

# **Electrical Circuit (1)**

**Introduction (week5 class1)**

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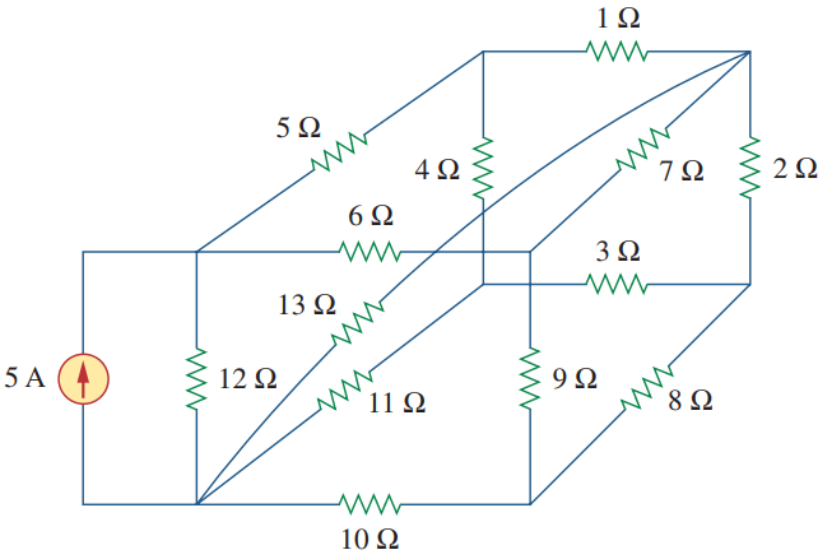
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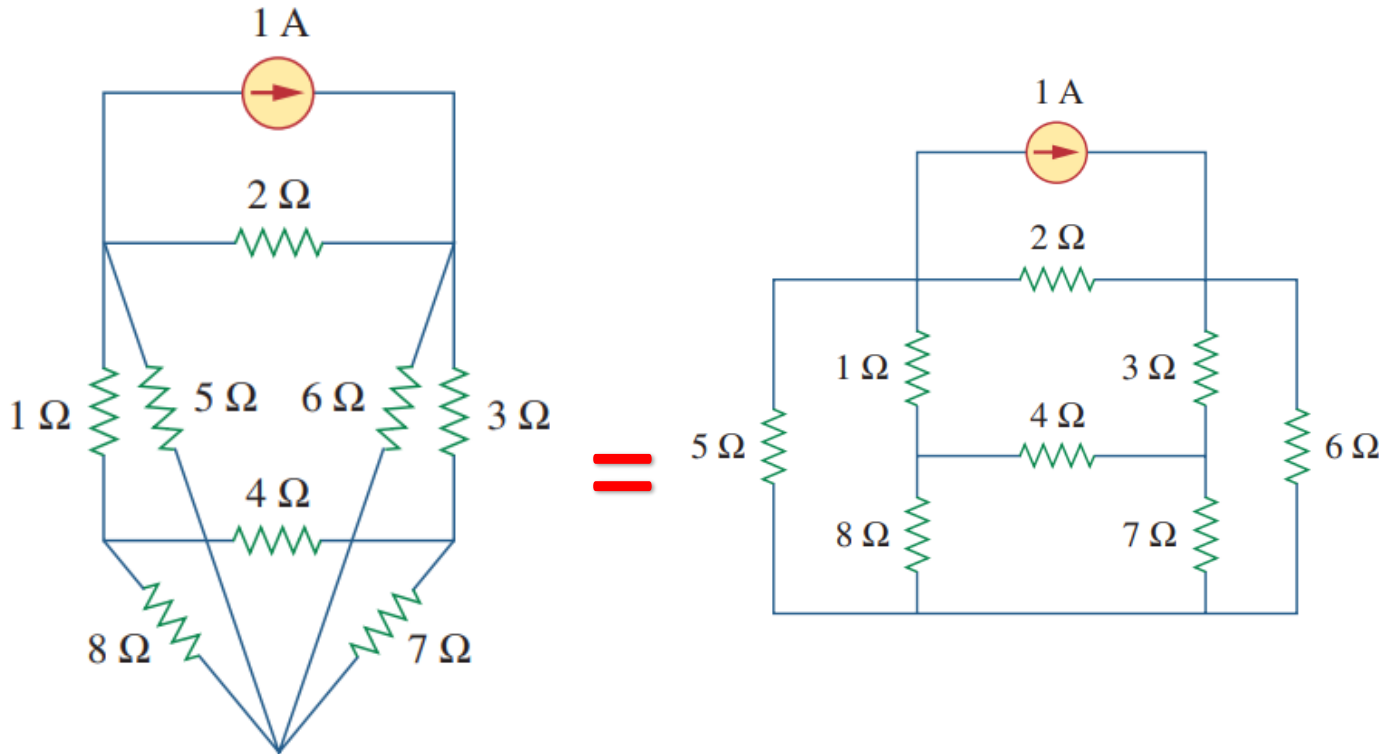
## Steps to Determine Mesh Currents:

1. Assign mesh currents  $i_1, i_2, \dots, i_n$  to the  $n$  meshes.
2. Apply KVL to each of the  $n$  meshes. Use Ohm's law to express the voltages in terms of the mesh currents.
3. Solve the resulting  $n$  simultaneous equations to get the mesh currents.

# Mesh Analysis



**Figure 3.16**  
A nonplanar circuit.



## Mesh Analysis

### Basic equation

$$-15 + (5 * i_1) + 10 * (i_1 - i_2) + 10 = 0$$

$$-10 + 10 * (i_2 - i_1) + (6 * i_2) + (4 * i_2) = 0$$

### Formulated equation

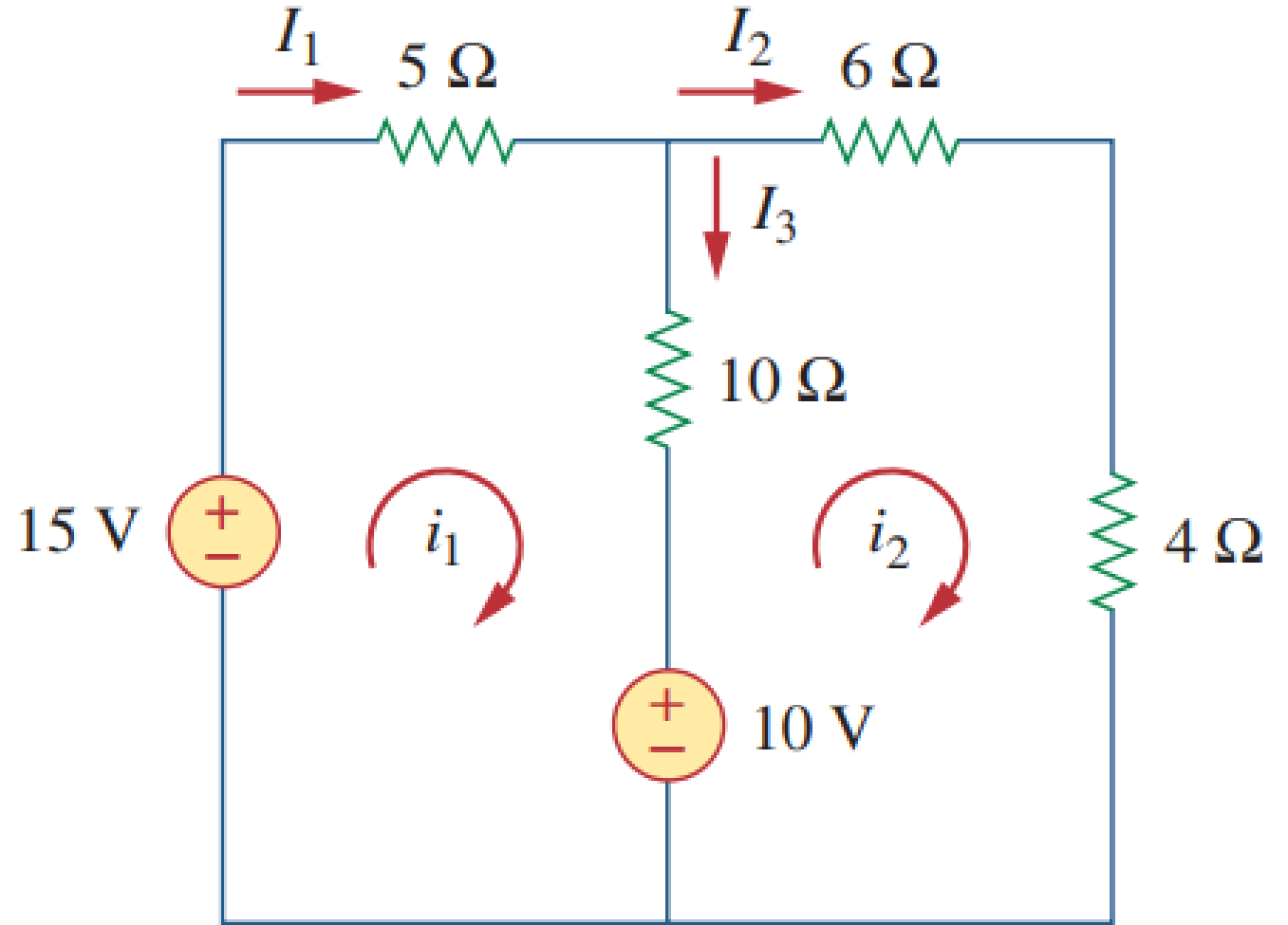
$$15i_1 - 10i_2 = 5$$

$$-10i_1 + 20i_2 = 10$$

### Final answer

$$i_1 = 1 \text{ A}$$

$$i_2 = 1 \text{ A}$$



## Mesh Analysis

### Basic equation

$$-24 + 10(i_1 - i_2) + 12(i_1 - i_3) = 0$$

$$10(i_2 - i_1) + 24i_2 + 4(i_2 - i_3) = 0$$

$$12(i_3 - i_1) + 4(i_3 - i_2) + 4(i_1 - i_2) = 0$$

### Formulated equation

$$22i_1 - 10i_2 - 12i_3 = 24$$

$$-10i_1 + 38i_2 - 4i_3 = 0$$

$$-8i_1 - 8i_2 + 16i_3 = 0$$

### Final answer

$$i_1 = 2.25A$$

$$i_2 = 0.75A$$

$$i_3 = 1.5A$$

