



# **SNS COLLEGE OF TECHNOLOGY**

## **An Autonomous Institution**

### **Coimbatore-35**



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade  
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.

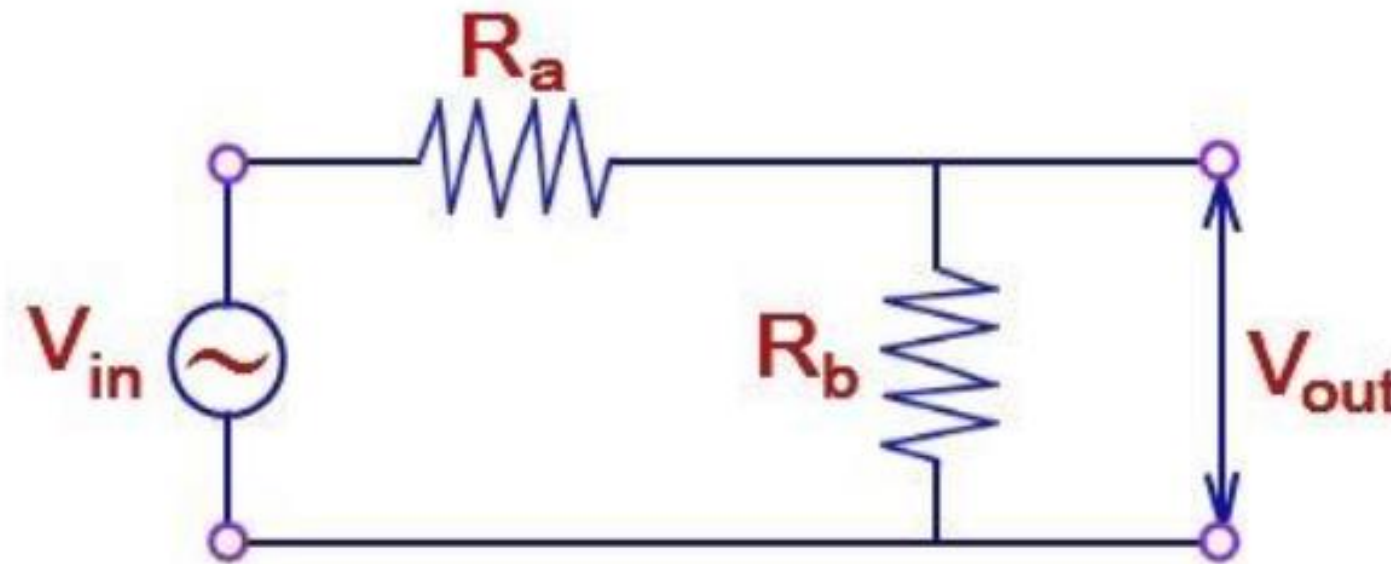
•



# 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  $10\text{V}$ .

### 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,

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

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

$$V_{out} = 5.71V$$

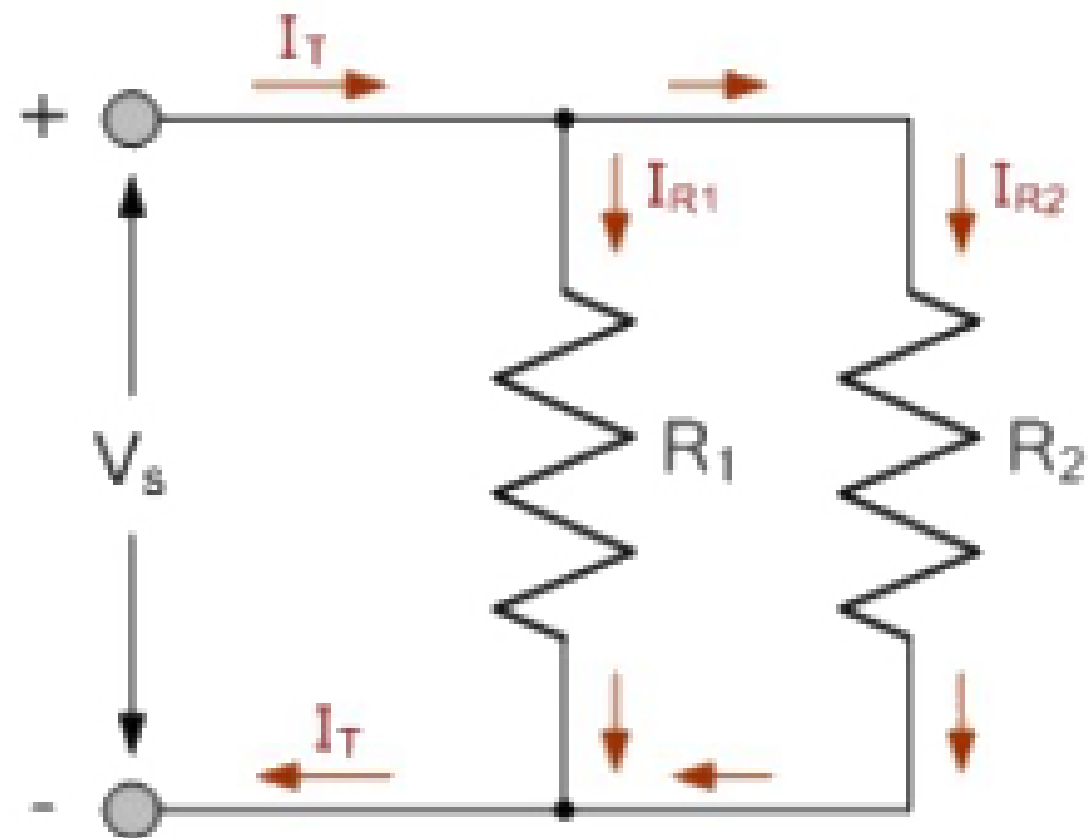


# Voltage and Current Division Rule



## 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 ...

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



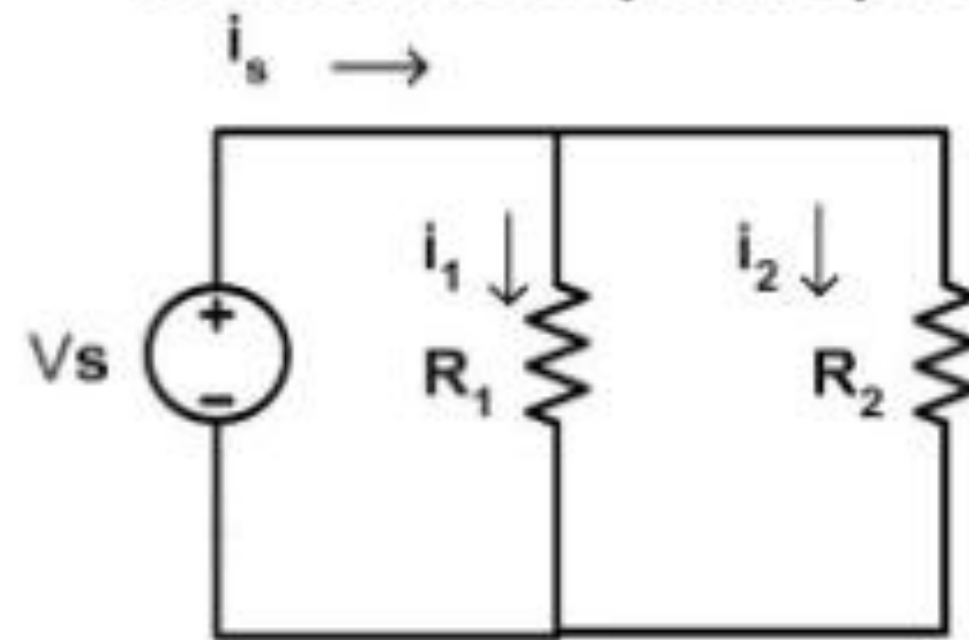


# Voltage and Current Division Rule



## 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**