

A conceptual image showing a human hand holding a glowing blue butterfly above a metallic robotic hand. The background is dark with blue and purple lighting.

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# FUNDAMENTAL OF ELECTRICAL ENGINEERING

# Symbols, Abbreviations, Electrical Circuit, and its Elements



## 1. الرموز والاختصارات:

الكمية	الرمز	الوحدة	رمز الوحدة
المقاومة	R	أوم	$\Omega$
السعة	C	فاراد	F, $\mu$ F, pF
المحاثة	L	هنري	H
الممانعة	Z	أوم	$\Omega$
المقاومية	$\rho$	أوم متر	$\Omega - m$
الناقلية	$\sigma$	سيمنس/متر	S/m
الإدماجية	$\gamma$	سيمنس	S
التيار	I	أمبير	A, mA, $\mu$ A
الجهد	V	فولت	V, mV, KV
التردد	f	هرتز	Hz, KHz, MHz

# The Electrical Circuit and its Elements:

An electrical circuit or network is a collection of interconnected electrical elements arranged in such a way that a closed path is available for current to flow.

**The three basic circuit elements are:**

## Resistance (R):

. Represents energy dissipation in the form of heat or radiant energy

## Inductance (L):

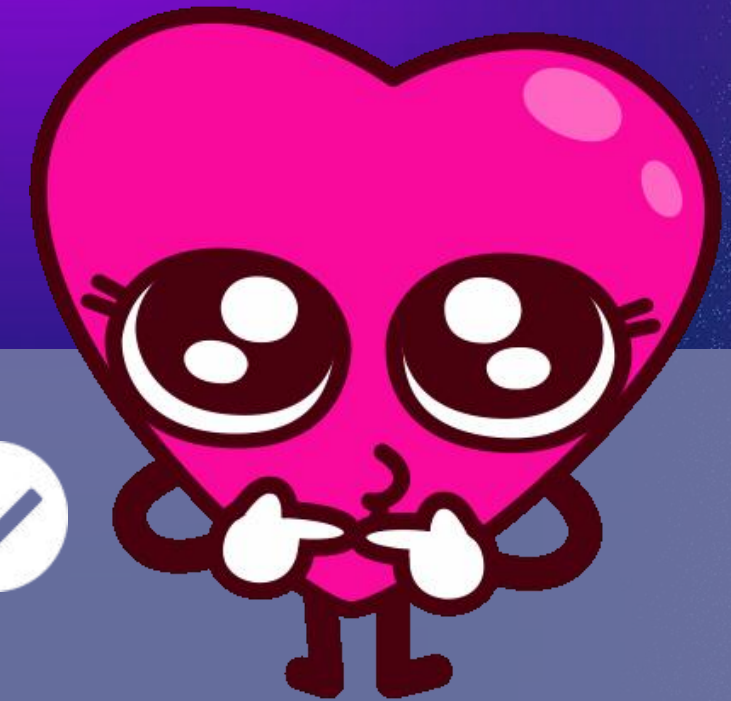
- Represents energy stored in a magnetic field and is measured in Henry (H).

## Capacitance (C):

- Represents energy stored in an electric field (due to charge storage) and is measured in Farad (F).



# 3. Classification of Elements:



**Linear Elements:** If the voltage-current relationship is a straight line (Ohm's Law applies).



**Nonlinear Elements:** If the voltage-current relationship is not linear.

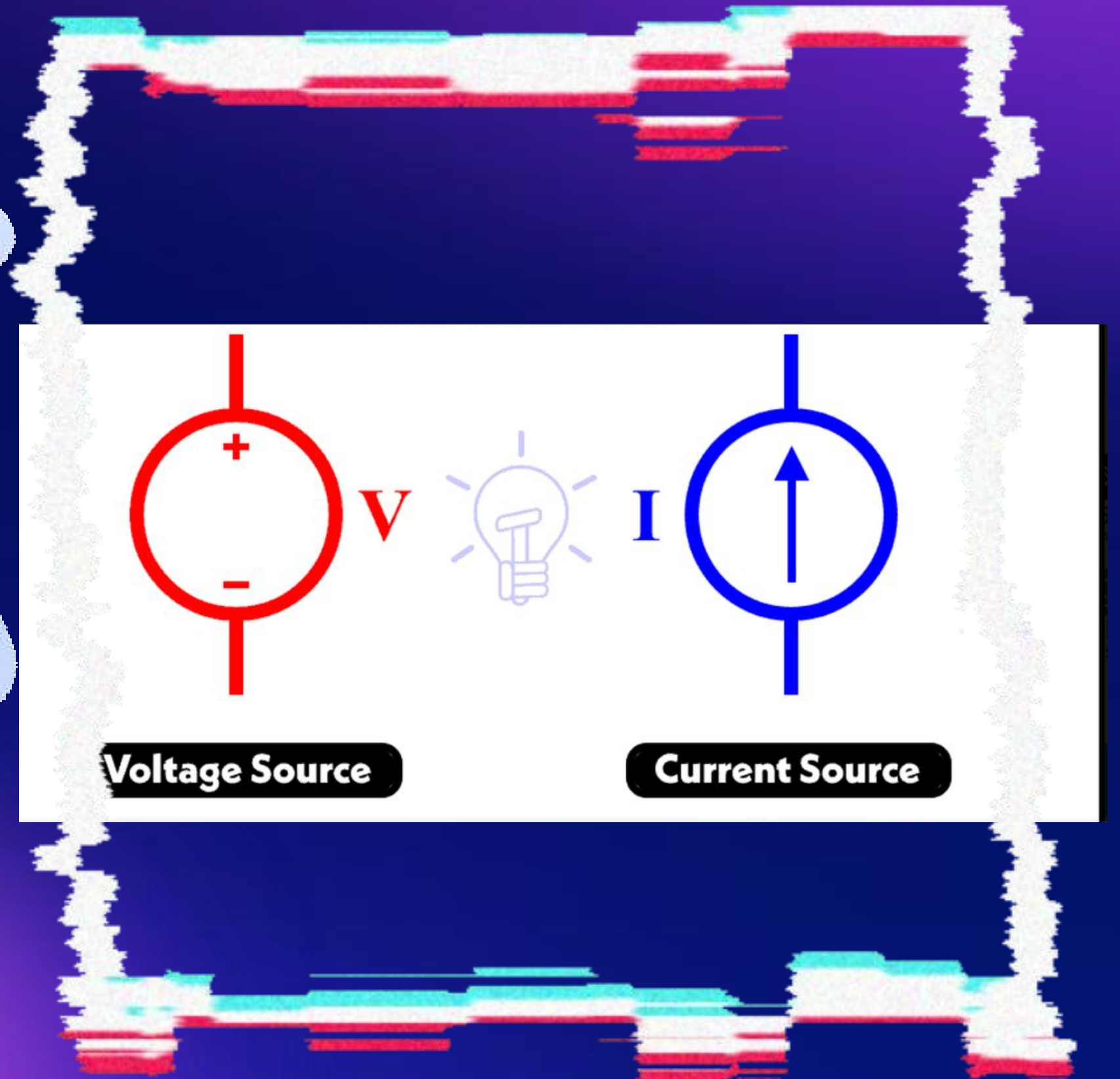


- **Passive Elements:** Elements that do not supply energy to the circuit, such as resistors, inductors, and capacitors.



**Active Elements:** Elements that provide energy, such as batteries and generators.

# 4. Voltage and Current Sources:



# Electrical sources are classified into two main types:

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## Independent Sources:

- **Independent Voltage Source:** A two-terminal device (like a battery or a generator) that maintains a constant voltage regardless of the current flowing through it.
  - **Independent Current Source:** A two-terminal device through which a constant current flows regardless of the voltage across it.
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## **Dependent (Controlled) Sources:**

- **Dependent Voltage Source:** A type of voltage source whose voltage depends on another voltage or current elsewhere in the circuit.
- **Dependent Current Source:** A current source whose current depends on the voltage or current elsewhere in the circuit.



# نشاط طلابي مهم جدا.....



يقدم الطالب مخطط بسيط يوضح فيه تصنيفات مصادر الغولطية والتيار علما ان هذا المخطط مطلوب ضمن الاختبارات ....



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