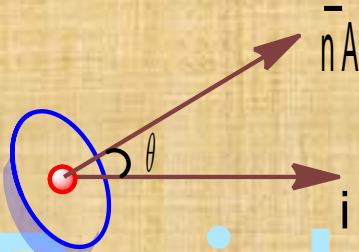
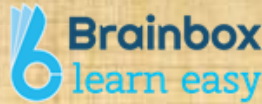


Chapter Three

CURRENT ELECTRICITY

Current Density (J):

Current density is defined as vector having magnitude equal to current per unit area surrounding that point and normal to direction of charge flow.



$$J = i/A$$

Then,

$$\text{Or } I = JA \cos \theta$$

$$I = \int \vec{J} \cdot d\vec{s}$$

$$J = \sigma E = E / \rho$$

$$\text{Units: amp/n}^2$$

Drift Velocity:

The average velocity of an electron in a direction opposite to field when an electric field is applied to the metallic conductor is called Drift Velocity (V_d).

$$i = nAV_d e$$

(or)

$$J = neV_d$$

(or)

$$V_d = \frac{i}{nAe} = J / ne$$

V_d is in the order of 10^{-4} m/s.

Relaxation time (T):

The average time between two successive collisions suffered by electrons inside a conductor when electric field is applied.

It is in the order of 10^{-4} sec.

Mobility:

Average drift velocity per unit electric field.

$$\mu = \frac{V_d}{E}$$

Units: $\text{m}^2\text{s}^{-1} \text{ volt}^{-1}$

