EEE141

Types of Electrical Circuits

Current : Current is defined as the flow of charged particles

$$I = \frac{Q}{T}$$

EMF : Electro-motive force (EMF) is defined as the work done per unit charge in a circuit

$$V = \frac{W}{Q}$$

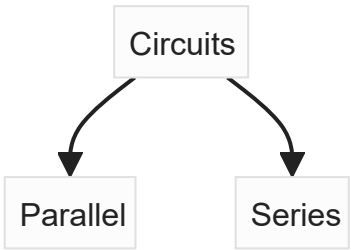
Resistance : Ratio of voltage and current passing through two points

$$R = \frac{V}{I}$$

A **branch** is a single
A **node** is the junction where multiple branches move

Types of circuits :

- Series : When elements carry the same current and share the same branch
- Parallel : When elements have the same voltage across them and connect to the same two nodes



Total resistance of a series circuit:

$$R_T = R_1 + R_2 + R_3 + \ldots + R_n$$

Total resistance of a parallel circuit:

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots + \frac{1}{R_n}$$

	Series	Parallel
Current	Constant across elements (Charge is conserved)	Split across junctions according to resistance
Voltage	Split across elements according to resistance	Constant across Branches (Energy is conserved)
Resistance	$R_T = R_1 + R_2 + R_3 + \ldots + R_n$	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots + \frac{1}{R_n}$

Power:

$$P = \frac{W}{T}; W = VQ$$

$$P = \frac{VQ}{T}$$

$$\therefore P = IV = I^2R = \frac{V^2}{R}$$

Kirchhoff's voltage law : Sum of potential differences in a closed loop will always equal zero

Voltage Divider formula:

$$V_x = R_x\frac{E}{R_T}$$