

B.Sc. Semester - 5 (Remedial) (CBCS) Examination**February/March. -2020****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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Q.1 UNIT-1**Q.1 (A) Answer the following: (Any one out of two) (07)**

1. Discuss in detail the Poynting's theorem
2. Discuss in detail the conservation of Angular momentum in Electrodynamics.

Q.1 (B) Attempt any one (out of two) (04)

- (1) Explain the Faraday's experiment outcomes.
- (2) Explain the Maxwell's modification to the Ampere's law in Electrodynamics.

Q.1 (C) Attempt any three (out of five) (03)

- (1) Write the integral form of Ampere's law without the Maxwell's correction.
- (2) The equation $\vec{\nabla} \times \vec{E} = 0$ is no longer valid in Electrodynamics. True or False?
- (3) Write the mathematical form of Poynting's vector.
- (4) What is the unit of Self inductance?
- (5) Write the mathematical form of divergence of Magnetic field.

Q.2 UNIT-2**Q.2 (A) Answer the following: (Any one out of two) (07)**

1. Explain Polarization of Electromagnetic waves.
2. Write detailed note about the energy and momentum in Electromagnetic waves.

Q.2 (B) Attempt any one (out of two) (04)

- (1) Explain the wave equation and sinusoidal waves.
- (2) Explain Monochromatic plane waves.

Q.2 (C) Attempt any three (out of five) (03)

- (1) Define the wave vector.
- (2) Write the three dimensional form of wave equation.
- (3) The frequency of ultraviolet waves is higher than Infrared waves. True or False?
- (4) What is the change in the amplitude of plane parallel waves travelling in one direction in non-dispersive medium.
- (5) Write equation relating frequency, wavelength of the Electromagnetic wave in free space.

Q.3 UNIT-3**Q.3 (A) Answer the following: (Any one out of two) (07)**

1. Explain in detail the Electric and Magnetic fields of moving charge with constant velocity.
2. Explain in detail the Jefimenko's equations.

Q.3 (B) Attempt any one (out of two) (04)

- (1) Explain Retarded potentials.
- (2) Explain the Gauge transformations.

Q.3 (C) Attempt any three (out of five) (03)

- (1) Define $\vec{E}$ in form of V and $\vec{A}$ in Electrodynamics
- (2) According to the Lienard-Wiechert potentials for moving point charge, how the vector and scalar potentials are related? Write the equation.
- (3) Give analogues equation of poisson's equation for scalar field V using Lorentz gauge.
- (4) What is retarded time?
- (5) What is retarded electric potential in electrodynamics

Q.4 UNIT-4

Q.4 (A) Answer the following: (Any one out of two) (07)

1. Explain in detail the Electric dipole radiation.
2. Explain in detail then magnetic dipole radiation.

Q.4 (B) Attempt any one (out of two) (04)

- (1) Explain the Blueness of sky and redness of sunset on the basis of radiation theory.
- (2) Explain radiation reaction.

Q.4 (C) Attempt any three (out of five) (03)

- (1) Define an electric dipole.
- (2) Define a magnetic dipole.
- (3) Equate the electric and magnetic fields of electric dipole radiation.
- (4) The poynting's vector coming from the electric dipole depends upon the orientation of dipole. True or False?
- (5) Give the equation of average total power radiated by electric dipole.

Q.5 UNIT-5

Q.5 (A) Answer the following: (Any one out of two) (07)

1. Give detailed note on Relativistic momentum and Relativistic energy.
2. Give detailed note on special theory of relativity and Einstein postulates of it.

Q.5 (B) Attempt any one (out of two) (04)

- (1) Discuss the Relativistic kinematics
- (2) Discuss the Proper time and Proper velocity

Q.5 (C) Attempt any three (out of five) (03)

- (1) What is rest mass? Explain in brief.
- (2) Explain the Newtonian velocity addition rule.
- (3) Constancy of the speed of light is a character of space-time geometry. True or False?
- (4) Explain Lorentz contraction.
- (5) Explain time dilation.
