

Question bank for B Sc MPCs V semester

Subject : Physics

Paper: 5

Subject Title: Electromagnetism

UNIT: I (Electrostatics)

Short Answer Type::

1. Obtain differential form of Gauss's law in electrostatics.
2. Find electric field due to an infinite long charge distribution.
3. Find the electric field due to infinite sheet of charge.
4. Define potential. Explain about equipotential surface.
5. Explain conservative nature of electric field (or) $\text{curl } E = 0$.
6. Obtain expression for potential energy of system of charges.
7. Show that $E = -\text{grad } V$ (or) show that intensity is negative gradient of potential.
8. Obtain potential for spherical charge distribution from electric field.
9. Explain electric flux and flux density.

Essay Answer Type::

1. a) State and prove Gauss law in electrostatics.
b) Obtain Gauss law in vector form.
2. Obtain electric field due to uniformly charged sphere
Case (i): inside and Case (ii): outside the sphere.
3. Obtain electric field due to charged cylinder.
4. Obtain expression for potential due to spherical conductor (spherical shell).
5. Obtain expression for energy density in electric field.

UNIT: II (Magnetostatics)

Short Answer Type::

1. Obtain force on conductor carrying current in field.
2. Obtain expression for force between two parallel conductors carrying currents.
3. Obtain torque acting on current carrying coil in field.
4. Obtain expression for curl of B and divergence of B .
5. State and explain Biot- Savart's Law.

6. State Ampere's law and obtain its vector form.
7. Distinguish between charge on electric and magnetic field.
8. Obtain expression for energy density in magnetic field.
9. Explain damping and correction in moving coil galvanometer.
10. Write applications of ampere's law.

Essay Answer Type::

1. a) Explain Biot-Savart's Law.
b) Derive the expression for magnetic induction due to a straight conductor carrying current.
2. Derive expression for magnetic induction due to circular coil carrying Current.
3. Obtain magnetic induction due to Solenoid.
4. Explain Ampere's law and its applications.
5. Explain about construction and theory of moving coil ballistic galvanometer.
6. Explain about force on a moving charge in magnetic field and from this obtain expression for frequency.

UNIT : III (Electromagnetic Induction)

Short Answer Type ::

1. State and explain Lenz's Law.
2. State Faraday's I and II law. Obtain its integral form.
3. Obtain differential form of Faraday's law.
4. State four basic laws of electricity and magnetism.
5. Write four Maxwell's equation in both integral and differential form.
6. Explain concept of displacement current.
7. Obtain expression for self inductance of solenoid.
8. Obtain expression for magnetic energy stored in an inductor.

Essay Answer Type::

1. a) State four basic laws in electricity and magnetism.
b) Obtain four Maxwell's equations in integral and differential form.
2. Explain the concept of displacement current. Explain how Maxwell modified Ampere's law.
3. Derive expression for equation of continuity.

Unit – IV (Electromagnetic waves)

Short Answer Type::

1. Explain about Brewster law.
2. Explain transverse nature of E.M waves.
3. Explain production and detection of E.M waves.
4. Explain perpendicular polarization.
5. Explain the concept of parallel polarization.
6. What is the concept of plane E.M wave.
7. What are the boundary conditions when wave is incident on boundary line.

Essay Answer Type::

1. Obtain Maxwell's wave equations in terms of electric and magnetic fields in free space and find velocity of wave.
2. Obtain Maxwell's wave equations.
3. Explain types of polarizations.
4. Obtain expression for reflection and transmission coefficient when wave is incident normally on boundary line separating two media.
5. Obtain reflection and transmission coefficient for oblique incidence of wave in dielectric medium.

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