



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 – VOLTAGE AND CURRENT DIVISION RULE



Voltage and Current Division Rule



Voltage Divider Formula

- The voltage divider is the series of resistors or capacitors that can be tapped at any intermediate point to generate a specific fraction of the voltage applied between its ends.
- It consists of an electric circuit composed of two resistors and one input voltage supply.



Voltage and Current Division Rule



Voltage Divider Formula

- The below figure shows a simple voltage divider.
- In this circuit, two resistors are connected in series.
- The output voltage of the voltage divider is a function of the input voltage.
- This circuit helps to determine how the input voltage divides among the components in the circuit.

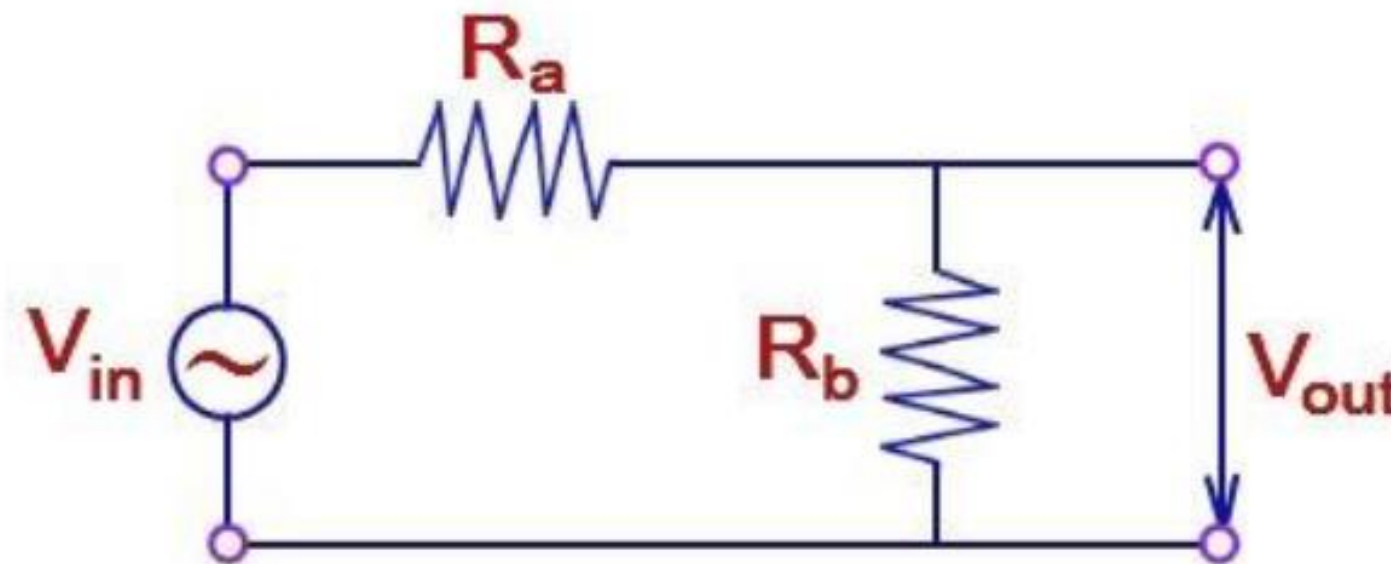
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Voltage and Current Division Rule



Voltage Divider Formula



The **voltage divider formula** is given by,

$$V_{out} = \frac{R_b}{R_a + R_b} V_{in}$$

Where,

- V_{out} is the output voltage
- R_a and R_b are the resistors
- V_{in} is the input voltage



Voltage and Current Division Rule



Example 1

Determine the output voltage of the voltage divider circuit whose R_a and R_b are $6\ \Omega$ and $8\ \Omega$ respectively and the input voltage is 10V .

Solution:

Given:

$$R_a = 6\ \Omega,$$

$$R_b = 8\ \Omega$$

$$V_{\text{in}} = 10\text{V}$$



Voltage and Current Division Rule



Voltage divider formula is given by,

$$V_{out} = \frac{R_b}{R_a + R_b} V_{in}$$

$$= [8 / (6 + 8)] 10$$

$$V_{out} = 5.71V$$

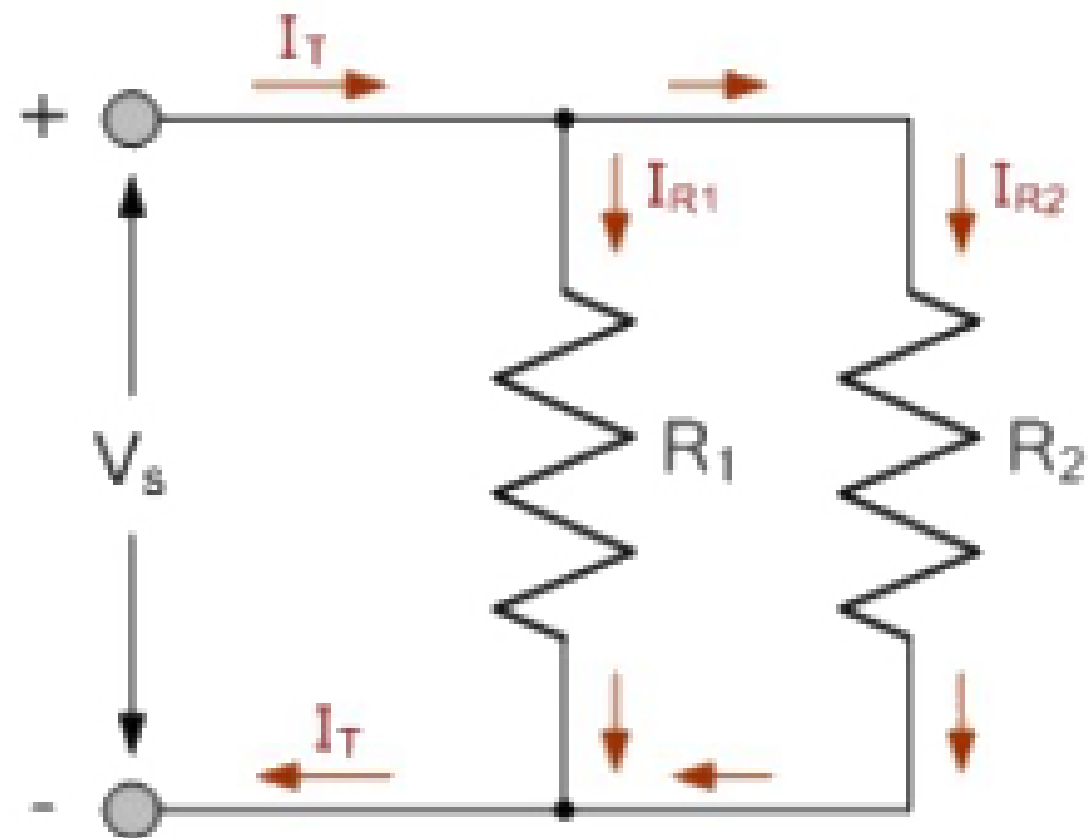


Voltage and Current Division Rule



Current Divider Formula

Current Divider circuits have two or more parallel branches for currents to flow through but the voltage is the same for all components in the parallel circuit





Voltage and Current Division Rule



Current Divider Formula

Current through *any* resistor $I_n = \frac{E_n}{R_n}$

Voltage in a parallel circuit $E_{\text{total}} = E_n = I_{\text{total}} R_{\text{total}}$

... *Substituting* $I_{\text{total}} R_{\text{total}}$ for E_n in the first equation ...

Current through any *parallel* resistor $I_n = \frac{I_{\text{total}} R_{\text{total}}}{R_n}$

... or ...

$$I_n = I_{\text{total}} \frac{R_{\text{total}}}{R_n}$$

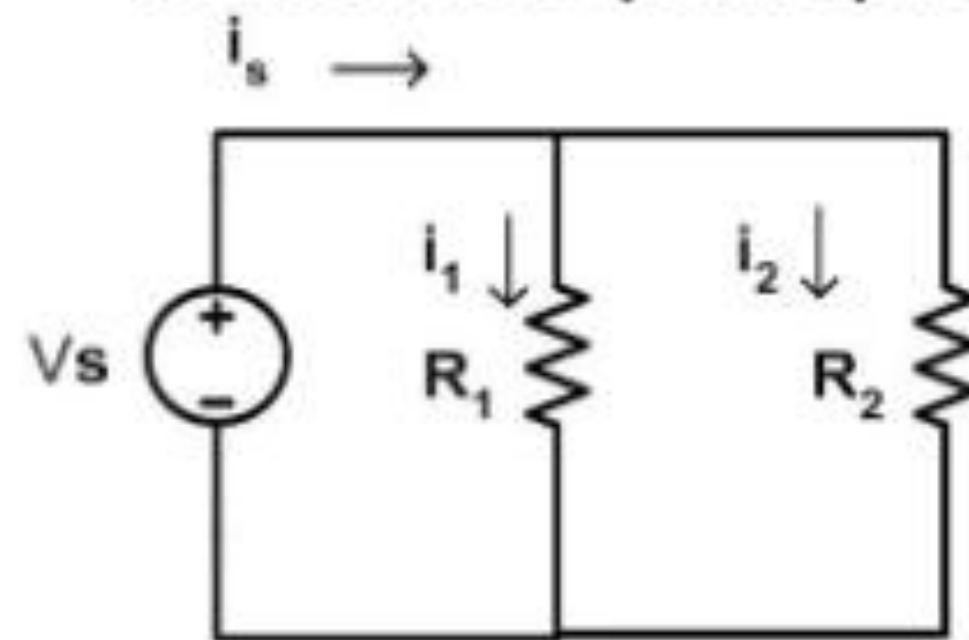


Voltage and Current Division Rule



Current Divider Formula

- Whenever current has to be divided among resistors in parallel, use current divider rule principle.



$$i_1 = \frac{R_2}{R_1 + R_2} i_s$$

$$i_2 = \frac{R_1}{R_1 + R_2} i_s$$



THANK YOU