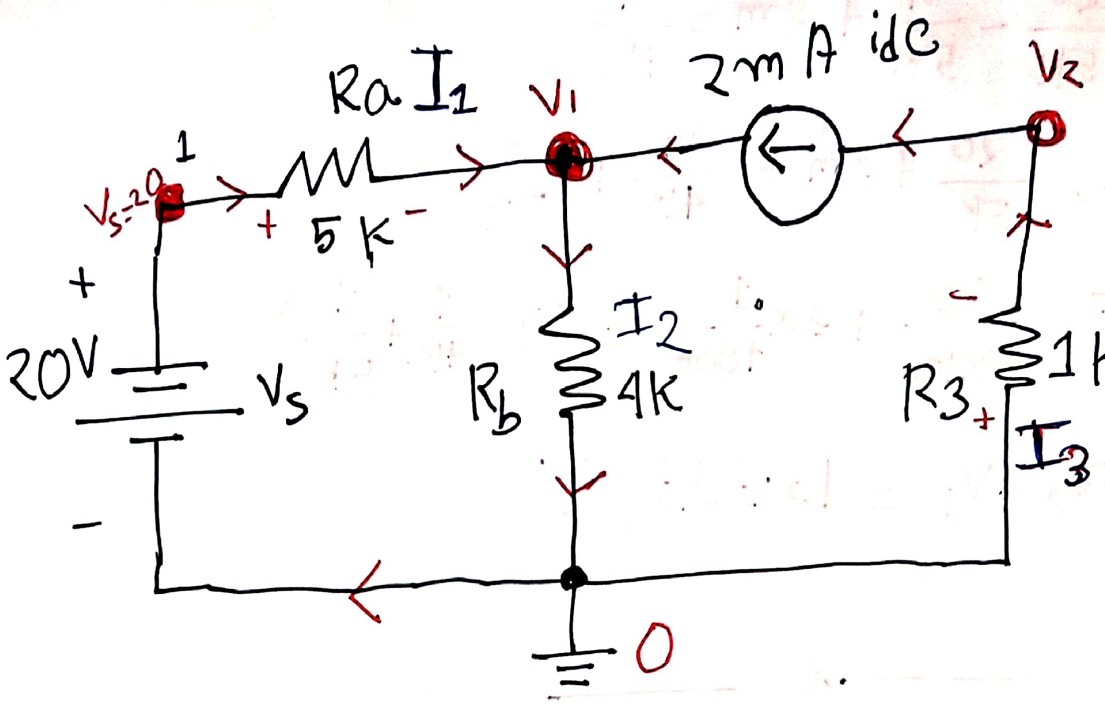
Lab - 3



Applying KCL at node 1,

KCL

current intering = current leaving

$I = \frac{V}{R}$

$$\frac{20 - V_1}{5k} + 2m = \frac{V_1}{4k} \quad \text{---(1)}$$

Applying KCL at node 2,

$$2m = \frac{0 - V_2}{1k}$$

$$2m = \frac{-V_2}{1k}. \qquad \text{or, } -V_2 = 2m \times 1k$$

$$-V_2 = 2\ V$$

Solving equation (1)

$$\frac{20 - V_1}{5k} + 2m = \frac{V_1}{4k}$$

$$\text{or, } \frac{20}{5k} - \frac{V_1}{5k} + 2m = \frac{V_1}{4k}$$

$$\text{or, } \frac{20}{5k} + 2m = \frac{V_1}{4k} + \frac{V_1}{5k}$$

$$\text{or, } \frac{20}{5\times100} + 2\times\frac{1}{1000} = V_1\left(\frac{1}{4k} + \frac{1}{5k}\right)$$

$$\text{or, } V_1 = 13.333 \text{ V}$$

———o———

$$I_1 = \frac{20 - V_1}{5k}$$

$$= \frac{20 - 13.33}{5\times1000}$$

$$= 0.0013 \text{ A}$$

$$= 1.333 \text{ m A}$$

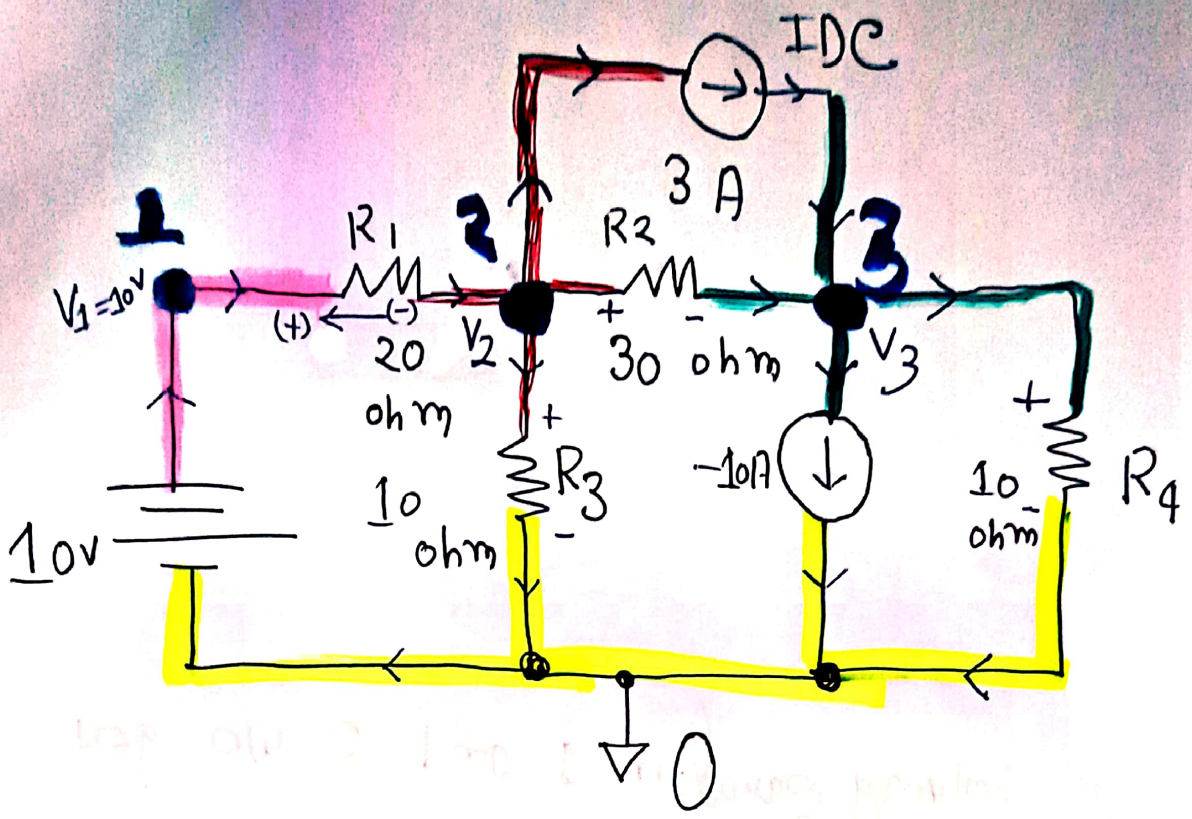
Series Circuit current same

$I_3 = 2$ mA

$$I_2 = \frac{V_1 - 0}{4k}$$

$$= \frac{1333}{4\times1000}$$

$$= 0.00333 \text{ A} = 3.33 \text{ mA}$$



Applying KCL at node 2

$$\frac{10 - V_2}{20} = 3 + \frac{V_2}{10} + \frac{V_2 - V_3}{30} \quad \text{——— (1)}$$

$20 - R_1$; $\frac{1}{R_3}$; $\frac{1}{R_2}$

$$I = \frac{V}{R}$$

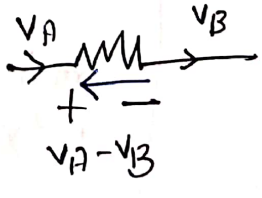
$$I = \frac{V_H - V_L}{R}$$

Applying KCL at node 3

$$3 + \frac{V_2 - V_3}{30} = -10 + \frac{V_3 - 0}{10} \quad \text{——— (11)}$$

$\frac{1}{R_2}$; $10 - R_4$

node means connecting point.



Solving equation 1 and 2 we get

$V_1 = 10\,V$ (already know)

$V_2 = 4.286\,V$

$V_3 = 98.57\,V$

R_1 Resistor current flow $= I_1 = \frac{10 - V_2}{R_1}$

$= \frac{10 - 4.286}{20}$

$= 0.2587\,A$

$= 258.7\,mA$

$$I_2 = \frac{V_2 - V_3}{R_2}$$

$$I_2 = \frac{4.286 - 28.57}{30}$$

$$= -3.1428\ A$$

$$I_3 = \frac{4.286 - 0}{10} \qquad I_3 = \frac{V_2 - 0}{R_3}$$

$$= 0.4286 * 1000\ A$$

$$= 428.6\ mA$$

$$I_4 = \frac{V_H - V_L}{R_4} = \frac{V_3 - 0}{R_4}$$

$$= \frac{28.57 - 0}{10}$$

$$= 9.86\ A$$