SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution
Coimbatore-35

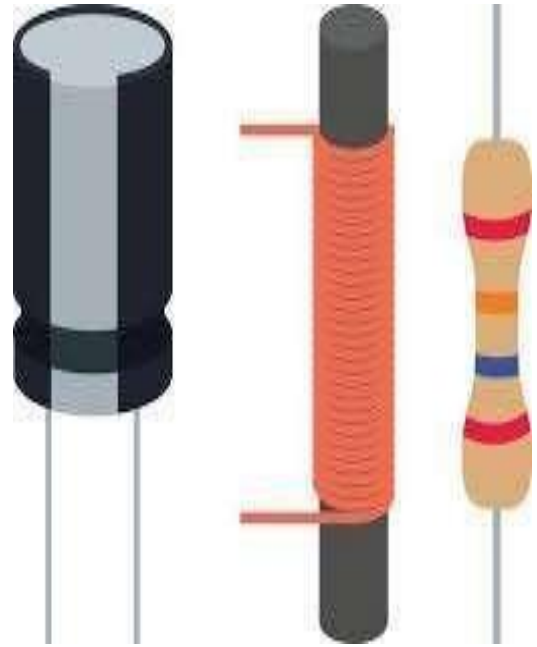
Department of Artificial Intelligence and Data Science

23EET103-Electric Circuits and Electron Devices

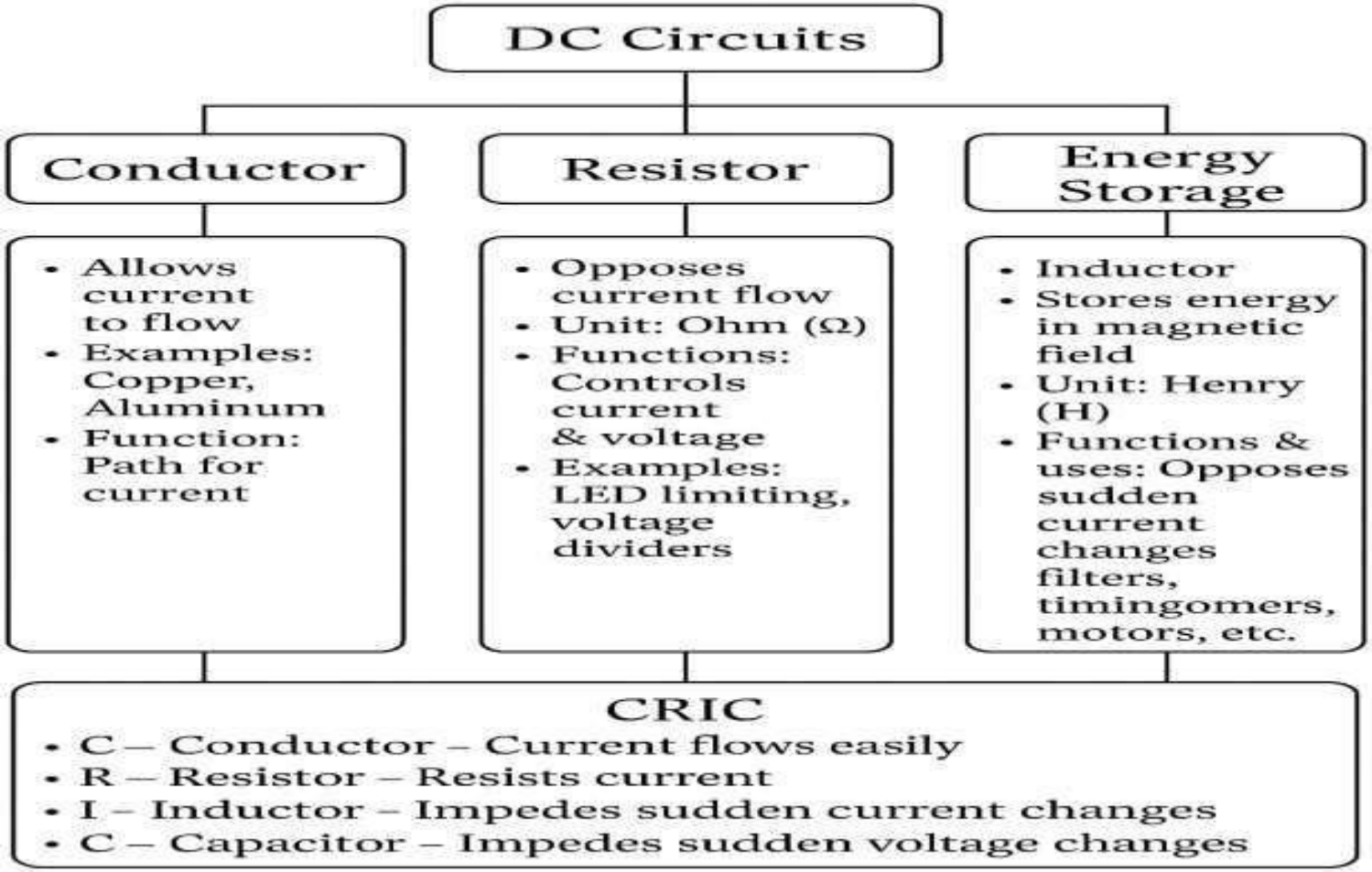
I B.Tech. AIDS / II SEMESTER

UNIT I : DC CIRCUITS

Topic 2 : Resistive Elements



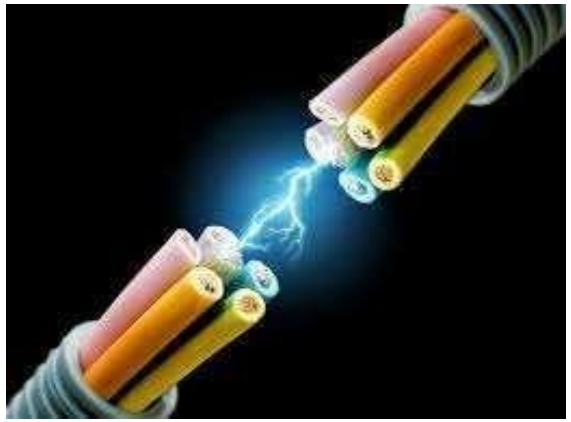
Let's Recall !!


DC Circuits
Conductor
Resistor
Energy Storage
• Allows current to flow
• Examples: Copper, Aluminum
• Function: Path for current
• Opposes current flow
• Unit: Ohm (Ω)
• Functions: Controls current & voltage
• Examples: LED limiting, voltage dividers
• Inductor
• Stores energy in magnetic field
• Unit: Henry (H)
• Functions & uses: Opposes sudden current changes filters, timingomers, motors, etc.
CRIC
• C – Conductor – Current flows easily
• R – Resistor – Resists current
• I – Inductor – Impedes sudden current changes
• C – Capacitor – Impedes sudden voltage changes

Topics for discussion

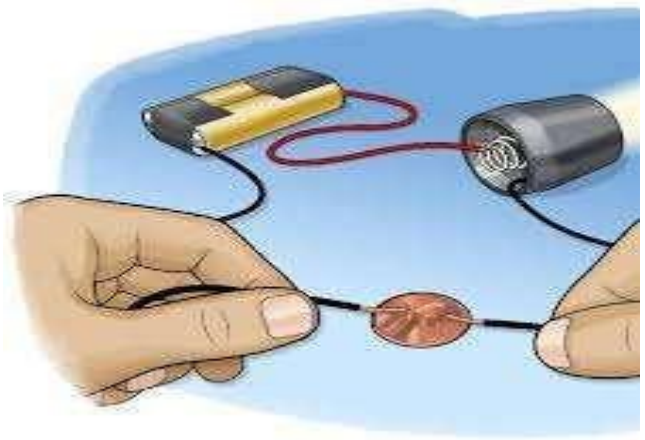
- Why DC Circuits: Conductor, Resistor, Inductor, Capacitor ?
- DC Circuits: Conductor, Resistor, Inductor, Capacitor Fundamentals
- DC Circuits: Conductor, Resistor, Inductor, Capacitor Terminologies
- Why DC Circuits: Conductor, Resistor, Inductor, Capacitor traversals in real world?

Lets explore !!



- Electricity?
- Voltage, Current, Resistance
- Nature of Current
- Ohms Law

Conductor



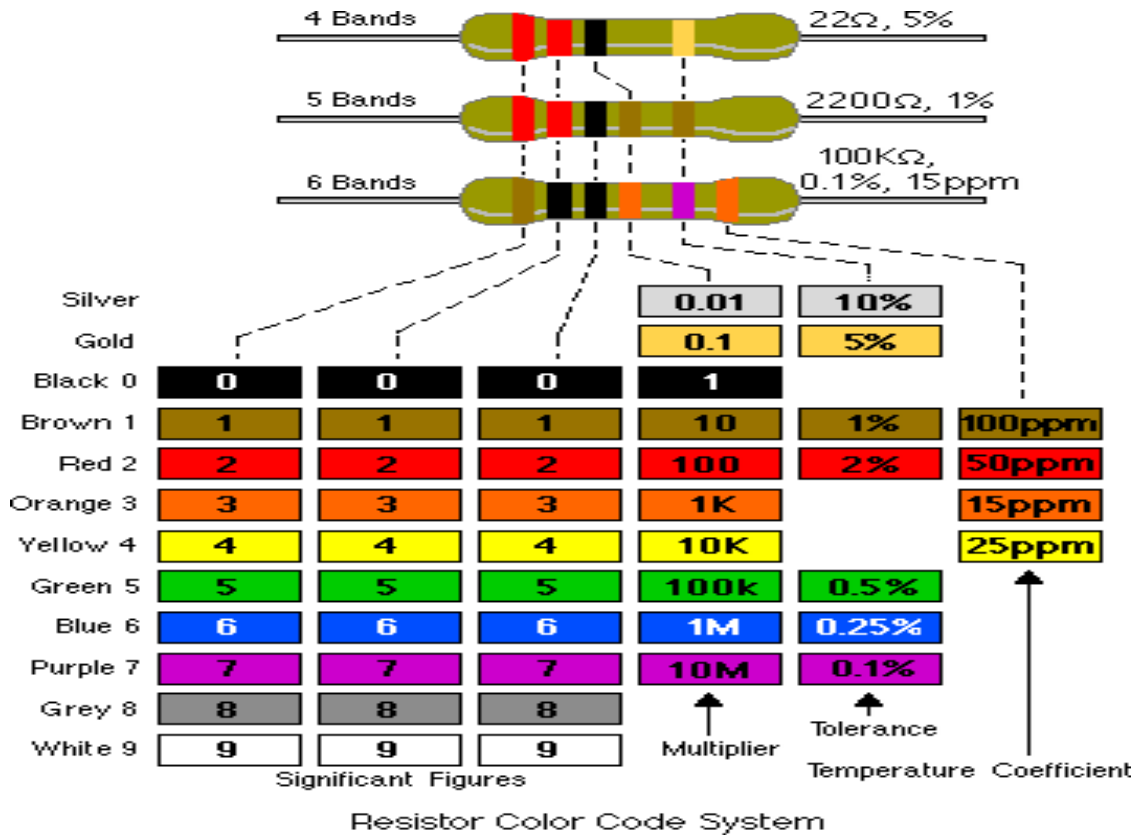
Definition: A material that allows free flow of electric current due to the presence of free electrons.

- **Examples**: Copper, Aluminum, Silver.

- **Key Characteristics**:
  - **Low resistance** → allows current to flow easily.
  - Conductivity depends on **material, cross-sectional area, and temperature**.

- **Role in DC Circuit**: Provides a path for current; ideally, it doesn't drop voltage significantly.

Resistor



Resistor Color Code System

Resistance to the flow of the current.

Measured in Ohms

It opposes an Electric Current

Definition: A component that **resists** the flow of current, converting electrical energy into heat.

Symbol: Ω (ohms)

Key Characteristics:

Ohm's Law: $V = I \cdot R$

Resistance is measured in **ohms (Ω)**

Can be **fixed or variable**.

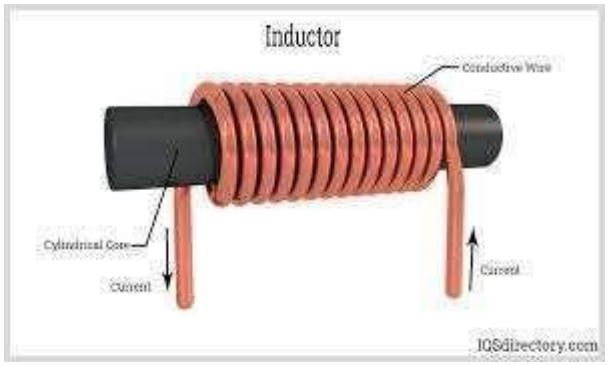
Role in DC Circuit:

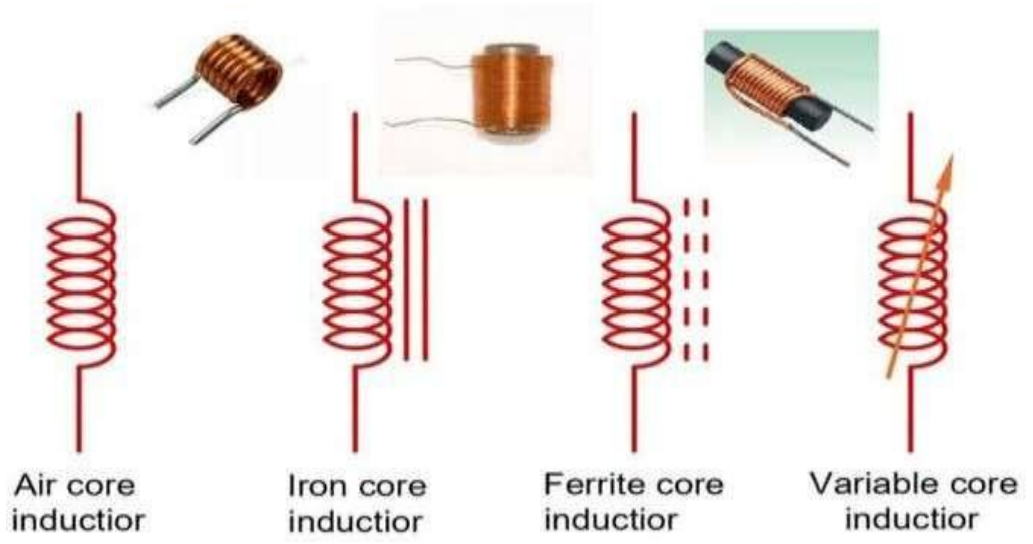
Limits current.

Divides voltage (voltage divider circuits).

Protects sensitive components.

Inductor





Definition: A component that **opposes changes in current** due to its magnetic field.

Symbol: **H**

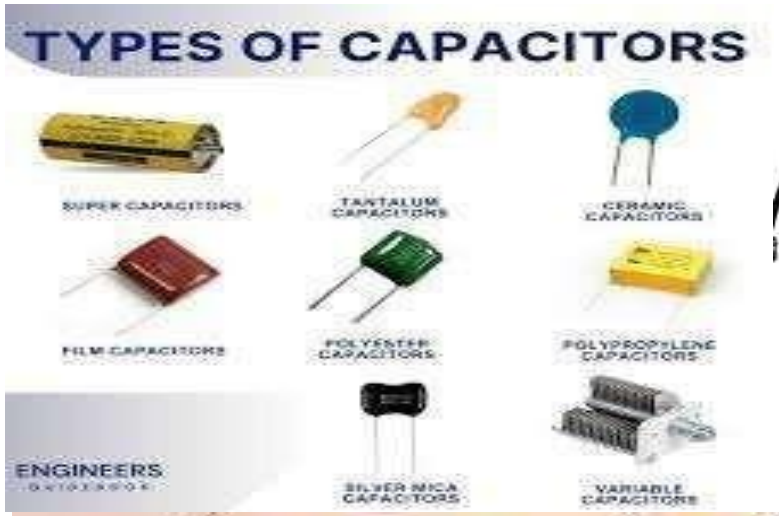
Key Characteristics:

- Inductance measured in Henrys (H)
- Stores energy in magnetic field
- In DC steady state, acts as a short circuit (ideal inductor).

Role in DC Circuit:

- Smoothens current (in filters)
- Protects circuits from sudden current changes
- Used in energy storage and transient analysis.

Capacitor



Definition: A component that **stores electrical energy** in an electric field between its plates.

Symbol: f

Key Characteristics:

- Capacitance measured in **Farads (F)**
- In DC steady state, acts as an **open circuit** (blocks DC).
- Can be **polarized** (electrolytic) or **non- polarized.**

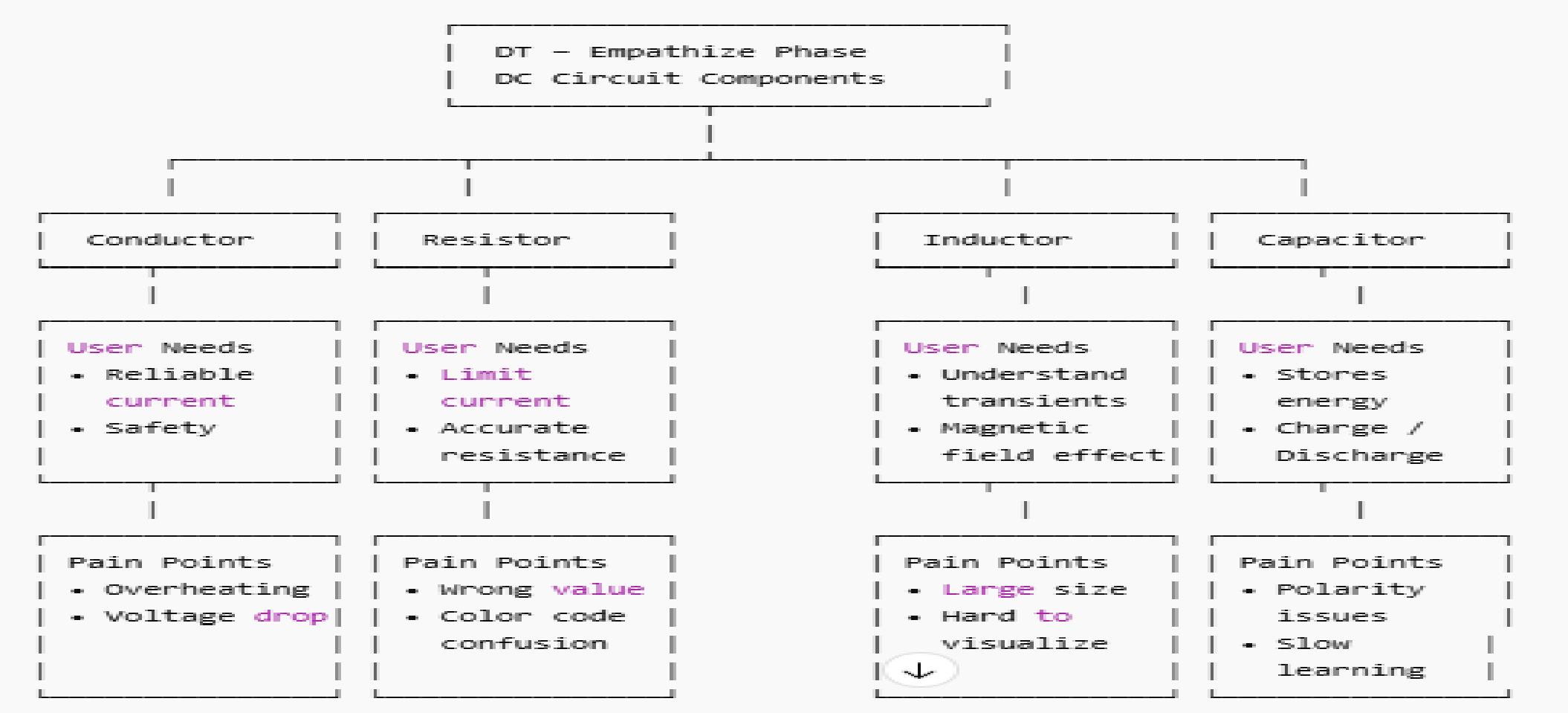
Role in DC Circuit:

- Stores energy for later use
- Filters voltage fluctuations
- Couples AC signals while blocking DC in circuits

Resistor, Inductor, Capacitor

Organization Hierarchy

DT-Empathize



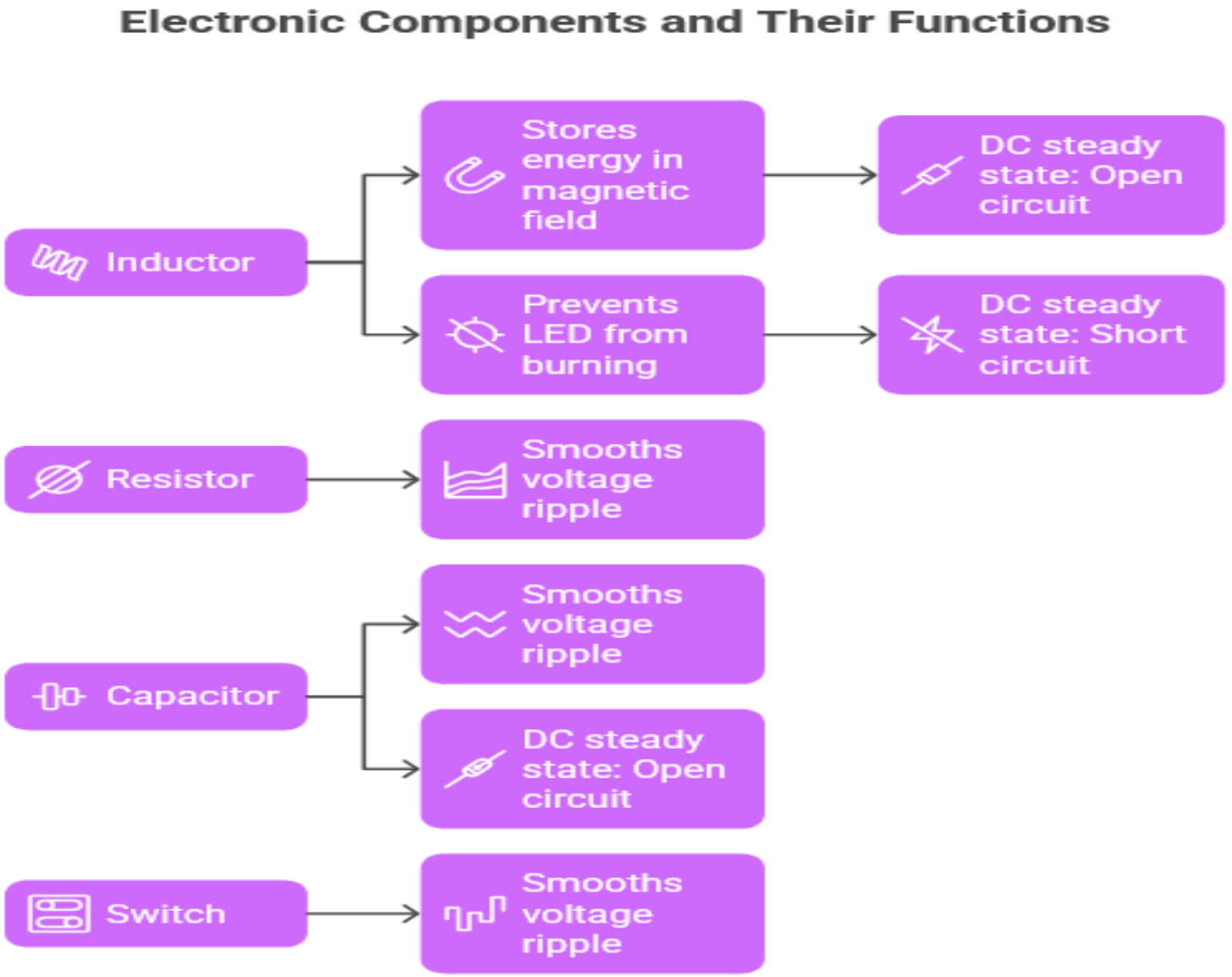
DC circuit components

- Basic elements used in direct current (DC) electrical circuits
- It controls, stores, or opposes the flow of electric current.
- They form the building blocks of circuits and determine how voltage and current behave.

Component	Function / Role	Unit
Conductor	Provides path for current	-
Resistor	Limits current, divides voltage	Ohm (Ω)
Inductor	Stores energy in magnetic field, opposes changes in current	Henry (H)
Capacitor	Stores energy in electric field, filters voltage	Farad (F)

Application of DC Components in Real world

Lets Summarize



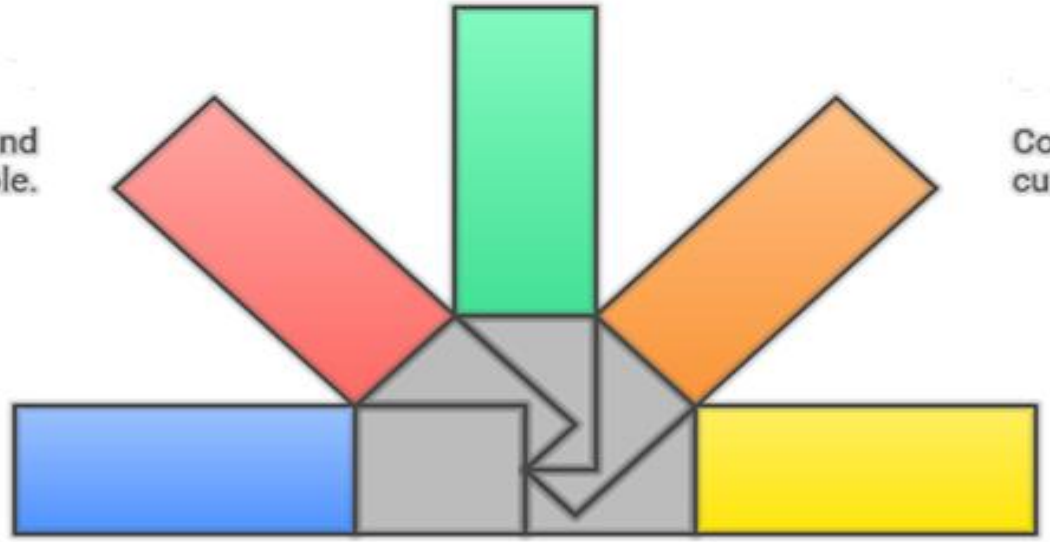
Activity - QUIZ

Which electronic component serves a specific function in a circuit?

Smooths voltage ripple and acts as an open circuit in DC steady state.

Prevents LED burnout and smooths voltage ripple.

Controls the flow of current in a circuit.



Stores energy in a magnetic field and prevents LED burnout.

Provides a constant voltage source in a circuit.

ANSWER

Which electronic component serves a specific function in a circuit?

Capacitor

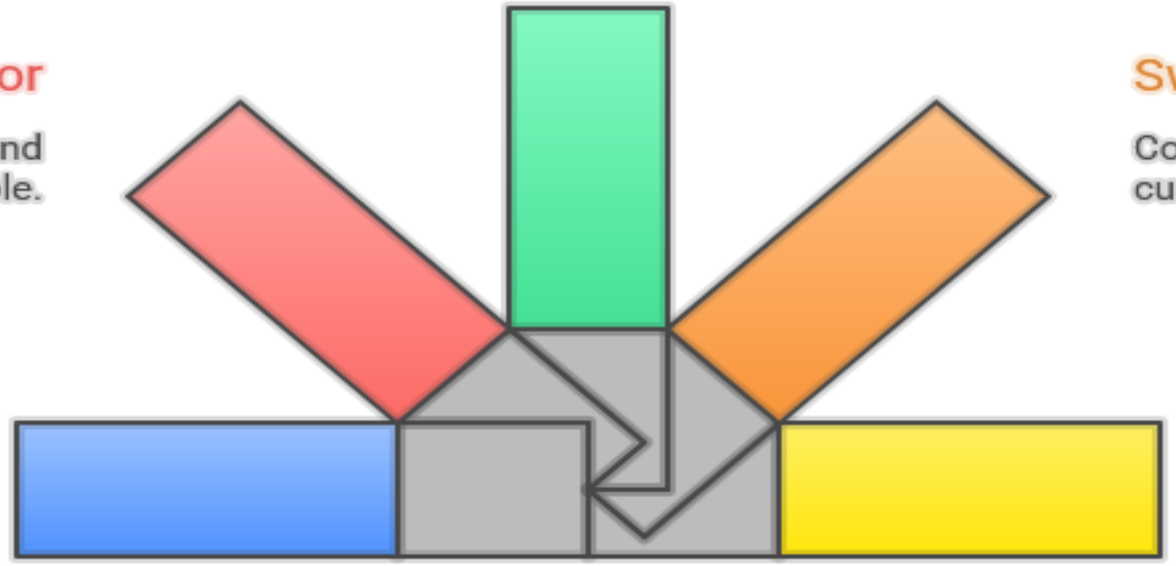
Smooths voltage ripple and acts as an open circuit in DC steady state.

Resistor

Prevents LED burnout and smooths voltage ripple.

Switch

Controls the flow of current in a circuit.



Inductor

Stores energy in a magnetic field and prevents LED burnout.

Battery

Provides a constant voltage source in a circuit.

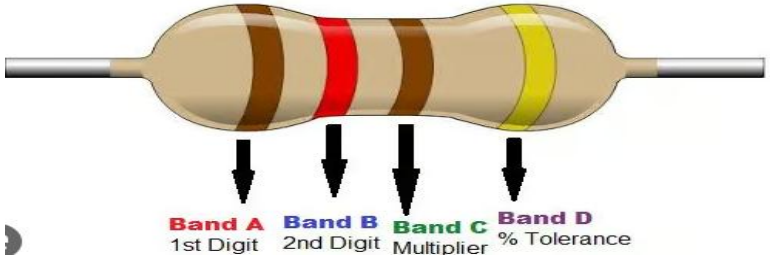
Activity - Quiz

Q: Identify the component symbol:

A) Capacitor

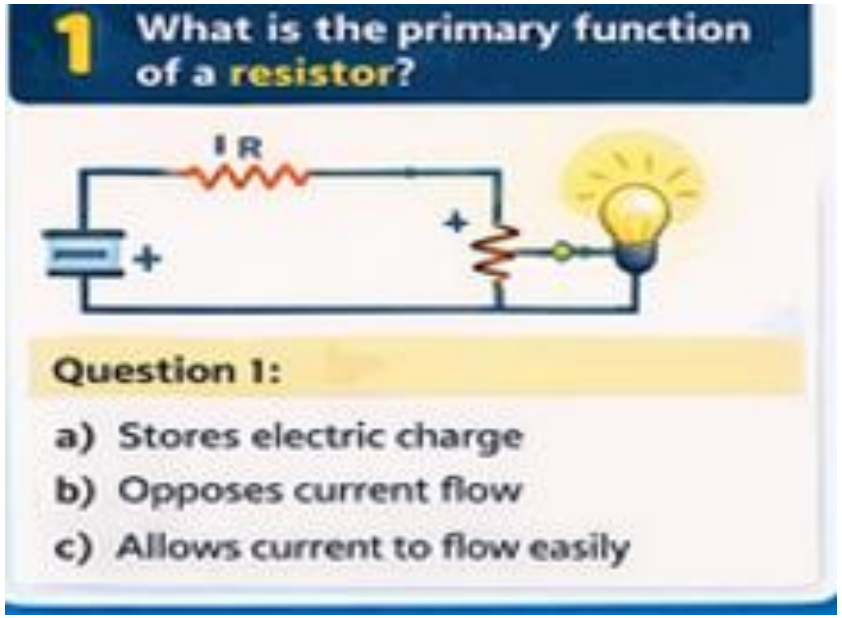
B) Resistor

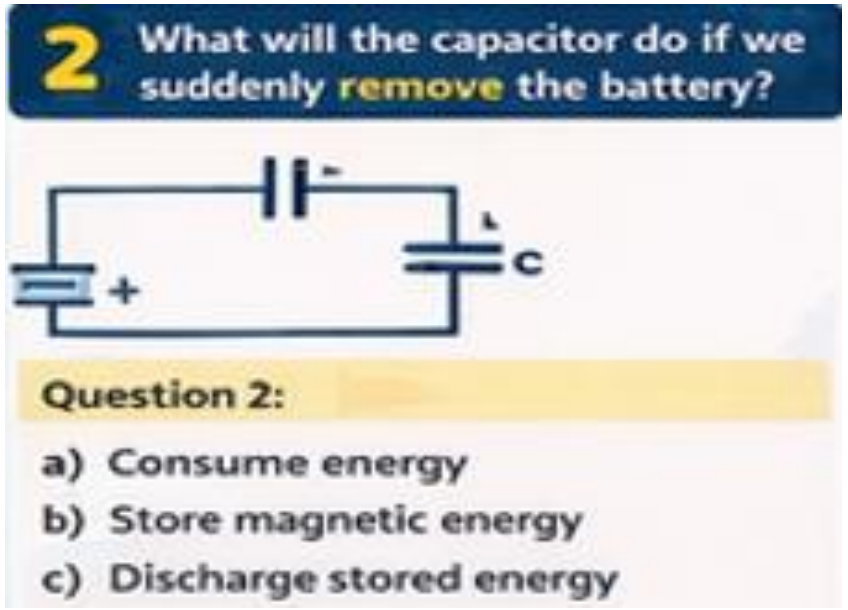
C) Inductor



B) Resistor

Activity - Quiz





Answer: b) Opposes current flow

Answer: c) Discharge stored energy

REFERENCE

- https://www.allaboutcircuits.com/textbook/direct-current/chpt-2/resistors
- https://archive.nptel.ac.in/content/storage2/courses/122104013/node4.html
- https://techweb.rohm.com/product/circuit-design/electric-circuit-design/2185

Thank you!