2310040036

D.Lahari

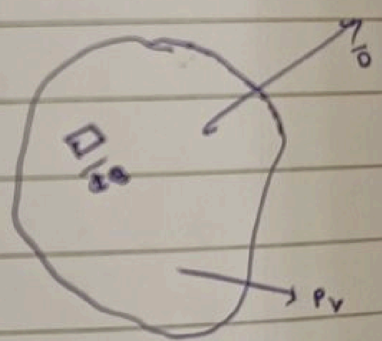
ALM CO-1

- State and Explain maxwell's Equations.
  - i) Gauss law for electric field & magnetic field
  - ii) Ampere's circuit law
  - iii) Faraday's law

i) Gauss law for electric field:-

Total displacement coming out of close surface is equal to net charge enclosed by closed surface. or the volume.

Total displacement in closed surface = Net charge in volume



$$\psi = \oint \vec{D}\cdot\vec{ds} = Q_{en}$$

Proof:-

As per gauss's law

$$\oint \vec{D}\cdot\vec{ds} = Q \quad — ①$$

For volume charge distribution ρv

$$Q = \int \rho v \, dv \quad — ②$$

from eq ① & eq ②

$$\boxed{\oint \vec{D}\cdot\vec{ds} = \int \rho v \, dv} \longrightarrow \text{Integral form}$$

As per divergence theorem,

$$\oint \vec{A} \cdot d\vec{s} = \int \vec{\nabla} \cdot \vec{A} \, dv \quad \text{--- (3)}$$

from eq (3) & integral form

$$\int \vec{\nabla} \cdot \vec{D} \, dv = \int \rho_v \, dv$$

$$\boxed{\vec{\nabla} \cdot \vec{D} = \rho_v} \rightarrow \text{Differential form}$$

⇒ Gauss's law for magnetic flux:

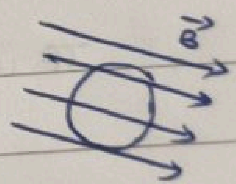
For closed surface, magnetic flux is zero.

$$\boxed{\oint \vec{B} \cdot d\vec{s} = 0} \rightarrow \text{Integral form}$$

Magnetic field always stays in closed loop.

~~Entering mag flux = -ve~~

~~Entering mag flux = +ve~~



As per Divergence theorem,

$$\oint \vec{B} \cdot d\vec{s} = \int (\nabla \cdot \vec{B}) \, dv = 0$$

$$\boxed{\nabla \cdot \vec{B} = 0} \rightarrow \text{Differential form}$$