Now,

$I_{R3} = I_1 = 0.985\,mA \;(\uparrow)$

$I_{R1} = I_1 - I_2 = 0.980 + 0.520 = 1.5\,mA \;(\downarrow)$

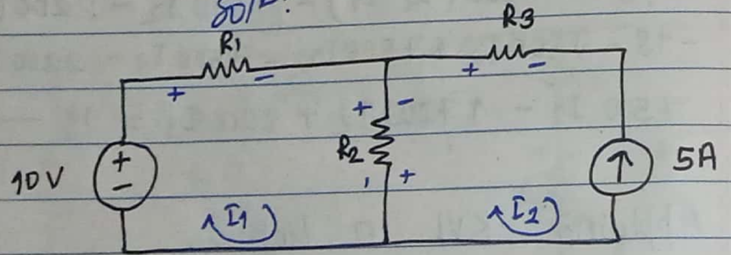
$I_{R4} = I_2 = -0.520\,mA \;(\rightarrow)$

$I_{R5} = I_2 - I_3 = -0.520 + 0.753 = 0.233 \;(\downarrow)$

$I_{R2} = I_3 = 0.753\,mA \;(\downarrow)$

<Num.No-38>: Find the branch current

Soln:



Given

$R_1 = 4\Omega$

$R_2 = 6\Omega$

$R_3 = 3\Omega$

Here,

$I_2 = -5\,A$ (∵ presence of current source)

$\therefore I_{R3} = -5A \;(\rightarrow)$

For loop 1,

$+10 - I_1R_1 - \cancel{I_2R_2}\,(I_1 - I_2)R_2 = 0$

or, $+10 - 4I_1 - 6(I_1 - I_2) = 0$

or, $10 - 4I_1 - 6I_1 + 6I_2 = 0$

or, $-10I_1 + 6I_2 = -10$

or, $-10I_1 = 20$

$\therefore I_1 = -2A$

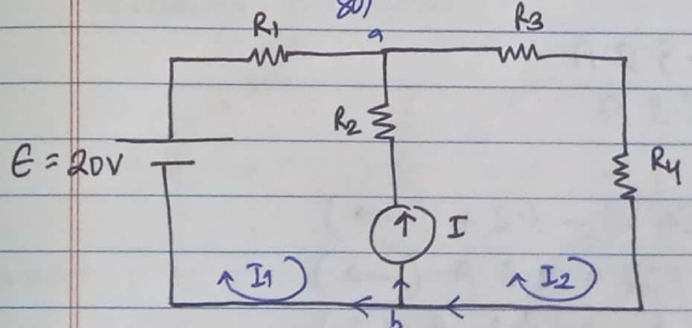
$\therefore I_{R1} = I_1 = -2A \;(\rightarrow)$

$\therefore I_{R2} = I_1 - I_2$

$= -2 + 5 = 3A \;(\downarrow)$

<Num.No-39>: find the branch current.

Soln:



Given,

$R_1 = 6\Omega$

$R_2 = 2\Omega$

$R_3 = 10\Omega$

$R_4 = 4\Omega$

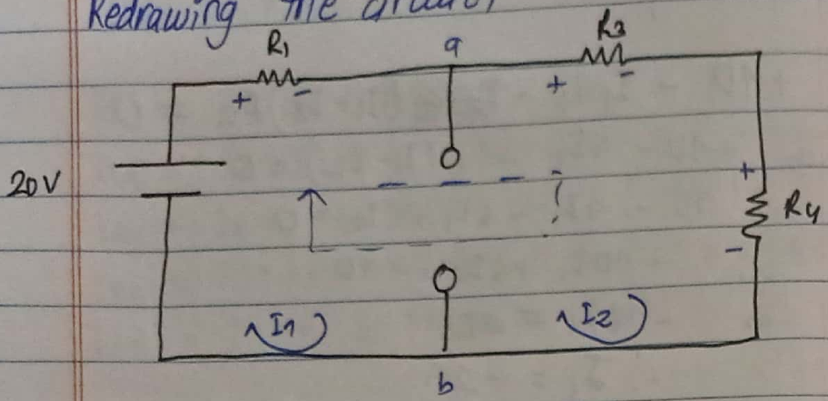
$I = 6A$

At node b, applying KCL,

$I + I_1 = I_2$

or, $6 = -I_1 + I_2$ —— (i)

Redrawing the circuit,



Applying KVL,

$$+20 - I_1R_1 - I_2R_3 - I_2R_4 = 0$$

or $20 - 6I_1 - 10I_2 - 4I_2 = 0$

or $-6I_1 - 14I_2 = -20$

or $6I_1 + 14I_2 = 20$ — (ii)

Solving (i) and (ii),

$I_1 = -3.2$ A

$I_2 = 2.8$ A

$I_{R1} = I_1 = -3.2$ A ($\rightarrow$)

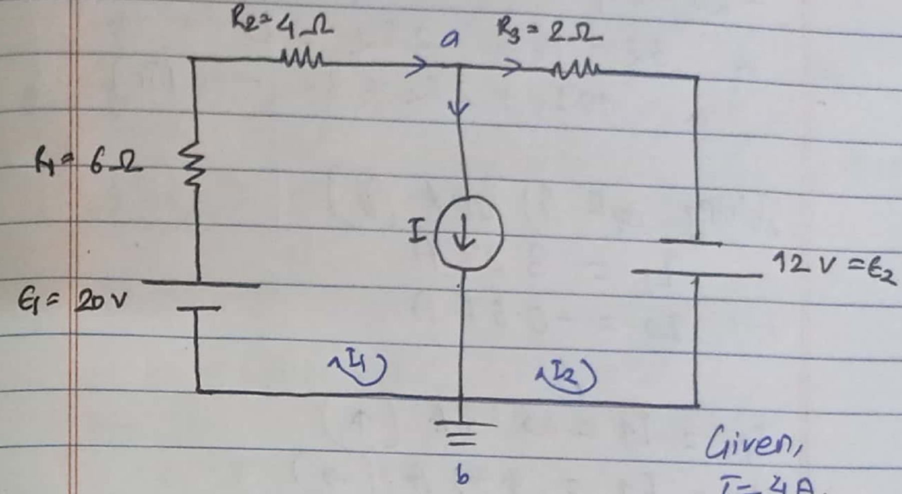
$I_{R3} = I_2 = 2.8$ A ($\rightarrow$)

$I_{R4} = I_2 = 2.8$ A ($\downarrow$)

∴ This question, the battery is charging.

<Num. No. 40>: Determine the current of network.

Soln.



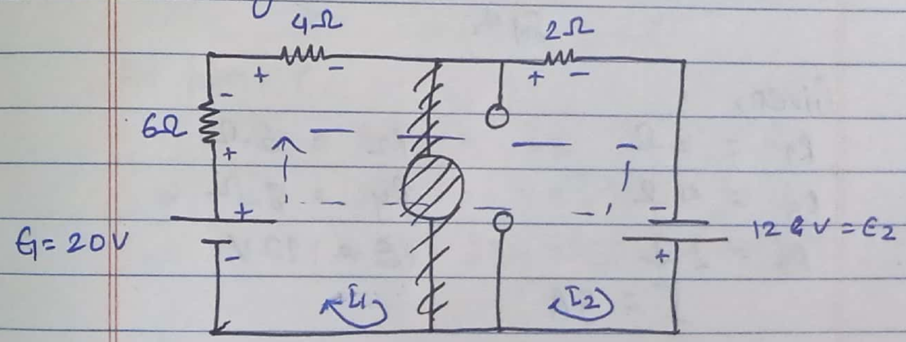
Given,
$I = 4$A.

At node a,

$I_2 + I = I_1$

or, $4 = I_1 - I_2$ — (i).

Redrawing the circuit,



Applying KVL,

$+20 - 6I_1 - 4I_1 - 2I_2 + 12 = 0$

or $32 - 10I_1 - 2I_2 = 0$

or $10I_1 + 2I_2 = 32$ —— (ii)

Solving eq^n (i) and (ii)

$I_1 = 3.33\ A$

$I_2 = -0.67\ A$

$I_{R1} = I_1 = 3.33\ A\ (\uparrow)$

$I_{R2} = I_1 = 3.33\ A\ (\rightarrow)$

$I_{R3} = I_2 = -0.67\ (\rightarrow)$

<Num.No.41>: Find the I_1 to I_4 using Mesh analysis.

Sol^n,

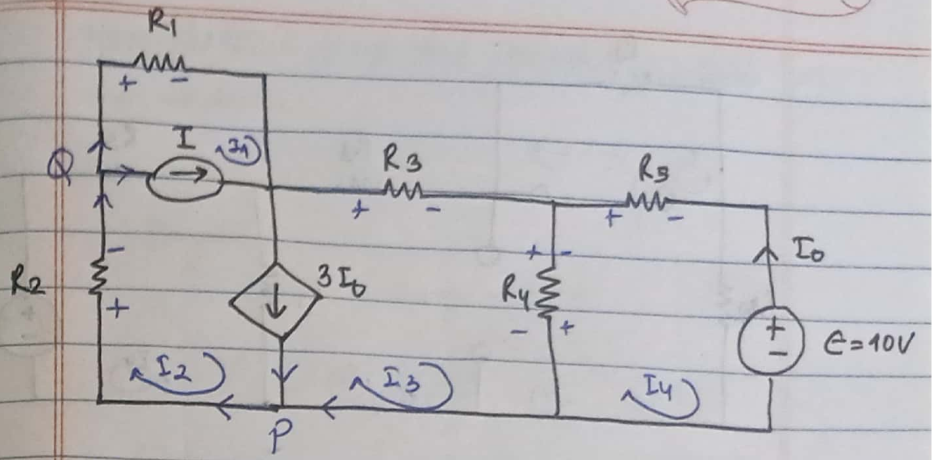
Given,

$R_1 = 2\Omega$ $\quad R_2 = 6\Omega$

$R_3 = 4\Omega$ $\quad R_4 = 8\Omega$

$R_5 = 2\Omega$ $\quad E = 10V$

$I = 5A$



Here, for loop 4,

$I_0 = -I_4$

So,

$3I_0 = -3I_4$

At point Q, $I_1 + I = I_2$

or, $I = I_2 - I_1$

or $-I_1 + I_2 = 5$ —— (i).

or $I_2 = 5 + I_1$ —— (a)

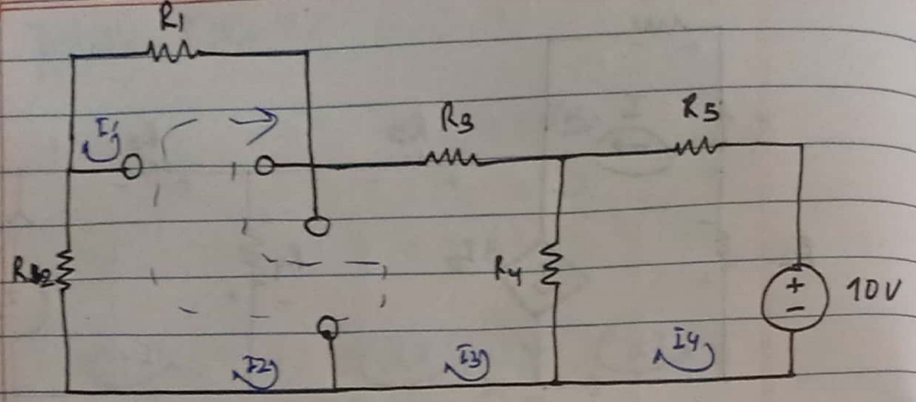
At point P,

$I_3 + 3I_0 = I_2$

or, $I_3 - 3I_4 = 5 + I_1$

or $-I_1 + I_3 - 3I_4 = 5$ —— (b).

Redrawing the circuit, we get.



Applying KVL,

~~2I1~~ for loop 1,

$-I_1R_1 - I_2R_2 - I_3R_3 - (I_3-I_4)R_4 = 0$

or, $-2I_1 - 6I_2 - 4I_3 - 8I_3 + 8I_4 = 0$

or, $-2I_1 - 6I_2 - 12I_3 + 8I_4 = 0$ —— (c)

for loop 2,

$-10 - (I_4-I_3)R_4 - I_4R_5 = 0$

or $-10 - (I_4-I_3)8 - 2I_4 = 0$

or, $8I_3 - 10I_4 = 10$ —— (d)

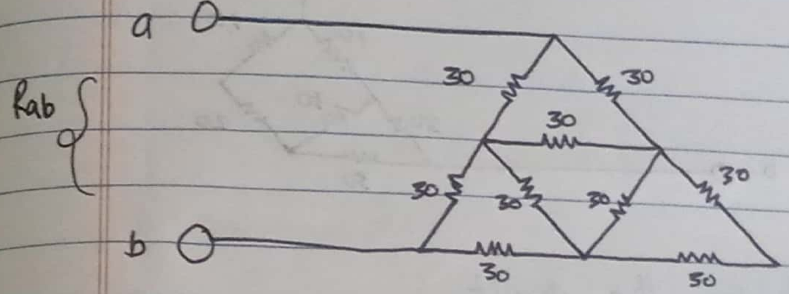
Solving, we get.

$I_1 = -7.5$ A $I_3 = 3.93$ A

$I_2 = -2.5$ A $I_4 = 2.148$ A

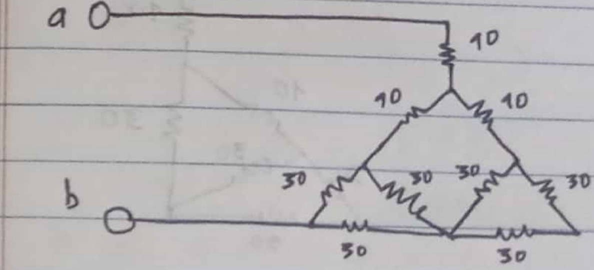
<Num.No 42> Find the resistance R_{ab} on the circuit.

Soln:

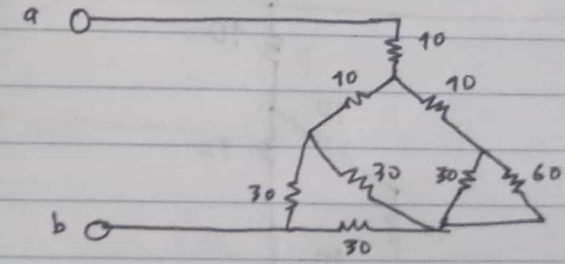


Now,

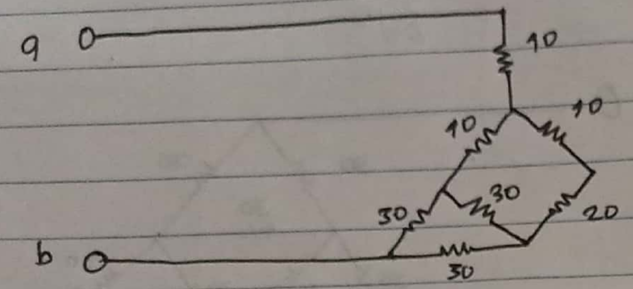
Redrawing the circuit.



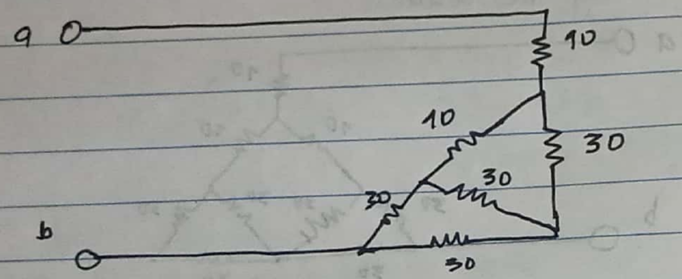
Redrawing the circuit,



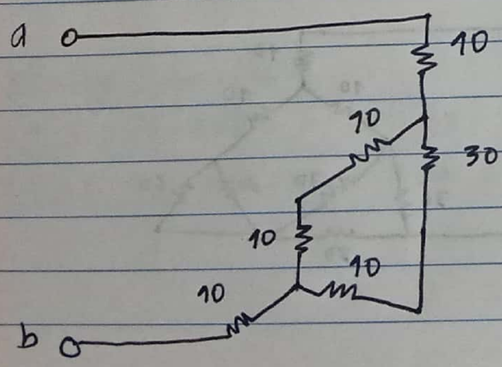
Redrawing the circuit,



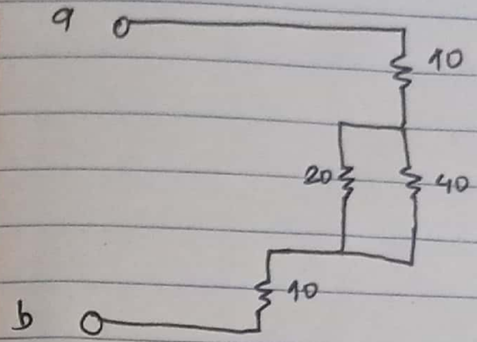
Redrawing the circuit,



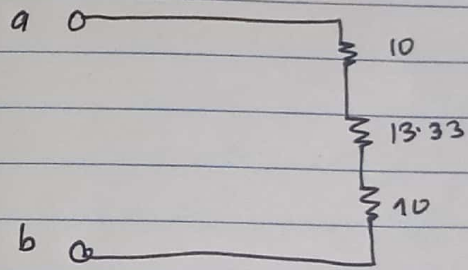
Redrawing the circuit,



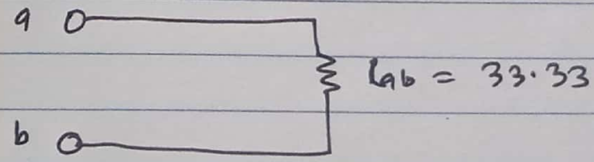
Redrawing the circuit,



Redrawing the circuit,



Redrawing the circuit,



$\therefore R_{ab} = 33.33\ \Omega$