

Giridhar Kumar.

Date
13/02/20

SEM-IV Unit-1 paper-06.

CLASSMATE
Date :
Page :

Important Questions and their Answer

Q. ②

Derive the equation of continuity.

Ans:-

∴ Total charge inside volume

$$Q = \int_V \rho dv$$

Rate of change of charge, $\frac{dQ}{dt}$

Current leaving surface

$$\oint_S \vec{J} \cdot d\vec{S}$$

By conservation

$$\frac{d}{dt} \int_V \rho dv = - \oint_S \vec{J} \cdot d\vec{S}$$

Using divergence theorem

$$\int_V \left(\frac{\partial \rho}{\partial t} + \nabla \cdot \vec{J} \right) dv = 0$$

Since Volume arbitrary

$$\text{So, } \left[\nabla \cdot \vec{J} + \frac{\partial \rho}{\partial t} = 0 \right] \text{ This is eqn of continuity.}$$

Q. ②

State and explain Lorentz force.

Ans:-

Lorentz force on a charge

$$\vec{F} = q(\vec{E} + \vec{v} \times \vec{B})$$

- Electric field change speed.
- Magnetic field changes direction.
- Magnetic force does ~~not~~ no work.