

B.Sc. Semester - 6 (CBCS) Examination
March/April-2025 (NEW COURSE)
Electrodynamics & Relativity (Core (New))

Time: 2:30 Hours**Marks: 70****Instructions:**

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

-
- Que-1(A) Answer the following questions (any two) (10)**
1. Derive Gauss's Law for dielectrics.
 2. Derive Bound charge equation.
 3. Obtain the expressions of torque and force acting on a magnetic dipole when placed in a non-uniform magnetic field.
- Que-1(B) Answer the following questions (any one) (04)**
1. Derive relation between susceptibility, permittivity and dielectric constant.
 2. Derive relation between susceptibility and permeability.
- Que-2(A) Answer the following questions (any two) (10)**
1. Derive the expression of Poynting's theorem in differential version.
 2. Write Maxwell's equations and Maxwell's modification in ampere's law.
 3. Explain energy stored in magnetic field
- Que-2(B) Answer the following questions (any one) (04)**
1. Explain newton's third law in electrodynamics.
 2. Write a note on motional emf.
- Que-3(A) Answer the following questions (any two) (10)**
1. Explain polarization and derive wave equation for E and B.
 2. Derive the boundary conditions: reflection and Transmission.
 3. Derive wave equation.
- Que-3(B) Answer the following questions (any one) (04)**
1. $f_1 = A \sin[b(z - vt)]$ and $f_2 = A e^{-b(z-vt)^2}$, prove both functions are valid or invalid wave function.
 2. Explain sinusoidal wave.
- Que-4(A) Answer the following questions (any two) (10)**
1. Explain Lienard-Wiechert potentials.
 2. Explain Lorentz gauge and Coulomb gauge.
 3. Explain Retarded Potential.
- Que-4(B) Answer the following questions (any one) (04)**
1. Explain field of a moving point charge.
 2. Explain scalar and vector potential.
- Que-5(A) Answer the following questions (any two) (10)**
1. Explain the structure of space time.
 2. Describe barn and ladder paradox.
 3. Obtain expression of proper time and velocity.
- Que-5(B) Answer the following questions (any one) (04)**
1. Describe Lorentz transformation.
 2. Explain relativistic energy and momentum.
