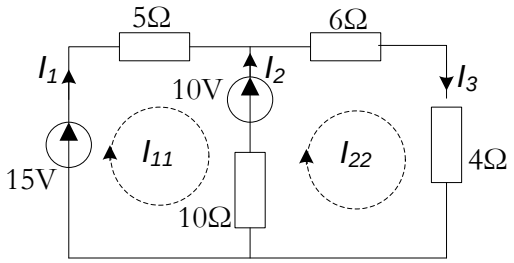
Mesh Analysis

Example 2.8.4. For the circuit below calculate the currents using the mesh analysis.



Example 2.8.4.

Solution:

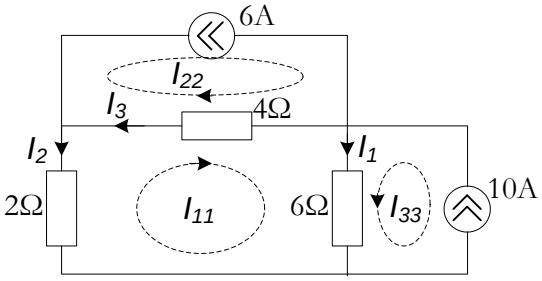
We have two fundamental loops with the corresponding mesh currents I_{11} and I_{22}, as shown in the figure above. The mesh equations corresponding to the two loops are:

$$I_{11} \cdot (5 + 10) - I_{22} \cdot 10 = 15 - 10,$$

$$I_{22} \cdot (6 + 4 + 10) - I_{11} \cdot 10 = 10.$$

Solving the system for the mesh currents I_{11} and I_{22}, we get I_{11}=1A and I_{22}=1A. The branch currents with the reference direction taken as shown in the figure above, in terms of mesh currents will be: $I_1 = I_{11} = 1A$, $I_2 = -I_{11} + I_{22} = 0A$ *and* $I_3 = I_{22} = 1A$.

Example 2.8.5. For the circuit below calculate the currents using the mesh analysis.



Example 2.8.5.

Solution:

We have two branches with current sources. The independent loops have been formed in a way in which a current source belongs to a single independent loop. In this way, for the direction of the mesh currents as shown in the figure above, we have: I_{22}=-6A and I_{33}=10A. A single mesh equation is written for the loop 11, in the following form:

$$I_{11} \cdot (2 + 4 + 6) - I_{22} \cdot 4 + I_{33} \cdot 6 = 0.$$

Solving for I_{11}, we get I_{11}=-3A. The branch currents with the reference direction taken as shown in the figure above, in terms of mesh currents will be: $I_1 = I_{11} + I_{33} = 7A$, $I_2 = -I_{11} = -3A$ *and* $I_3 = -I_{11} + I_{22} = -3A$.