



# **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

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### **UNIT 1 – MESH AND NODE ANALYSIS OF ELECTRIC CIRCUITS**

**TOPIC – RESISTORS IN SERIES AND PARALLEL**

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# Resistors in Series and Parallel

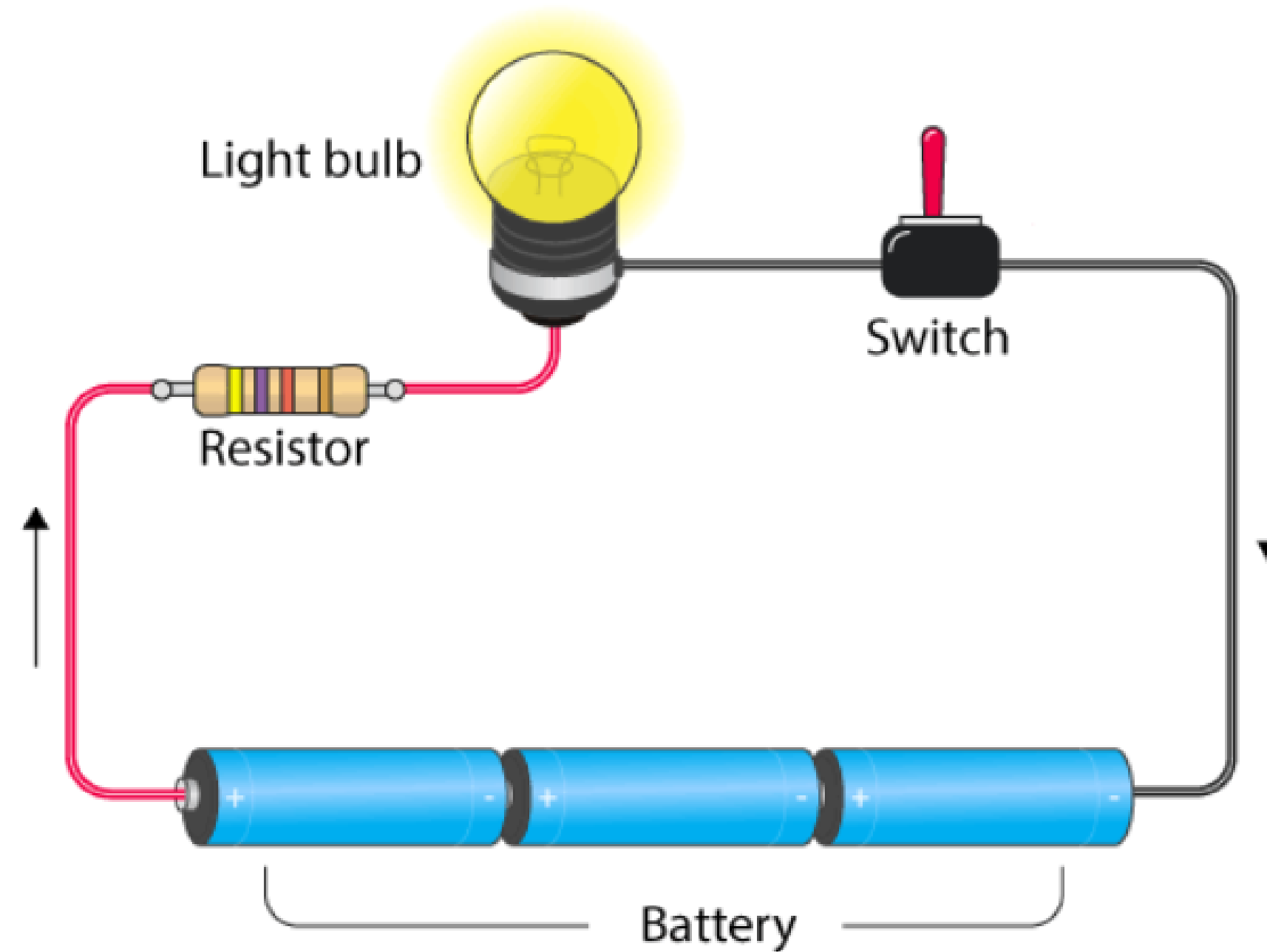


- A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element.
- Resistors reduce the current flow and lower voltage levels within circuits.
- Most circuits often have more than one resistor to limit the flow of charges in a circuit.



# Resistors in Series and Parallel

## Circuit Components





# Resistors in Series and Parallel



## Circuit Components

- A circuit is composed of conductors (wire), power source, load, resistor, and switch. A circuit starts and ends at the same point.
- Usually, copper wire without insulation is used as a conductor. A switch is used to make or break a circuit.
- Resistors control the flow of the electric current in a circuit. A resistor is a passive element which means that it only consumes power but does not generate power.



# Resistors in Series and Parallel



## Circuit Components

A load in a circuit consumes electrical energy and converts it into other forms of energy like light, heat, etc. A load can be a light bulb, fan, etc.

## Need of a Combination Circuit

In an electric circuit, the different components are connected either in series or in parallel to produce different resistive networks. In the same circuit, resistors can sometimes be connected in parallel and series across different loops to produce a more complex resistive network.



# Resistors in Series and Parallel



- These circuits are known as mixed resistor circuits.
- In the end, however, the total resistance should be known.
- It is important to know how to do this because resistors never exist in isolation.
- They are always part of a larger circuit that will have many resistors connected in different combinations.



# Resistors in Series and Parallel



## Resistors in Series

- Two or more resistors are said to be connected in series when the same amount of current flows through all the resistors.
- In such circuits, the voltage across each resistor is different.
- In a series connection, if any resistor is broken or a fault occurs, then the entire circuit is turned off.
- The construction of a series circuit is simpler compared to a parallel circuit.



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# Resistors in Series and Parallel



For the above circuit, the total resistance is given as:

$$R_{\text{total}} = R_1 + R_2 + \dots + R_n$$



# Resistors in Series and Parallel

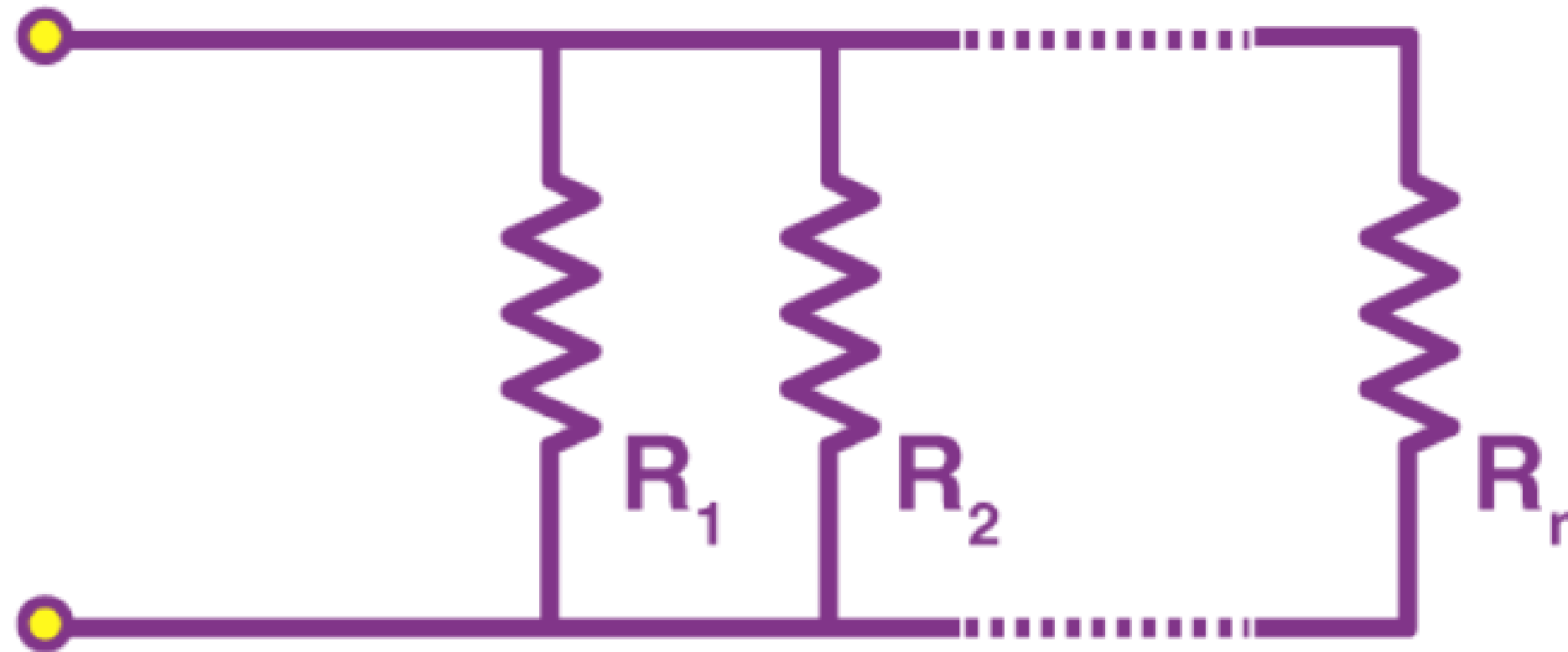


## Resistors in Parallel

- Two or more resistors are said to be connected in parallel when the voltage is the same across all the resistors.
- In such circuits, the current is branched out and recombined when branches meet at a common point.
- A resistor or any other component can be connected or disconnected easily without affecting other elements in a parallel circuit.



# Resistors in Series and Parallel



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



**THANK YOU**