

B.Sc. Semester - 6 (CBCS) Examination
April/May-2022 (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. Show that the potential (electric field) produced by a polarized object is equal to the potential produced by an object with surface charge density and volume charge density.
 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 magnetic field.
- Q.1(B) **Answer the following questions (any one)** (04)
1. Explain electric displacement and obtain expression for Gauss's law.
 2. Explain effect of a magnetic field on atomic orbits.
- Q.2(A) **Answer the following questions (any two)** (10)
1. Derive the expression for energy stored in magnetic fields.
 2. Derive the expression of Poynting's theorem in differential version.
 3. Explain how Maxwell fixed Ampere's law.
- Q.2(B) **Answer the following questions (any one)** (04)
1. State and explain Faraday's law.
 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. Explain all terms in sinusoidal wave equation.
 3. Derive the boundary conditions for reflection and Transmission.
- Q.3(B) **Answer the following questions (any one)** (04)
1. Derive the wave equation for E and B.
 2. Write a note on monochromatic plane waves.
- Q.4(A) **Answer the following questions (any two)** (10)
1. Explain Retarded Potential.
 2. Explain Lorentz gauge and Coulomb gauge.
 3. Describe Gauge transformation.
- Q.4(B) **Answer the following questions (any one)** (04)
1. Derive the expression for Jefimenko's equation.
 2. Obtain fields of a moving point charge.
- Q.5(A) **Answer the following questions (any two)** (10)
1. Explain Einstein's postulates.
 2. Describe Lorentz transformation.
 3. Obtain expression of relativistic energy and momentum.
- Q.5(B) **Answer the following questions (any one)** (04)
1. Describe proper time and proper velocity.
 2. Explain time dilation in detail.
