



**SNS COLLEGE OF TECHNOLOGY**  
**An Autonomous Institution**  
**Coimbatore-35**



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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

**DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

**23ECB101-CIRCUIT ANALYSIS AND DEVICES**

I YEAR/ II SEMESTER

**UNIT 1 – MESH AND NODE ANALYSIS OF ELECTRIC CIRCUITS**

**TOPIC – MESH ANALYSIS**



# Mesh Analysis



## What is Mesh Analysis?

Mesh analysis is defined as

- The method in which the current flowing through a planar circuit is calculated.
- A planar circuit is defined as the circuits that are drawn on the plane surface in which there are no wires crossing each other.
- Therefore, a mesh analysis can also be known as loop analysis or mesh-current method.



# Mesh Analysis



## Procedure of Mesh Analysis

The following steps are to be followed while solving the given electrical network using mesh analysis:

### Step 1:

To identify the meshes and label these mesh currents in either clockwise or counterclockwise direction.

### Step 2:

To observe the amount of current that flows through each element in terms of mesh current.

### Step 3:

Writing the mesh equations to all meshes using Kirchhoff's voltage law and then Ohm's law.

### Step 4:

The mesh currents are obtained by following Step 3 in which the mesh equations are solved.

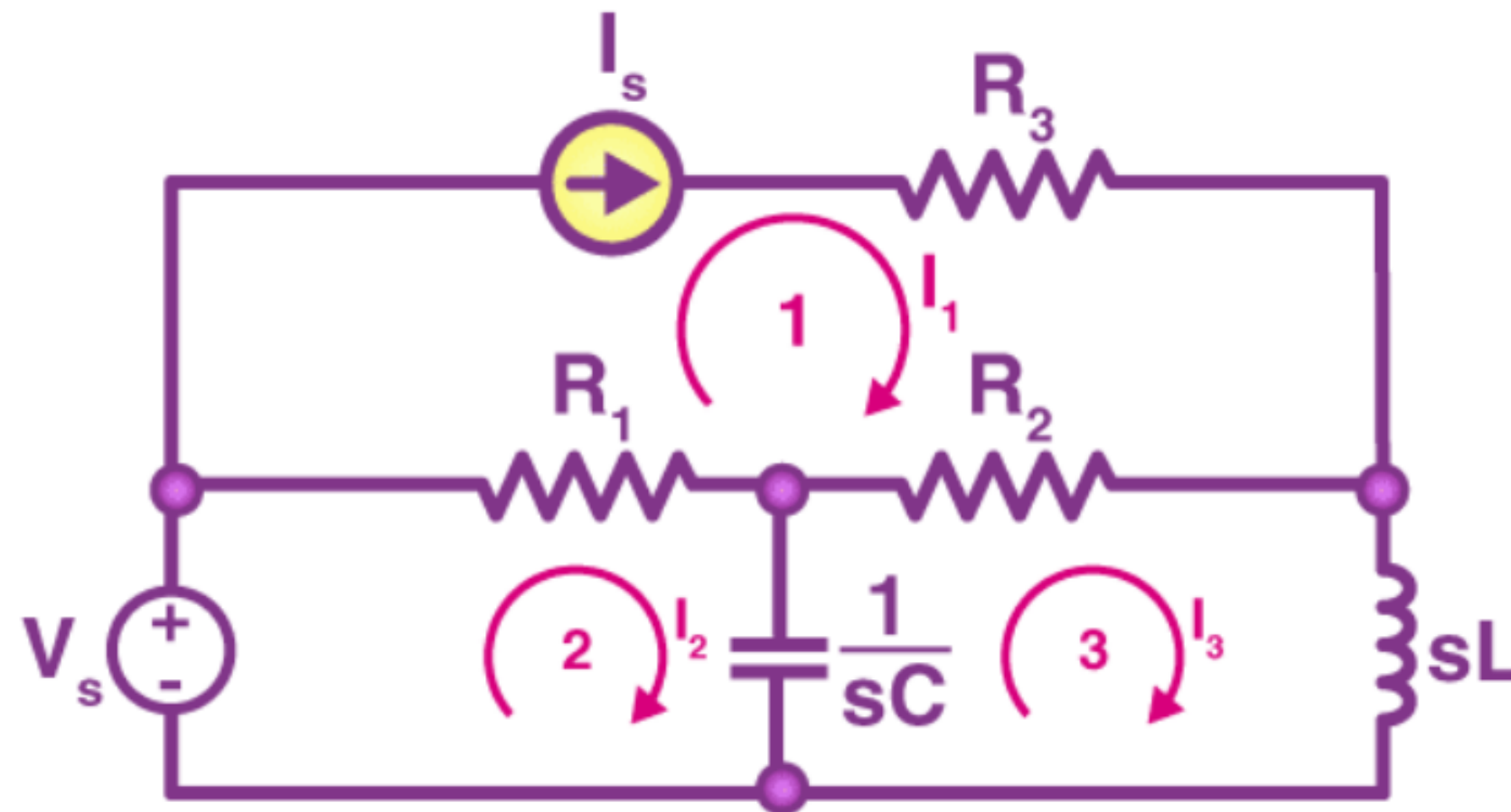


# Mesh Analysis



## Mesh Current Diagram

The below diagram is a circuit with mesh currents labelled as  $I_1$ ,  $I_2$ , and  $I_3$  and the arrows represent the direction of the mesh current.





# Mesh Analysis



## Mesh Current Diagram

The below diagram is a circuit with mesh currents labelled as  $I_1$ ,  $I_2$ , and  $I_3$  and the arrows represent the direction of the mesh current.

## What is Super Mesh Analysis?

Super mesh analysis is used for solving huge and complex circuits in which two meshes share a common component as a source of current.



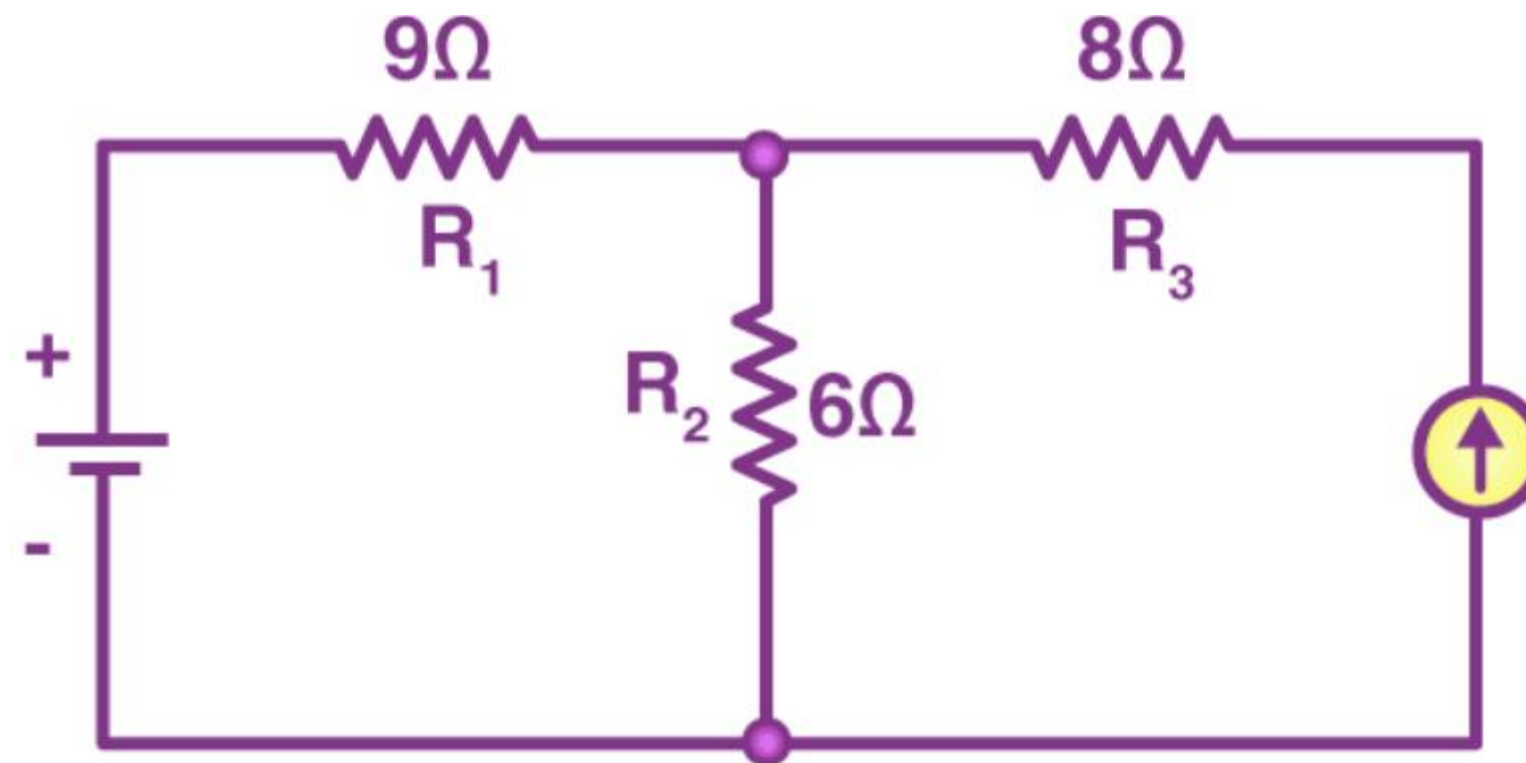
# Mesh Analysis



## Example of Mesh Analysis

### Example 1:

In the given circuit 90v is the battery value, 5A is the current source and the three resistors are 9 ohms, 6 ohms, and 8 ohms. Using mesh analysis, determine the current across each resistor and potential difference.



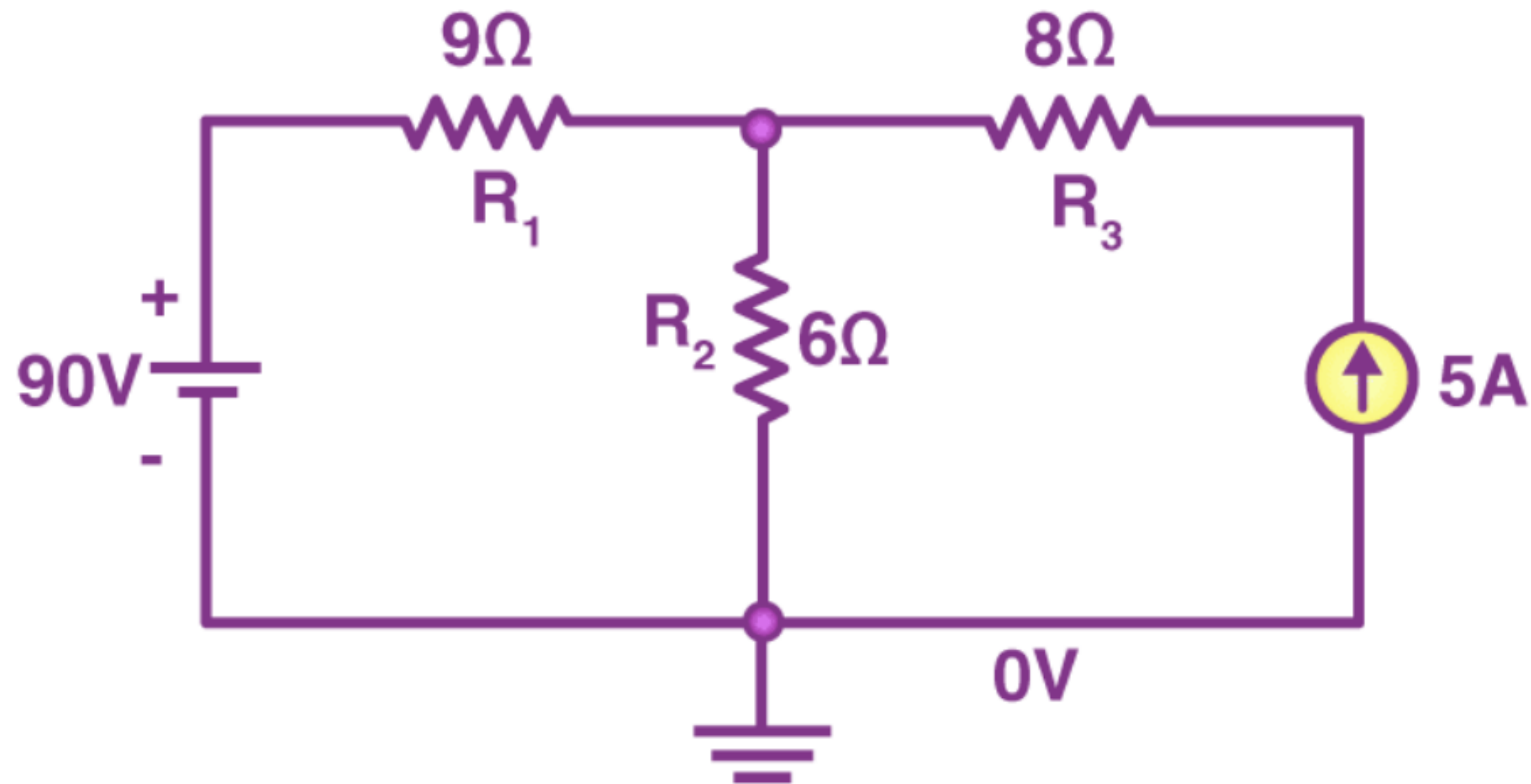


# Mesh Analysis



**Solution:**

Let's first determine the ground as shown in the figure

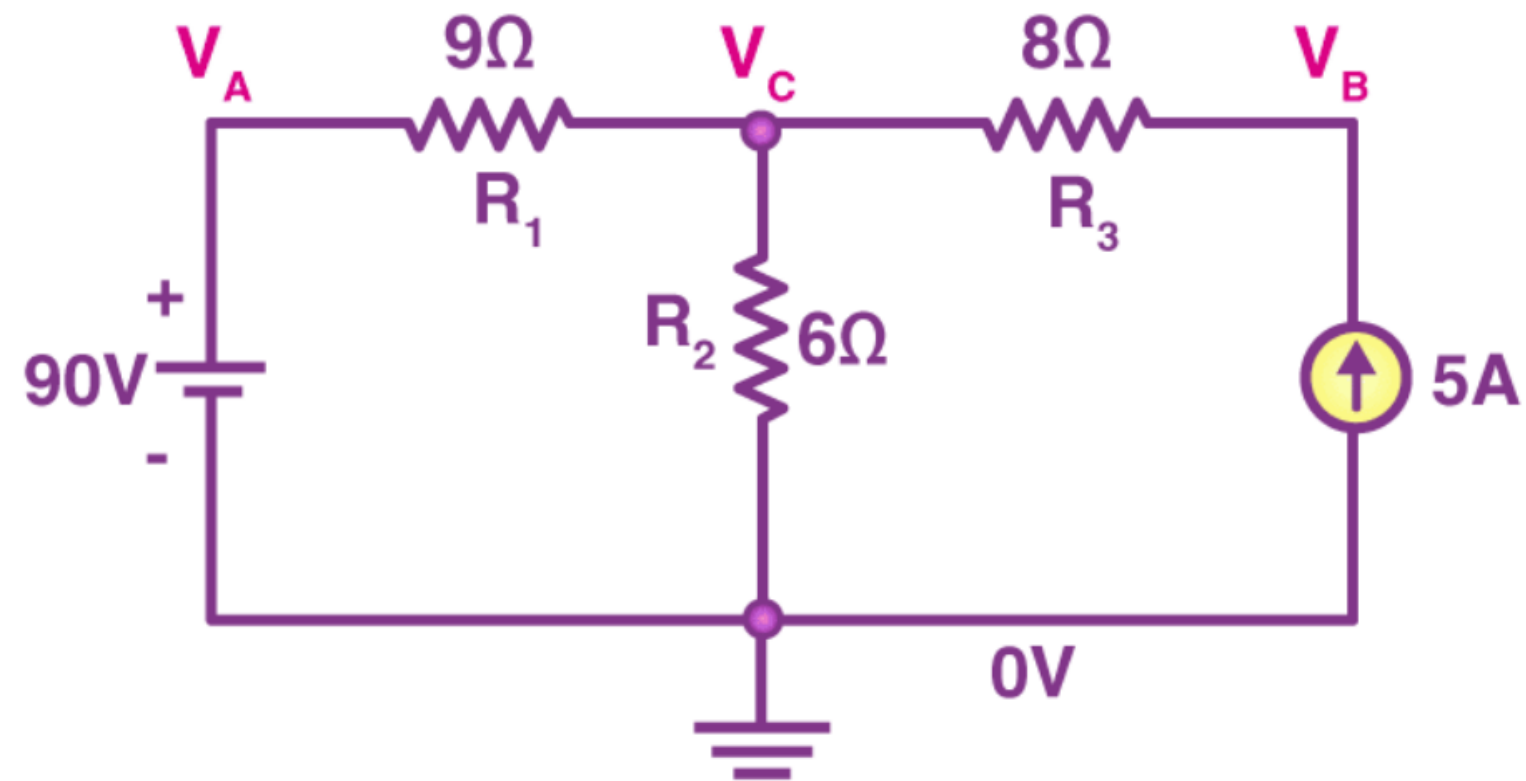




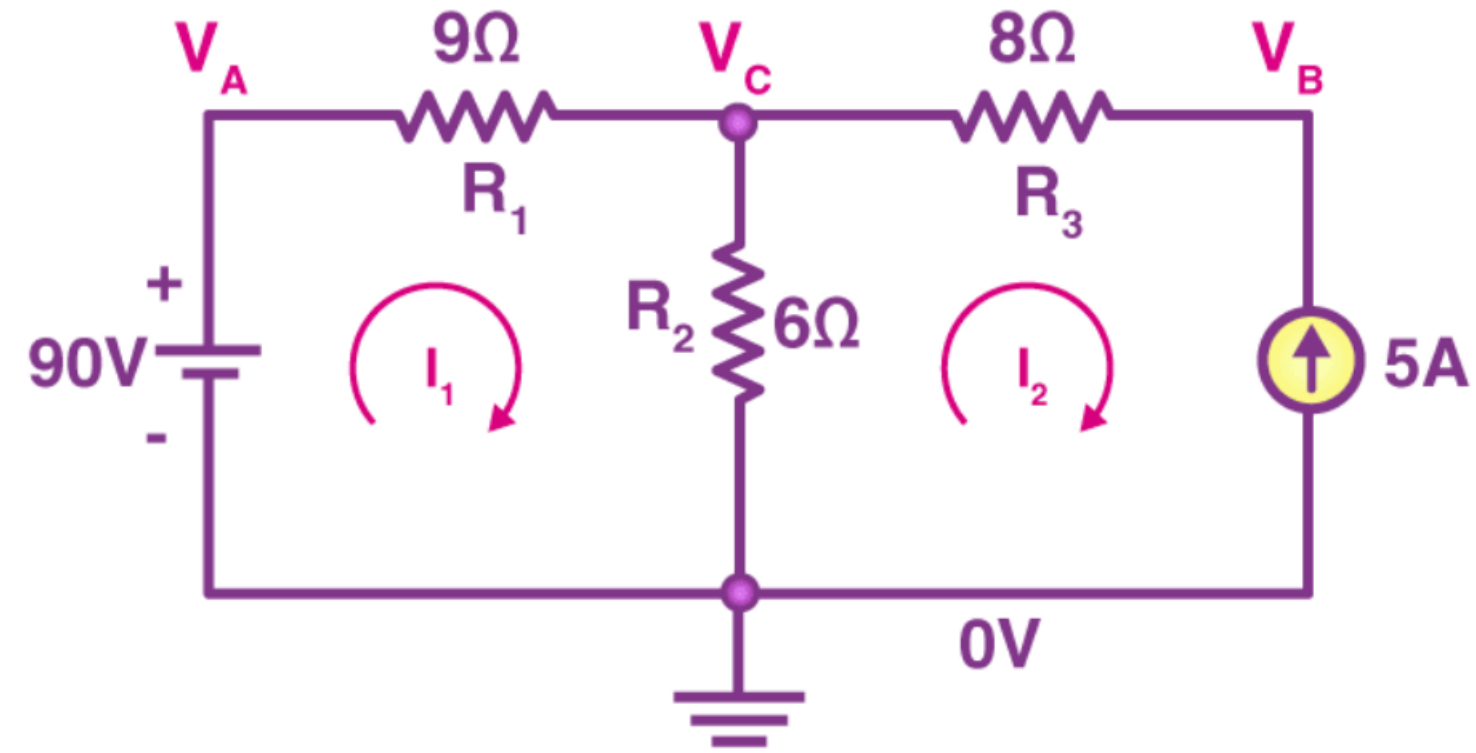
# Mesh Analysis



Let the potential be  $V_A$ ,  $V_B$ , and  $V_C$  as shown in the figure



Let  $I_1$  and  $I_2$  be the currents flowing through the two loops in the clockwise direction as shown in the figure







# Mesh Analysis



Therefore,

$$+V_B - V_1 - V_2 = 0$$

$$90 - I_1R_1 - R_2(I_1 - I_2) = 0$$

$$90 - 9I_1 - 6(I_1 - I_2) = 0$$

$$-15I_1 + 6I_2 = -90$$

$$5I_1 - 2I_2 = 30 \text{ (this is obtained by dividing the equation with -3)}$$

Substituting  $I_2$  as -5 since the direction of  $I_2$  is opposite to the actual direction of current

Therefore,

$$I_1 = 4A$$

So, through  $R_1$ , 4A current is flowing and through  $R_3$ , 5A current is flowing.

Now the potential difference at  $V_A = 90V$

At  $V_B$ , the potential difference is  $V_2 = I_2 - R_2$

Therefore,  $V_B = 54V$

At  $V_C$ , the potential difference is  $V_3 = I_3 - R_3$

$$V_C - 54 = 40$$

$$V_C = 94V$$



**THANK YOU**