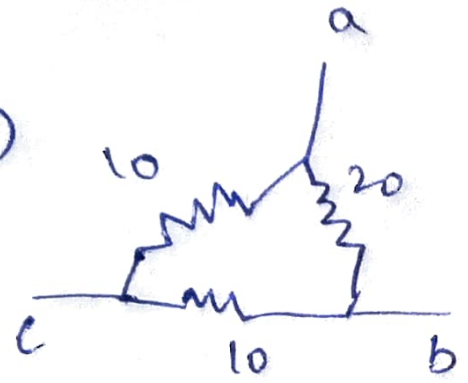
Hemanth, N
2019503519

Problems:

① 

$$R_1 = \frac{R_a R_c}{R_a + R_b + R_c} = \frac{10(20)}{40}$$

$$= 5\ \Omega$$

$$R_2 = \frac{R_a \cdot R_b}{R_a + R_b + R_c} = \frac{20(10)}{40}$$

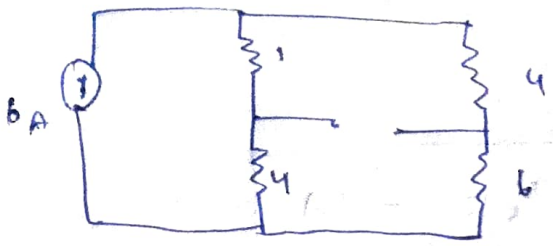
$$= 5\ \Omega$$

$$R_3 = \frac{R_c \cdot R_b}{R_a + R_b + R_c} = \frac{10(10)}{40} = 2.5\ \Omega$$

$R_1 = 5\ \Omega$, $R_2 = 5\ \Omega$, $R_3 = 2.5\ \Omega$ //

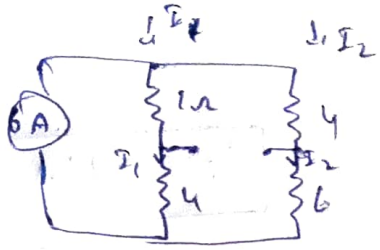
2.)

Hemanth N
2019503579



Remove AB

=>



$$Req = \frac{(4+6)\cdot(1+4)}{10+5} = \frac{50}{15} = \frac{10}{3} = 3.33\ \Omega$$

$$V_{eq} = I \cdot Req$$

$$6 \times \frac{10}{3} = 20V$$

$$I_1 + I_2 = 6A$$

$$\Rightarrow I_2 = 6 - I_1$$

Both I_1, I_2 in Parallel

$$\Rightarrow 5(I_1) = 10(6 - I_1)$$

$$5I_1 = 60 - 10I_1$$

$$\Rightarrow I_1 = 60/15 \Rightarrow \boxed{I_1 = 4A}$$

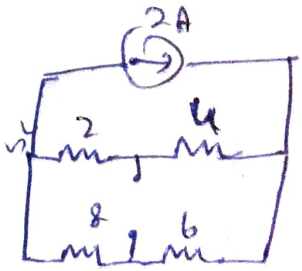
$I_2 = (2A)$

$V_1 = 8V$, $V_2 = 4V$

$8 - 4 = (4)$

Overall voltage: $\boxed{V_{th} = +4V}$

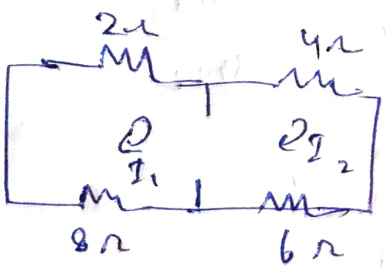
(3)



$\Rightarrow$ $\frac{(2+4)\cdot(8+6)}{8+14} = \frac{6(24)}{20}$

$R_{eq} \Rightarrow 4.2 \times 2 = \boxed{4.2\,\Omega}$

$V_1 = 2(4.2) = 8.4\,V$



(I) $\Rightarrow 8I_1 + 2I_1 = 10$

$\Rightarrow \boxed{I_1 = 1A}$

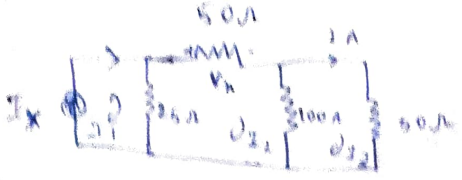
(II) $\Rightarrow 4I_2 + 6I_2 = 0$

$\boxed{I_2 = 1A}$

$\therefore V_{eq} = 8.4 + 2 = \boxed{10.4\,V}$

$V_1 + V_{eq} \Rightarrow 8.4 + 2$

2019602619



In Mesh ① =>

$$-25I_1 + 25I_2 = 0 \quad \Rightarrow \quad I_2 - I_1 = 0 \quad -(1)$$

In Mesh ② =>

$$-25(I_2 - I_1) - 50I_2 - 100(I_2 - I_3) = 0$$

$$\Rightarrow \quad -25I_2 + 25I_1 - 50I_2 - 100I_2 + 100I_3 = 0$$

$$\Rightarrow \quad -175I_2 + 25I_1 + 100I_3 = 0 \quad -(2)$$

In Mesh ③ =>

$$-50I_3 - 100(I_3 - I_2) = 0$$

$$\Rightarrow \quad -50I_3 - 100(I_3) + 100I_2 = 0$$

$$\Rightarrow \quad -150I_3 + 100I_2 = 0 \quad -(3)$$

Given that $I_3 = 2A$

$$\therefore \quad -150(2) + 100I_2 = 0$$

$$\Rightarrow \boxed{I_2 = 3A}$$

By ① =>

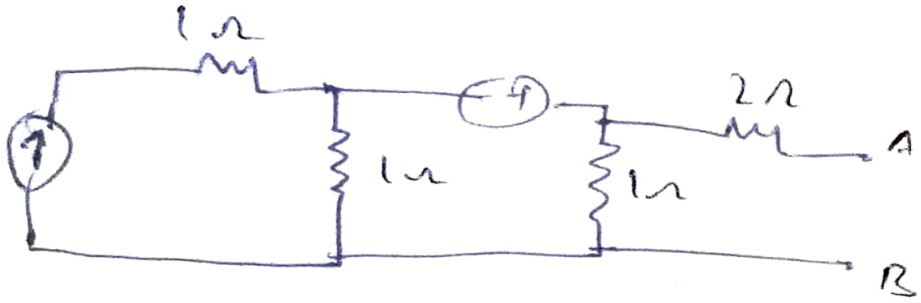
$$-I_1 + I_2 = 0$$

$$-I_1 + 3 = 0 \quad \Rightarrow \quad I_1 = 3A \text{ ; (i.e) } I_x = 3A$$

$$\therefore \boxed{I_x = 3A, \; I_2 = 3A, \; I_3 = 2A}$$

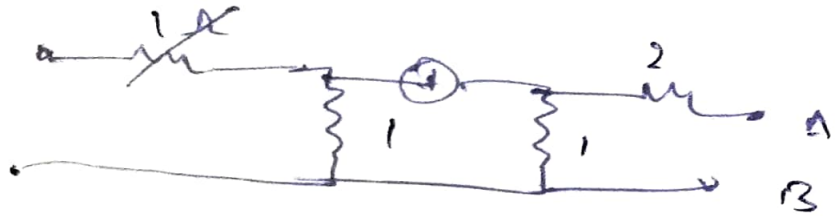
$$V_x = 50(I_2) \Rightarrow \boxed{V_x = 150V}$$

(5.a)



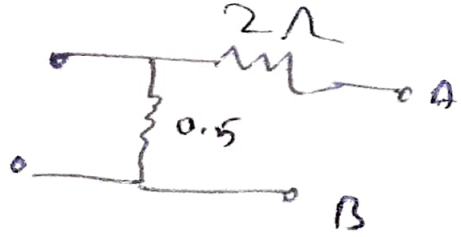
⇒

Remove 1Ω



⇒

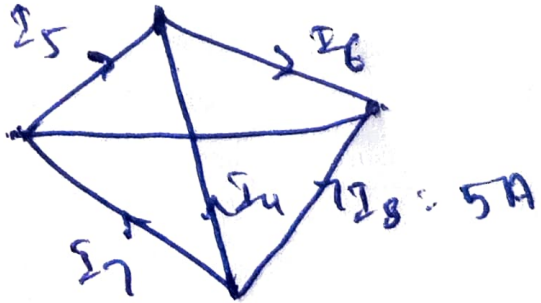
⇒



$R_{AB} = 2 + 0.5$

$R_{AB} = 2.5\,\Omega$

5(b)



$I_4 + 1 = 2 + 4$

$I_4 = 5A$

$I_6 + 4 + I_8 = 0$ (KCL)

$I_6 = -4 + I_8$

$= -4 - 5$ $\Rightarrow$ $\boxed{I_6 = -9A}$

$I_5 + 2 = I_6$

$I_5 = -9 - 2 \Rightarrow \boxed{I_5 = -11A}$

$\boxed{I_4 = 5A, \quad I_6 = -9A, \quad I_5 = -11A}$