Assignment - 1

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Section: 1

Course: CSE251

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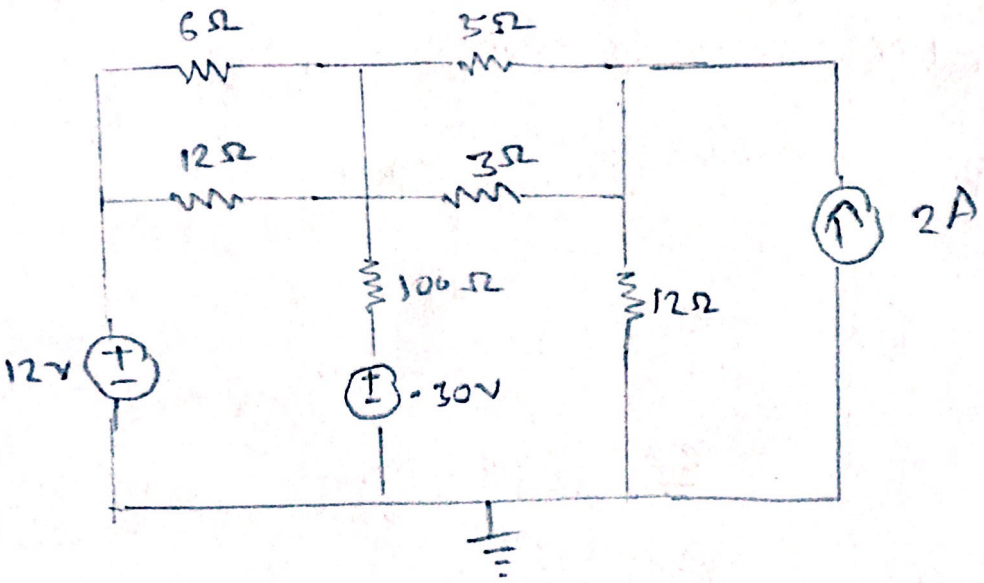
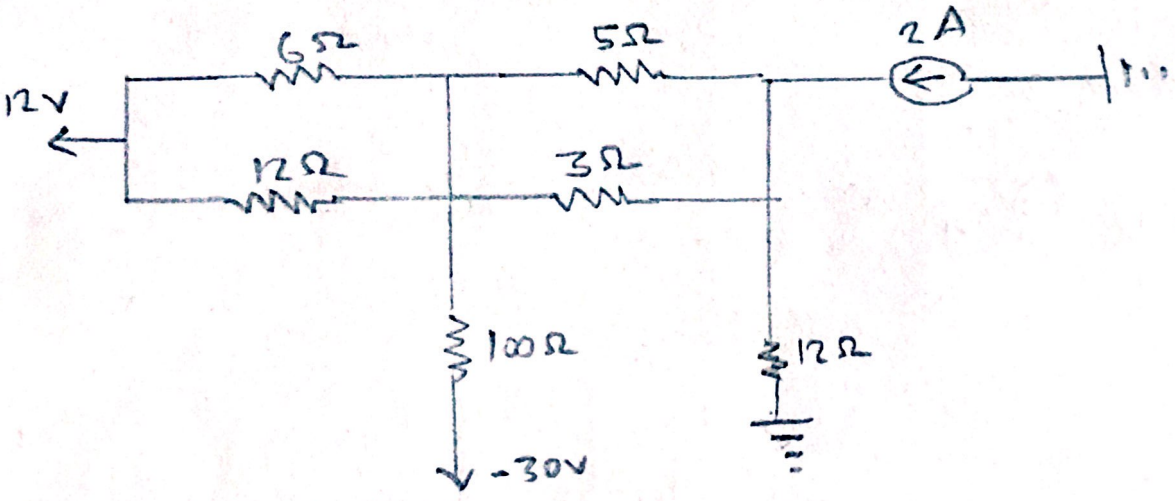
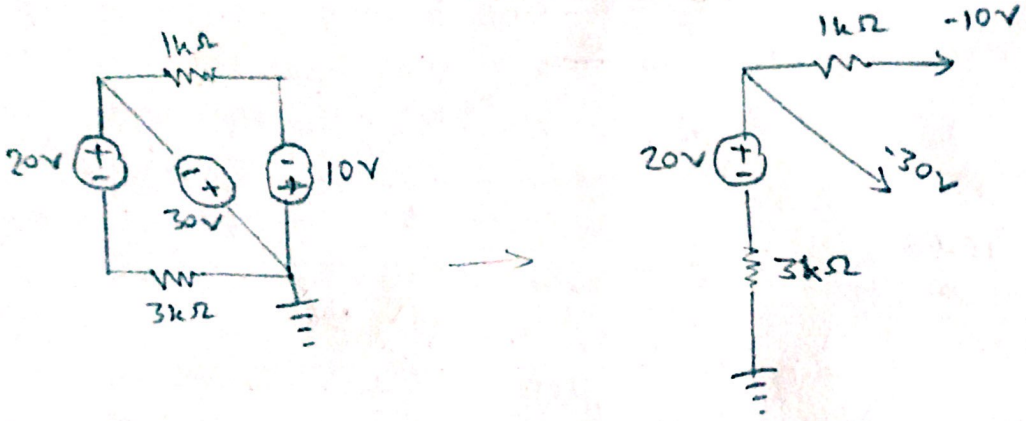
Ans. to the Ques. No. - 1

a

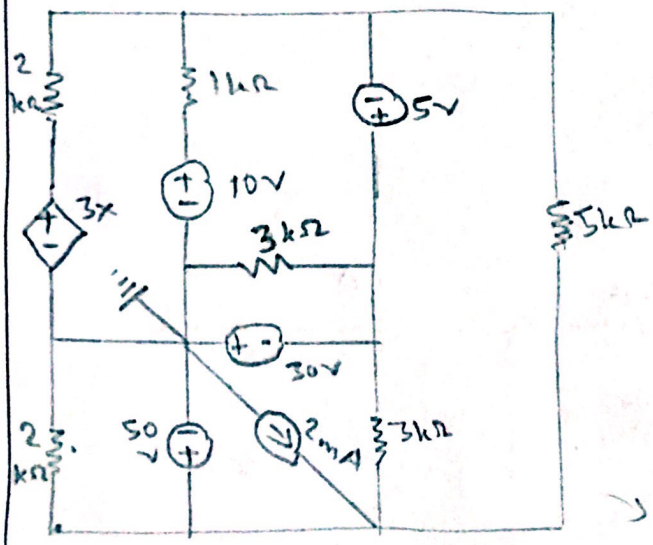


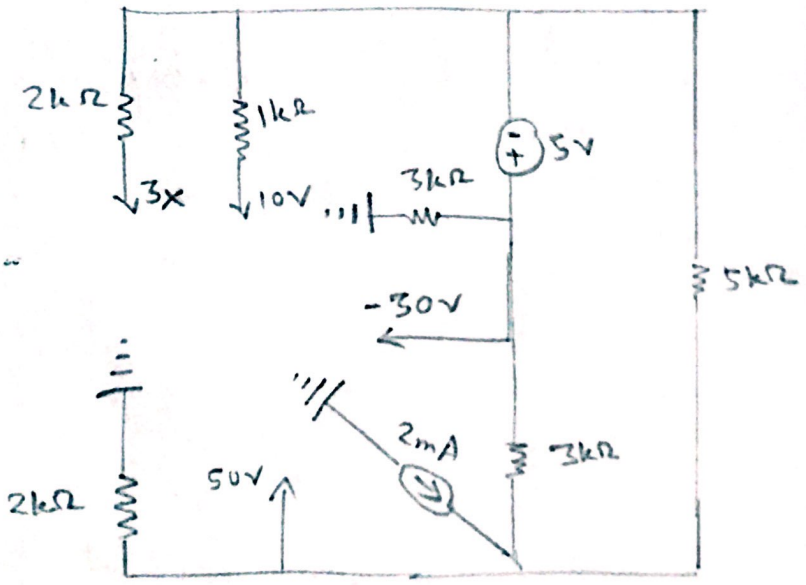


b


1kΩ
20V
30V
10V
3kΩ
1kΩ
-10V
20V
30V
3kΩ

c


2 kΩ
1kΩ
5V
10V
3x
3kΩ
5kΩ
30V
2 kΩ
50 V
2mA
3kΩ


2kΩ
1kΩ
5V
3x
10V
3kΩ
5kΩ
-30V
2mA
3kΩ
2kΩ
50V

Ans. to the Ques. No-2

L_3,

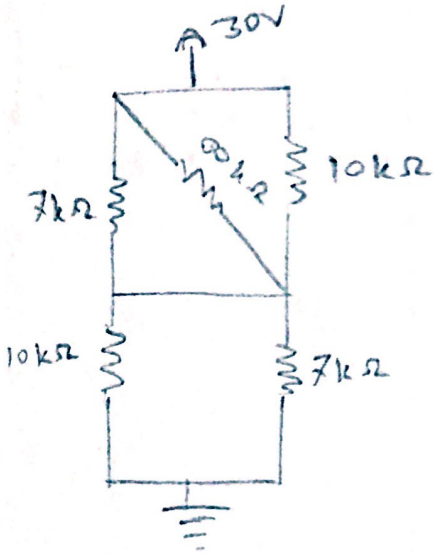
$(I_3 + I_1)10 + 7I_3 + 30 = 0$

$\therefore 17I_3 + 10I_1 = -30 \ldots (i)$

L_1,

$(I_3 + I_1)10 + (I_1 - I_2)7 = 0$

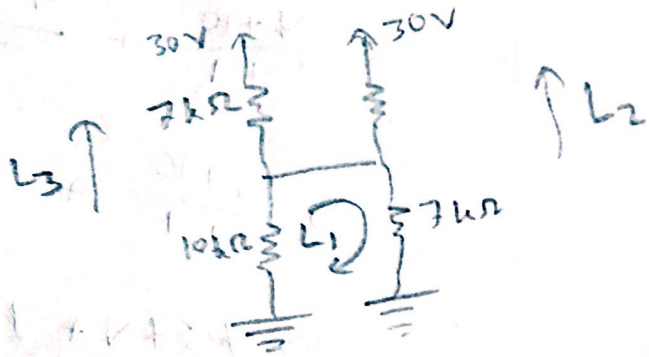
$\therefore 10I_3 - 7I_2 + 17I_1 = 0 \ldots (ii)$



L_2,

$(I_2 - I_1)7 + 10I_2 + 30 = 0$

$\therefore 17I_2 - 7I_1 = -30 \ldots (iii)$



(i), (ii) & (iii),

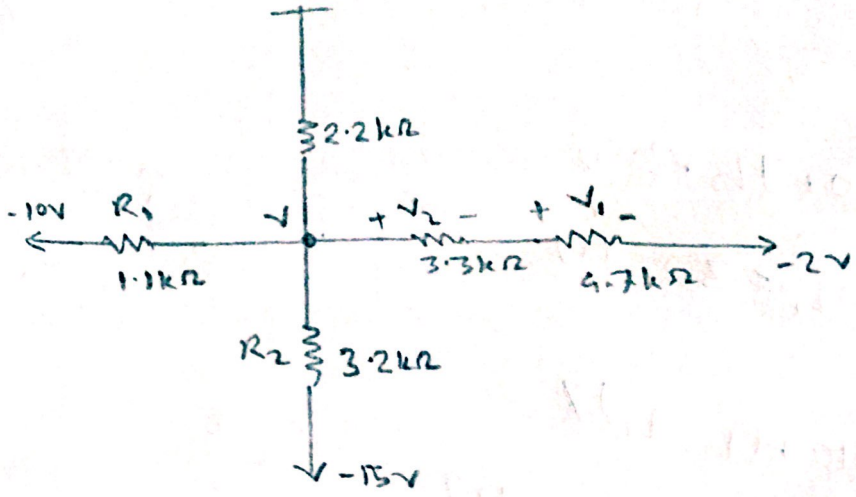
$I_1 = 0.64$ mA

$I_2 = -1.5$ mA

$I_3 = -2.14$ mA

$\therefore I = -0.64$ mA

Ans. to the Ques. No. -3



(a)

KCL at node V,

$$\frac{V+10}{1.1} + \frac{V+15}{3.2} + \frac{V-0}{2.2} + \frac{V+2}{3.3+4.7} = 0$$

$$\Rightarrow \frac{V+10}{1.1} + \frac{V+15}{3.2} + \frac{V}{2.2} + \frac{V+2}{8} = 0$$

~~$\Rightarrow 7.27V + 72.7 + 2.5V + 37.5 + 3.6V + V + 18 = 0$~~

$$\therefore \Rightarrow \left(\frac{8}{1.1} + \frac{8}{3.2} + \frac{8}{2.2} + \frac{8}{8}\right)V + \left(\frac{8\times10}{1.1} + \frac{15\times8}{3.2} + \frac{8}{2.2} + \frac{2\times8}{8}\right) = 0$$

$$\therefore V = \frac{-2549}{317}$$

$$= -8.04\,V$$

$$R_{eq} = \frac{1}{\frac{1}{1.1} + \frac{1}{2.2} + \frac{1}{3.2} + \frac{1}{3.3+4.7}} = \frac{176}{317} \text{ k}\Omega$$

$$V_1 = \frac{4.7}{\frac{176}{317}} \times \left(-\frac{2549}{317}\right) = -68.07 \text{ V}$$

$$V_2 = \frac{3.3}{\frac{176}{317}} \times \left(-\frac{2549}{317}\right) = -47.79 \text{ V}$$

$$P_{R_1} = \frac{V_{R_1}^2}{R_1} = \frac{\left\{\frac{1.1}{\frac{176}{317}} \times \left(-\frac{2549}{317}\right)\right\}^2}{1.1}$$

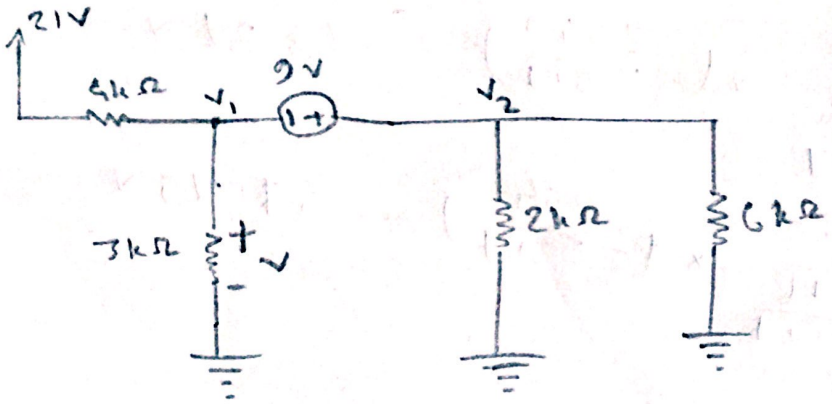
$$= ~~14.48 \text{ V}~~ \; 230.73 \text{ mW}$$

$$P_{R_2} = \frac{V_{R_2}^2}{R_2} = \frac{\left\{\frac{3.2}{\frac{176}{317}} \times \left(-\frac{2549}{317}\right)\right\}^2}{3.2}$$

$$= 671.22 \text{ mW}$$

$$P_{R_2} > P_{R_1}$$

Ans. to the Ques No. 4



a

KCL on node V_1,

$$\frac{V_1-21}{4}+\frac{V_1}{3}+\frac{V_2}{2}+\frac{V_2}{6}=0 \quad \text{mA}$$

$$\Rightarrow \frac{V_1-21}{4}\times 12+\frac{V_1}{3}\times 12+\frac{V_2}{2}\times 12+\frac{V_2}{6}\times 12=0$$

$$\Rightarrow 3V_1-63+4V_1+6V_2+2V_2=0$$

$$\therefore 7V_1+8V_2=63 \quad \ldots(i)$$

Supernode,

$$V_2-V_1=9 \quad \ldots(ii)$$

b

(i) & (ii), $V_1=-\frac{3}{5}$, $V_2=\frac{42}{5}$

$$V=V_1-0=-\frac{3}{5}$$