

# 1. Basic Terminology: Circuit Elements, Sign Conventions

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DC  constant magnitude  
unidirectional

Circuit: Interconnection of elements such that there is at least one source and one sink.  
Has a closed path for current flow

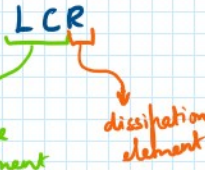
Network: Random interconnection of elements; need not have source, sink and/or closed path

## TERMINOLOGY

**Active element:** Element which supplies energy

Eg: Voltage sources, current sources

**Passive element:** Element which absorbs/stores energy

Eg:  LCR  
Storage element  
dissipation element

## Electric current:

Rate of flow of charges across cross section of a conductor

- Flows from higher potential to lower potential
- Units: Ampere (Coulomb/second)

## Potential difference

Energy required to move unit +ve charge from one terminal to another is PD  
between those two terminals

- Units: Volts (Joule/Coulomb)

## Electric power

Rate of absorption/delivery of electrical energy

Power given away  $\rightarrow$  negative power

Power absorbed  $\rightarrow$  positive power

- Units: Watts

## OHM'S LAW



At constant temp., potential difference across terminals of a conductor  $\propto$  current flowing through it

$$V \propto I$$

$$V = IR$$

$$R = \rho \frac{l}{A}$$

resistivity

Conductance  $G$  (measured in Siemens)

$$G = \frac{1}{R}$$

### SIGN CONVENTION

#### Active

Current leaves  
+ve terminal

- Rising potential  $\rightarrow$  +ve
  - Falling potential  $\rightarrow$  -ve
- } just a convention

#### Passive

Current enters  
+ve terminal

### IDEAL VOLTAGE SOURCE

Terminal voltage is independent of current through it

- No internal resistance  $\rightarrow$  no loss
- Current delivered depends on circuit

### IDEAL CURRENT SOURCE

Current is independent of voltage across it.

- Voltage across it depends on the load in the circuit connected.

