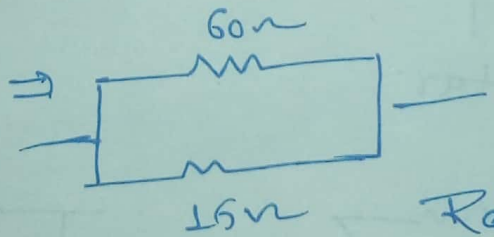
(Q) Find equivalent resistance b/w terminal A and B?





$V_c = V_d = 0$

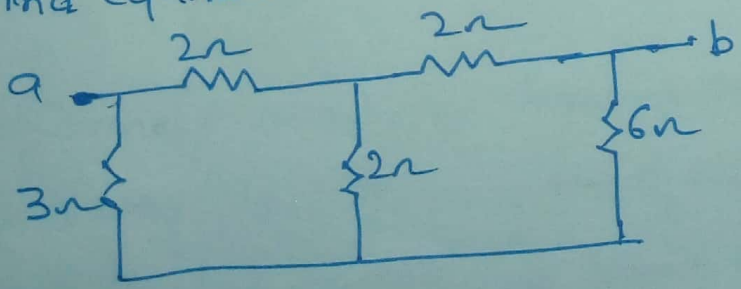
$I_{cd} = 0$

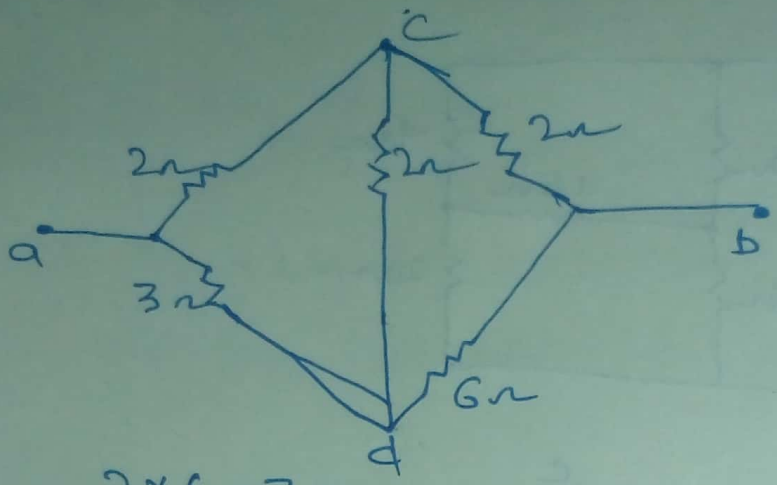


$R_{eb_2} = \frac{60 \times 15}{60 + 15}$

$= 12\Omega$

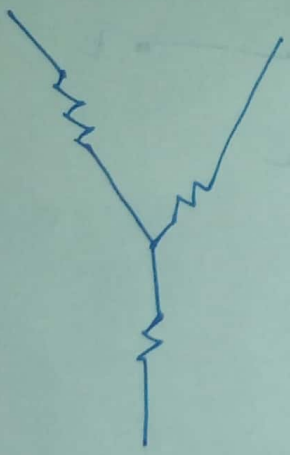
(Q) Find equivalent resi- b/w terminal A and B?





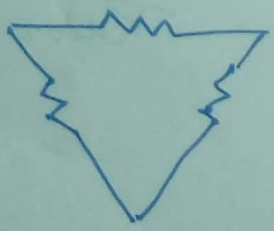
$2 \times 6 = 3 \times 2$

$\neq$

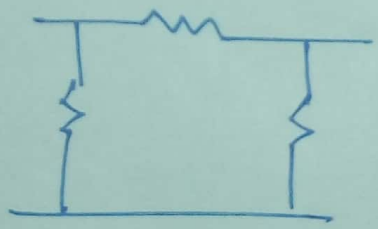


Star.

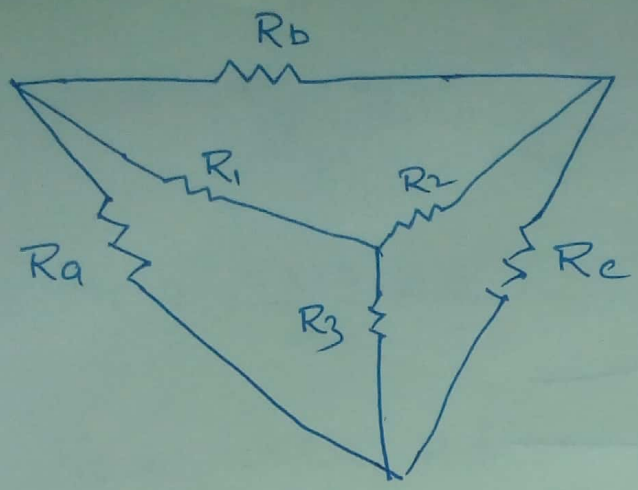
T-N/w.



Delta



π-n/w.



$\Delta \rightarrow Y$ (Delta to star)

$$R_1 = \frac{R_a \cdot R_b}{R_a + R_b + R_c}$$

$$R_2 = \frac{R_b \cdot R_c}{R_a + R_b + R_c}$$

$$R_3 = \frac{R_a \cdot R_c}{R_a + R_b + R_c}$$

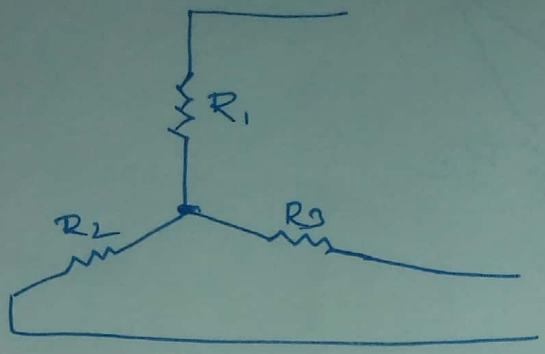
$Y \rightarrow \Delta$

$$R_a = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_2}$$

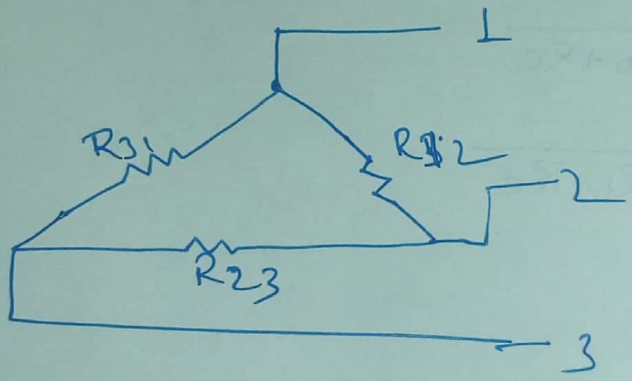
$$R_b = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_3}$$

$$R_{c2} \quad \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_1}$$

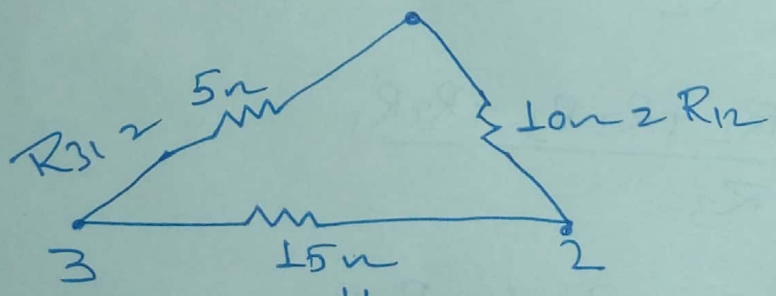
Star Connection → When element are Connected in such a way that finishing end of all the element are Connected to common point or star pt or neutral pt. is said to be star Connection

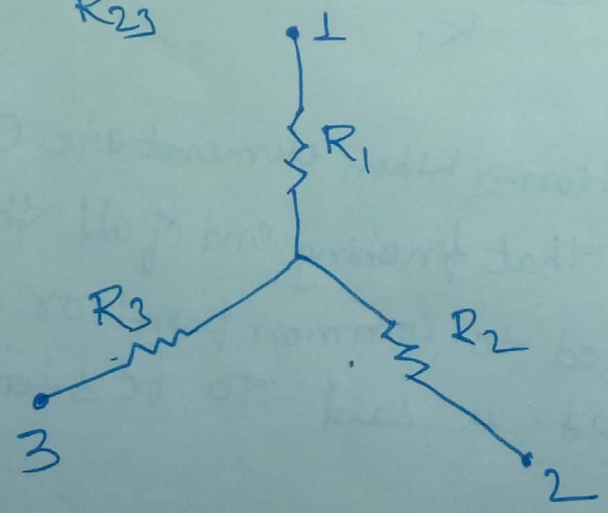


Delta Connection → element are Connected in such a way finishing end of first element Connected to starting end of second element



(Q) Convert Δ into Y





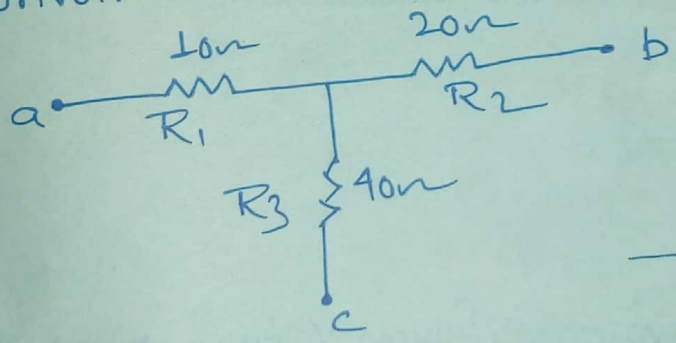
$$R_1 = \frac{R_{12} \cdot R_{31}}{R_{12} + R_{23} + R_{31}}$$

$$R_1 \Rightarrow \frac{5 \times 10}{30} = \frac{5}{3}$$

$$R_2 = \frac{10 \times 15}{30} \Rightarrow 5\Omega$$

$$R_3 = \frac{5 \times 15}{30} = \frac{5}{2}\Omega$$

(Q) Convert Y into Δ.



$$R_{12} = R_1 + R_2 + \frac{R_1 R_2}{R_3}$$

or

$$R_{12} = \frac{R_3 R_1 + R_2 R_3 + R_1 R_2}{R_3}$$

$$10 + 20 + \frac{10 \times 20}{40}$$

$$R_{ab} = 35\Omega$$

$$R_{bc} = R_b + R_c + \frac{R_b \cdot R_c}{R_a}$$

$$= 20 + 40 + \frac{20 \times 40}{}$$