

B.Sc. Semester - 6 (CBCS) Examination
March/April-2023 (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.

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- Q.1(A) Answer the following questions. (Any Two) (10)**
1. Discuss bound charge.
 2. Explain linear dielectrics and obtain relationship involving electric displacement.
 3. Obtain the expressions of torque and force acting on a magnetic dipole when placed in a non-uniform magnetic field.
- Q.1(B) Answer the following questions. (Any One) (04)**
1. Derive relation between susceptibility, permittivity and dielectric constant.
 2. Explain effect of a magnetic field on atomic orbits.
- Q.2(A) Answer the following questions. (Any Two) (10)**
1. Derive the expression of Poynting's theorem in differential version.
 2. Explain Maxwell's modification in Ampere's law.
 3. Explain energy stored in magnetic field.
- Q.2(B) Answer the following questions. (Any One) (04)**
1. Discuss electrodynamics before Maxwell.
 2. Write a note on motional emf.
- Q.3(A) Answer the following questions. (Any Two) (10)**
1. Derive the expression of wave equation.
 2. Derive the boundary conditions: Reflection and Transmission.
 3. Explain polarization and derive wave equation for E and B.
- Q.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. Write a note on monochromatic plane waves.
- Q.4(A) Answer the following questions. (Any Two) (10)**
1. Explain Lienard-Wiechert potential.
 2. Explain Lorentz gauge and Coulomb gauge.
 3. Explain Retarded Potential.
- Q.4(B) Answer the following questions. (Any One) (04)**
1. Derive the expression for Jefimenko's equation.
 2. Explain scalar and vector potential.
- Q.5(A) Answer the following questions. (Any Two) (10)**
1. Explain twin paradox.
 2. Describe Lorentz transformation.
 3. Obtain expression of proper time and velocity.
- Q.5(B) Answer the following questions. (Any One) (04)**
1. Describe Lorentz contraction.
 2. Explain time dilation in detail.
