loops passing through in the same direction minus the assumed current through in the opposite direction.

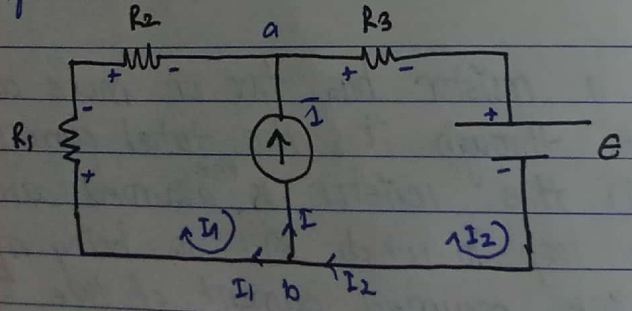
b) The polarity of a voltage source is unaffected by the direction of the assigned loop currents.

→ Step 4: Solve the resulting simultaneous linear equations for the assumed loop currents.

<Num. No 34 ~~In numeri~~ |35|36|37 = In num copy>

#Supermesh:

If current source is between two-mesh systems, it is called a super-mesh.



For solving super-mesh system, the circuit is redrawn removing the current source.

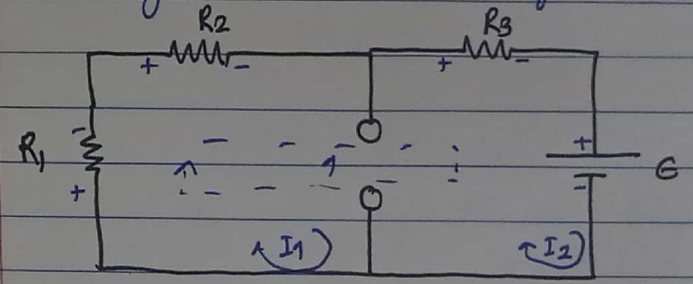
At node b, applying KCL,

$I_2 = I + I_1$

or, $I = I_2 - I_1$

or, $I = -I_1 + I_2$ — (i).

Redrawing the circuit diagram, we get.



For loop 1,

$-I_1R_1 - I_2R_2 - I_2R_3 - E = 0$

$\therefore E + I_1R_1 + I_2R_2 + I_2R_3 = 0$

X) Three type of Q:

i) Single current source at side
ii) Middle of the two mesh.
iii) Two or more supermesh.

<Num No: 38|39|40|41|42 => In numerical copy>

Nodal Analysis

Nodal analysis is a method that is used to solve planar circuits for any currents at any place in electrical circuits using KCL.

Steps to solve:

→ Step 1: Firstly, we calculate how many nodes these are in our circuits. If these are 'n' nodes, these are n-1 equations.

→ Step 2: We take a reference node which is mostly grounded. Generally, the most common node is grounded. It is refered as zero(0) node.

→ Step 3: At every node, we apply KCL. If we are not supplied with current, we assume the current is travelling out from the node.

We solve the obtained equations to find voltage.

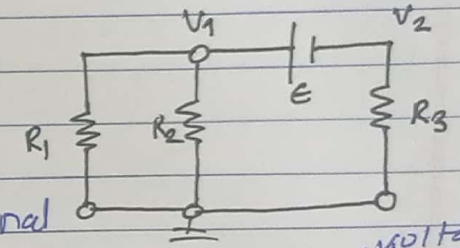
<Num.No: 43, 44, 45: In numericals copy>:

Super-node:

A super-node exists when an ideal voltage source appears between any two nodes of an electric circuit.

To solve super-mesh:

→ First, we write the equation for the voltage.

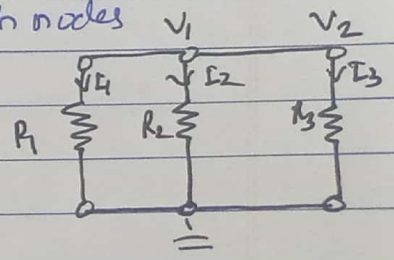


The positive terminal voltage difference with negative terminal gives the super-node voltage.

Here,

$$V_1 - V_2 = \epsilon .$$

→ Now, the voltage is replaced with a short circuit and then we find equations using previous notation. We solve both nodes in one eqn:



$$I_1 + I_2 + I_3 = 0$$

$$\text{or. } \frac{V_1}{R_1} + \frac{V_1}{R_2} + \frac{V_2}{R_3} = 0 .$$

*) Note

<Num No. 46, 47, 48 = In numericals copy>:

(X) Note: (Note copy content)

When to use mesh analysis or node analysis

(i): If numbes of nodes = numbes of mesh, we can use any method

(ii) If numbes of nodes les than numbes of mesh, we use nodal analysis.

(iii) If numbes of ~~nodes~~ mesh les than numbes of nodes, we use mesh andlysis.