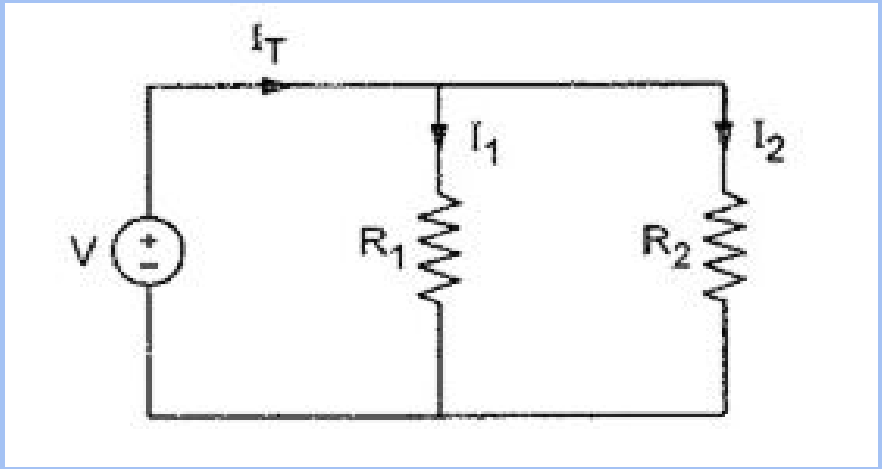
SUBJECT: BASIC ELECTRONICS

Current Divider Rule

Elementrix Classes

Current Divider Rule

Let's consider a simple parallel circuit with two resistors, R_1 and R_2, connected in parallel, and a voltage source (V) connected across the combination.



Formula: $\mathrm{I}_X = I_T \times \dfrac{\text{Resistance of opposite branch}}{\text{Resistance of opposite branch} + \text{Resistance of current branch}}$

1. Define the Resistances:

R_1 = 3 ohm

R_2 = 6 ohm

2. Calculate Total Resistance (R_{total}):

$$\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R_{total}} = \frac{1}{3} + \frac{1}{6} = \frac{2+1}{6} = \frac{3}{6} = \frac{1}{2}$$

$$R_{total} = 2\Omega$$

2. Calculate Total Current (I_{total}):

$$I_{total} = \frac{V}{R_{\text{total}}} = \frac{12}{2} = 6\,A$$

$$\boxed{I_{\text{total}} = 6A}$$

3. Apply Current Divider Rule for Each Resistor to Calculate Individual Branch Currents:

Use the current divider rule for each resistor:

For R_1:

$$I_{R_1} = I_{total} \times \frac{R_2}{R_2 + R_1}$$

$$I_{R_1} = 6 \times \frac{6}{6+3} = 6 \times \frac{6}{9} = \frac{36}{9} = 4\,A$$

$$\boxed{I_{R_1} = 4\,A}$$

For R_2:

$$I_{R_2} = I_{total} \times \frac{R_1}{R_1 + R_2}$$

$$I_{R_2} = 6 \times \frac{3}{3+6} = 6 \times \frac{3}{9} = \frac{18}{9} = 2\,A$$

$$\boxed{I_{R_2} = 2\,A}$$

This means that in the given parallel circuit, 4 amperes of current flows through the 3-ohm resistor (R_1), and 2 amperes flows through the 6-ohm resistor (R_2).

पढ़िए और पढ़ाइये

SUBSCRIBE, SHARE, COMMENT