

## Electric Current (I)

The rate of flow of charge through any cross-section of a wire is called electric current flowing through it.

Electric current ( $I$ ) =  $q / t$ . Its SI unit is ampere (A).

The conventional direction of electric current is the direction of motion of positive charge.

The current is the same for all cross-sections of a conductor of non-uniform cross-section. Similar to the water flow, charge flows faster where the conductor is smaller in cross-section and slower where the conductor is larger in cross-section, so that charge rate remains unchanged.

If a charge  $q$  revolves in a circle with frequency  $f$ , the equivalent current,

$$i = qf$$

(In a metallic conductor current flows due to motion of free electrons while in electrolytes and ionized gases current flows due to electrons and positive ions.)

## Types of Electric Current

According to its magnitude and direction electric current is of two types

(i) **Direct Current (DC)** Its magnitude and direction do not change with time. A cell, battery or DC dynamo are the sources of direct current.

(ii) **Alternating Current (AC)** An electric current whose magnitude changes continuously and changes its direction periodically is called alternating current. AC dynamo is source of alternating current.

## Current Density

The electric current flowing per unit area of cross-section of conductor is called current density.

$$\text{Current density (J)} = I / A$$

Its SI unit is ampere metre<sup>-2</sup> and dimensional formula is  $[AT^{-2}]$ .

It is a vector quantity and its direction is in the direction of motion positive charge or in the direction of flow of current.

## Thermal Velocity of Free Electrons

# Notes Class 12th Physics Chapter Current Electricity

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