

M.Sc.(Phy.) Semester - 1 (CBCS) Examination**Nov/Dec - 2022 [NEW COURSE]****Electrodynamics and Plasma Physics(Core (New))****Time: 2:30 Hours****Marks: 70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

Q.1 Answer the followings (Any Seven). 14

1. What are the characteristics of electromagnetic wave?
2. Write mathematical expression for an operator $\vec{\nabla}$, gradient of scalar function (ϕ).
3. Show that velocity of light $c = (\mu_0 \epsilon_0)^{-\frac{1}{2}}$.
4. What are the characteristics of electromagnetic waves?
5. Define: skin depth of electromagnetic waves.
6. What are monochromatic plane waves.
7. Explain displacement current in electrodynamics.
8. What are the principal techniques used for plasma confinement?
9. What are the different types of plasma instability?
10. What is the meaning of collective behavior of plasma?

Q.2 Answer the followings (Any two) 14

1. Explain: Boundary conditions for Maxwell's equations in electrodynamics.
2. Describe electrodynamics before and after Maxwell and prove Maxwell's modifications in Ampere's law.
3. Discuss in detail: The skin depth of conduction material.

Q.3 Answer the followings 14

1. Derive Maxwell's equation for the materials that are subject to electric and magnetic polarizations.
2. Derive expressions for Lienard-Wiechert potentials for a moving point charge on a specific trajectory.

OR

Q.3 Answer the followings 14

1. Derive equation for motion of charge particle in (i) uniform magnetic field and (ii) presence of electric and magnetic fields.
2. Explain: retarded potentials.

Q.4 Answer the followings (Any two) 14

1. Describe plasma oscillations and Faraday rotation.
2. Explain the applications of plasma in various fields.
3. Describe the motion of a charged particle in non-uniform magnetic and electric field.

Q.5 Answer the followings (Any two) 14

1. Explain: Phase velocity and Group velocity.
2. Derive an equation for dielectric constant of plasma
3. Explain: Hydro Magnetic waves.
4. Explain: Magneto sonic or Alfvén waves.
