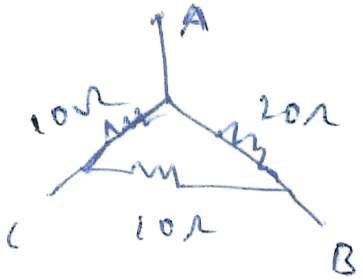
Hemanth, 2019503519

(1)



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

$$= 5\,\Omega$$

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

$$= 5\,\Omega$$

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

$R_1 = 5\,\Omega$

$R_2 = 5\,\Omega$

$R_3 = 2.5\,\Omega$

(2)

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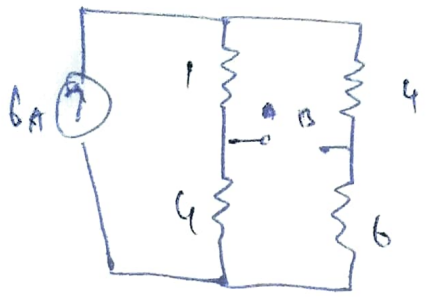

$V_{Th} = ?$ $R_{Th} = ?$

$$R_{eq} = \frac{(1+4)\cdot(4+6)}{15} = \frac{50}{15} = \frac{10}{3}\ \Omega$$

$$V = I.R_{eq} = 6\left(\frac{10}{3}\right) = 20V$$

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

$$\Rightarrow 5I_1 = 60 - 10I_1 \Rightarrow I_1 = 60/15$$

$$\boxed{I_1 = 4A}$$

$$I_2 = 6 - 4 = 2A$$

$$\therefore V_1 = 1(4) = 4V, \quad V_2 = 4(2) = 8V$$

$$V_1 - V_2 = 4 - 8 = -4V$$

$$\therefore \boxed{V_{Th} = 4V}$$

* Voltage Drop Across A, B is 4V

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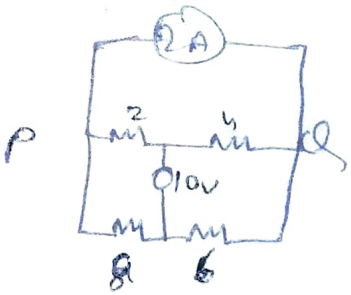
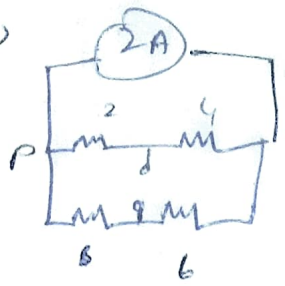
(3)



$\Rightarrow$



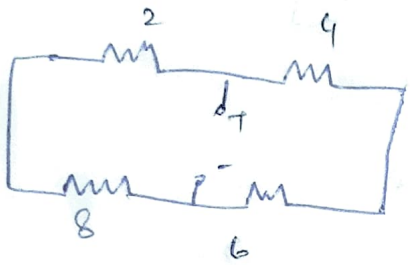
$\Rightarrow \frac{2(8)}{2+8} + \frac{4\times 6}{4(8)}$

$= 0.8 + 2.4$

$= 4.2\Omega$

$V = IR = 4(1) = 8.4\ V$

Remove current



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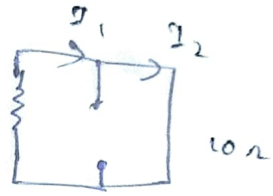

$I_1 - I_2 = 1A$

NOW, $V_{PQ} = V_{2\Omega} + V_{4\Omega} = |-2I_1 + 4I_2|$

$V_{eq} = V_1 = 10V + V_{PQ} \Rightarrow$

$8.4 + 2 = \boxed{10.4V}$

$\therefore \boxed{V_{eq} = 10.4V}$

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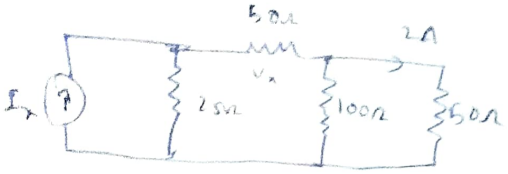
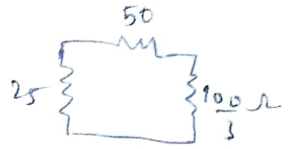
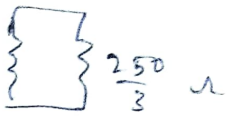
(4)

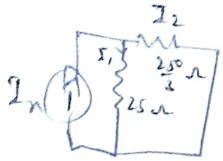


$\Rightarrow 100/3\ \Omega$



$\equiv$



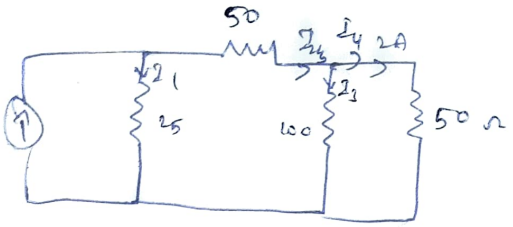


$\Rightarrow I_2 = \frac{25}{325} I_x \times 3$

$$I_2 = \frac{3 I_x}{13} \quad \text{---(1)}$$

$$I_1 = \frac{250 I_x}{3\left(25 + \frac{250}{3}\right)} = \frac{250 I_x}{325} \Rightarrow I_1 = \frac{10}{13} I_x \quad \text{---(2)}$$

$\therefore$



$$I_4 = \frac{100(I_2)}{150} = \frac{100(3) I_x}{13 \times 150} \Rightarrow I_4 = \frac{2 I_x}{13} = 2A$$

$\therefore$ By . $\therefore I_x = 13A$

$\therefore \boxed{I_x = 13\ A}$

Current thro' 50 Ω $\Rightarrow I_2 = \frac{3(I_x)}{13} = 3A$

$\Rightarrow$ Voltage across 50Ω $= 50 \times I_2 = 50(3)$

$$V_x = 150\ V$$

$I_1 = 10A$
$I_2 = 3A$
$I_3 = 1A$
$I_4 = 2A$

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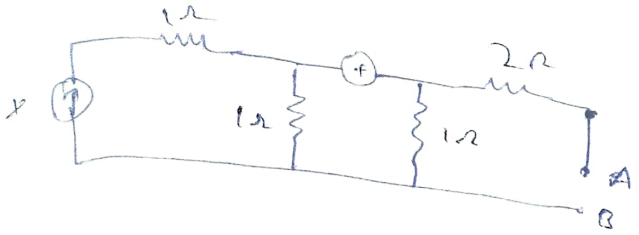
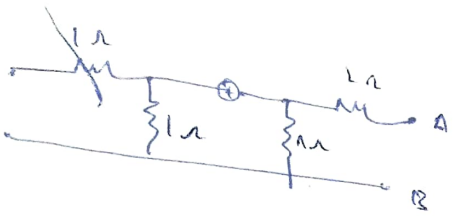
5(a)





⇒ Equivalent ⇒ 1Ω || 1Ω

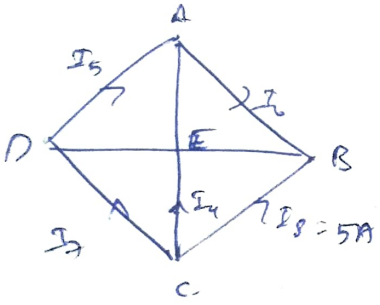
$= 0.5\Omega$

∴

2 + 0.5

∴ **Req = 2.5 Ω**

5(b)



$I_4 + 1 = 2 + 4$ (Junc E)

$I_4 = 5A$

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

(Junc B)

$I_6 = -4 + I_8$

$= -4 - 5$

$I_6 = -9A$

$I_5 + 2 = I_6 \Rightarrow I_5 = -9 - 2 =$ **$-11A$** (Junc C)

$I_4 = 5A$, $I_6 = -9A$, $I_5 = -11A$