

B.Sc. Semester - 5 (CBCS) Examination
Oct/Nov.- 2024 (Old Course)
ELECTRODYNAMICS AND RELATIVITY (CORE)

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

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

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- Que.1(A) Answer the following questions. (Any one out of Two) (07)
1. Explain Inductance.
 2. Explain the Poynting Theorem.
- Que.1(B) Answer the following questions. (Any one out of Two) (04)
1. Explain modification in Ampere's Law
 2. Explain Maxwell's equation for Electromagnetic.
- Que.1(C) Answer the following questions. (Attempt any Three out of five) (03)
1. What is the Continuity Equation?
 2. How much energy is stored in the Magnetic Field?
 3. Write: Neumann Formula.
 4. Define Current Density.
 5. What is the SI Unit of Charge?
- Que.2(A) Answer the following questions. (Any one out of Two) (07)
1. Explain Boundary Conditions: Reflection and Transmission.
 2. Explain Electromagnetic Waves in a Vacuum.
- Que.2(B) Answer the following questions. (Any one out of Two) (04)
1. Explain the Monochromatic Plane Wave.
 2. Explain Polarization.
- Que.2(C) Answer the following questions. (Attempt any Three out of five) (03)
1. What is a Wave?
 2. The velocity of Electromagnetic waves in a vacuum is _____.
 3. _____ wave requires a medium for propagation.
 4. Define Polarization.
 5. Define Transverse Wave.
- Que.3(A) Answer the following questions. (Any one out of Two) (07)
1. Explain Scalar and Vector Potential.
 2. Derive Jefimenko's Equations.
- Que.3(B) Answer the following questions. (Any one out of Two) (04)
1. Explain Lienard-Wiechert Potential.
 2. Explain the Coulomb Gauge.
- Que.3(C) Answer the following questions. (Attempt any Three out of five) (03)
1. Define Retarded Time.
 2. When the Divergence of any vector becomes zero then we can represent that vector in the form of the curl of the _____ Potential. (Vector, Scalar)
 3. Write Lorenz Gauge.
 4. Define Vector Potential.
 5. The curl of an electric field is Zero therefore, an electric field can be a form of negative gradient of a _____ Potential. (vector, Scalar)

- Que.4(A) Answer the following questions. (Any one out of Two) (07)
1. Find vector and scalar potential of Electric Dipole Radiation.
 2. Explain Radiation Reaction.
- Que.4(B) Answer the following questions. (Any one out of Two) (04)
1. Explain the Blueness of the sky and Redness of the Sunset.
 2. Drive the Abraham-Lorentz Formula for the Radiation Force.
- Que.4(C) Answer the following questions. (Attempt any Three out of five) (03)
1. "Only accelerated charge or changing current cannot produce radiation" (True or False)
 2. What is Dipole Radiation?
 3. What is a Magnetic Dipole?
 4. Radiation means _____ flow of energy away from the source.
 5. Draw a Physical Dipole and a Perfect Dipole.
- Que.5(A) Answer the following questions. (Any one out of Two) (07)
1. Explain the Lorentz Transformations.
 2. Discuss Relativistic Energy and Momentum.
- Que.5(B) Answer the following questions. (Any one out of Two) (04)
1. Explain the Relativity of Simultaneity.
 2. Write a short note on Minkowski's Force.
- Que.5(C) Answer the following questions. (Attempt any Three out of five) (03)
1. Define postulates of Special Relativity.
 2. According to Lorentz Contraction, the moving object is shortened in all dimensions.
(True or False)
 3. According to Relativity, the moving clock runs _____.
 4. If the velocity of the particle is increasing then the mass will be _____.
 5. Write a Relativistic Energy Mass Equivalent Equation.
