EXPERRIMENT-2

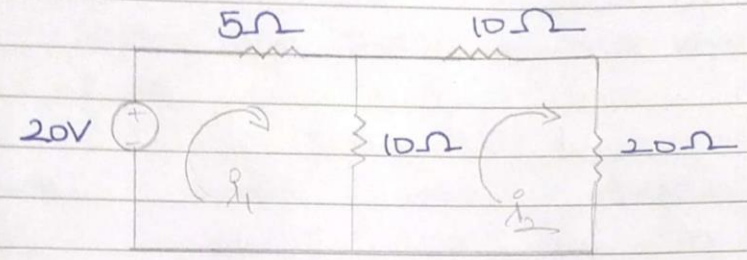
AIM:

To find the current using Mesh Analysis, Nodal Analysis, Superposition Theorem.

PROCEDURE:

MESH ANALYSIS

CIRCUIT DIAGRAM



FIND THE CURRENT FLOWING THROUGH THE CIRCUIT

MESH 1

$20 = 5I_1 + 10(I_1 - I_2)$

$20 = 15I_1 - 10I_2$

$4 = 3I_1 - 2I_2$ — (1)

MESH 2

$10I_2 + 20(I_2) + 10(I_2 - I_1) = 0$

$40I_2 - 10I_1 = 0$

$I_1 = 4I_2$ — (2)

Substitute Eq (2) in Eq (1)

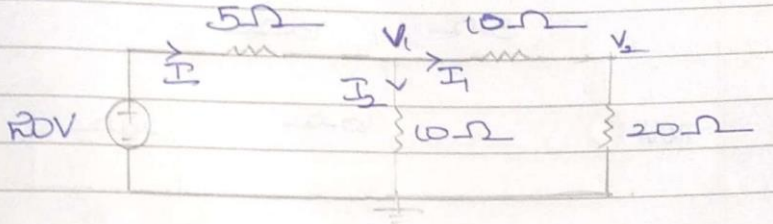
$10I_2 = 4$

$I_2 = 0.4A$

$I_1 = 1.6A$

NODAL ANALYSIS

CIRCUIT DIAGRAM



FIND THE CURRENT I_1 and I_2

$I = I_1 + I_2$

$\frac{20-V_1}{5} = \frac{V_1-0}{10} + \frac{V_1-V_2}{10}$ — (1)

$\frac{V_1-V_2}{10} = \frac{V_2-0}{20}$

$\Rightarrow 2V_1 = 3V_2$ — (2)

Substituting (2) in (1)

$\frac{20-V_1}{5} = \frac{V_1-0}{10} + \frac{V_1}{30}$

$20-V_1 = \frac{4V_1}{6}$

$60 - 3V_1 = 2V_1$

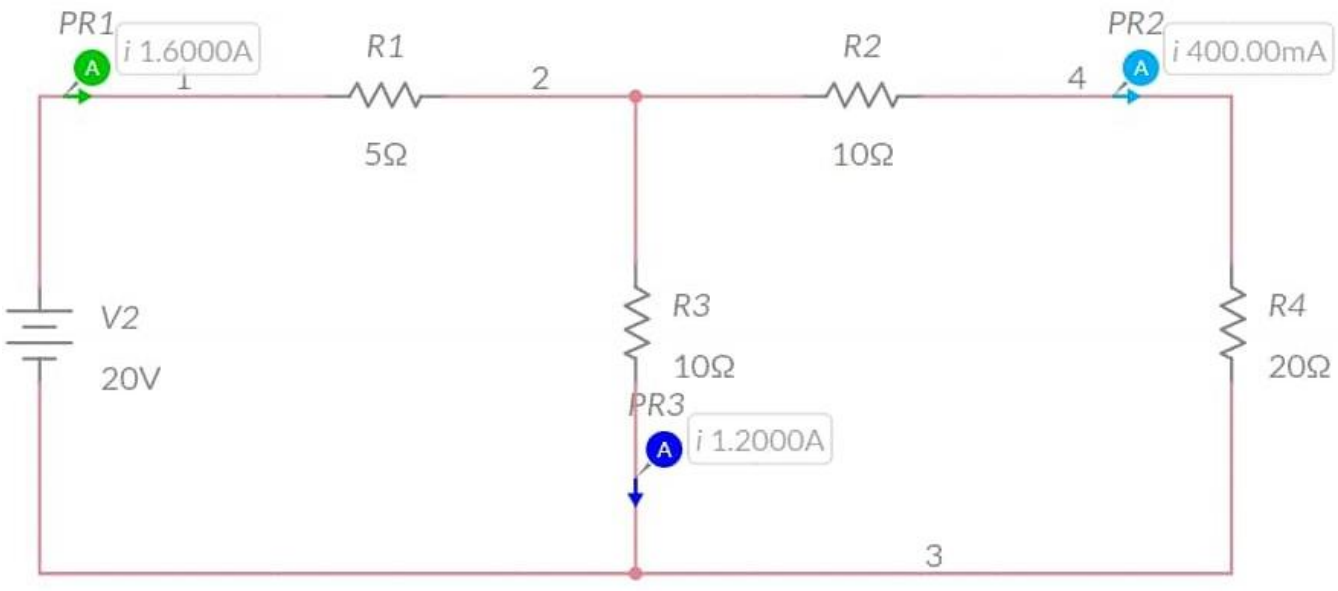
$V_1 = 12$

$I = \frac{20-V_1}{5} = \frac{20-12}{5} = \frac{8}{5} = 1.6A$

$I_1 = 1.2A$

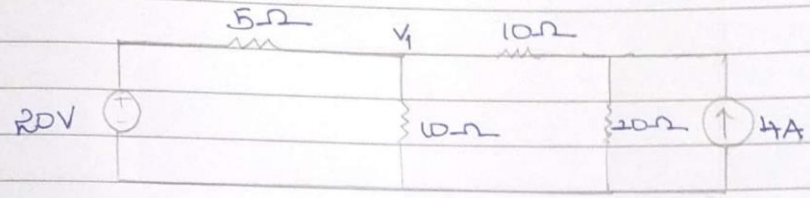
$I_2 = I - I_1 = 0.4A$

MULTISIM:



SUPERPOSITION THEOREM

CIRCUIT DIAGRAM



FIND THE CURRENT FLOWING THROUGH 20Ω

CONSIDER ONLY VOLTMETER

$\frac{V_1-20}{5}+\frac{V_1}{10}+\frac{V_1}{30}=0$

$10V_1 = 120$

$V_1 = 12V$

CURRENT FLOWING THROUGH 20Ω

$I_1 = \frac{V_1}{10+20} = 0.4A$

CONSIDER ONLY AMMETER

$R_{AB} = \left(\frac{5\times10}{5+10}\right)+10 = \frac{30}{3}\Omega$

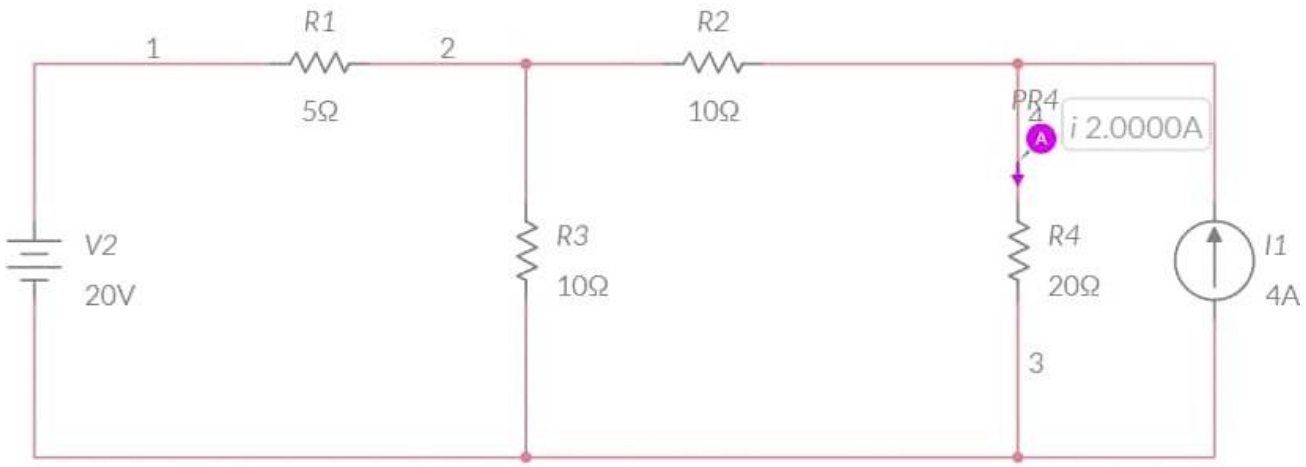
CURRENT FLOWING THROUGH 20Ω

$I_2 = I_S\left(\frac{R_1}{R_1+R_2}\right)$

$= 4\left(\frac{10/3}{\frac{10}{3}+20}\right) = 1.6A$

$I = I_1+I_2 = 0.4A+1.6A = 2A$

MULTISIM:



CONCLUSION:

The value of current we got from MULTISIM is same as the value what we got theoretically.

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