

B.Sc. Semester - 5 (Remedial) (CBCS) Examination

Feb/Mar. -2021 (OLD COURSE)

ELECTRODYNAMICS AND RELATIVITY(CORE)

Time: 1:30 Hours

Marks: 42

Instructions:

1. Figures to the right indicate marks.
2. There are five questions in the question paper.
3. Answer any three of the following questions.

- 1(a) Answer the following question (any one). (7)
- (1) discuss: Energy in magnetic field.
 - (2) Explain Maxwell's stress tensor.
- 1(b) Answer the following question (any one). (4)
- (1) Explain motional emf and prove flux rule..
 - (2) Explain: Newton's third law in electrodynamics.
- 1(c) Answer the following question (any three). (3)
- (1) Give the SI unit of electric charge.
 - (2) Write Neumann formula.
 - (3) Write an equation of Ampere's law in differential form.
 - (4) Give the SI unit of current density.
 - (5) In electromagnetic field, the angular momentum, L_{em} =
- 2(a) Answer the following question (any one). (7)
- (1) Derive wave equation.
 - (2) Explain boundary conditions of electromagnetic waves for reflection and transmission.
- 2(b) Answer the following question (any one). (4)
- (1) Write a short note on sinusoidal wave.
 - (2) Explain polarization.
- 2(c) Answer the following question (any three). (3)
- (1) What is wave?
 - (2) Define intensity.
 - (3) is the distance by which maxima is "delayed".
 - (4) Traveling speed of electromagnetic waves in empty space is, v =m/s.
 - (5) The real amplitudes of electromagnetic waves are related by equation, B_0 =
- 3(a) Answer the following question (any one). (7)
- (1) Write a note on retarded potentials.
 - (2) Write a note on Lienard-Wiechert potentials.
- 3(b) Answer the following question (any one). (4)
- (1) Explain Coulomb gauge.
 - (2) Explain Lorentz gauge.
- 3(c) Answer the following question (any three). (3)
- (1) $\nabla \times B$ =
 - (2) In Lorentz gauge $\nabla \times A$ =
 - (3) $\nabla^2 - \mu_0 \epsilon_0 \frac{\partial^2}{\partial t^2} \equiv$
 - (4) The curl of gradient of any scalar function is
 - (5) Write equation of advanced time.
- 4(a) Answer the following question (any one). (7)
- (1) Derive the mathematical expression of the total power radiated by an oscillating electric dipole.
 - (2) Explain the Lienard's generalization of Larmor formula.

4(b) Answer the following question (any one).

(4)

- (1) Explain the reason behind the blueness of the sky and redness of the sunset.
- (2) Derive the Abraham-Lorentz formula by explaining the radiation reaction.

4(c) Answer the following question (any three).

(3)

- (1) Whenaccelerate, their fields can transport energy irreversibly out to infinity.
- (2) When a high speed electron hits a metal target it rapidly decelerates, giving off what is called.....
- (3) An electric dipole consists of two like charges. True/False
- (4) $P_{\text{electric}} / P_{\text{magnetic}} = ?$
- (5) In the case of point charge, the radiated power.....as the particle velocity increases.

5(a) Answer the following question (any one).

(7)

- (1) Write a note on Galilean Lorentz transformations.
- (2) Write a note on relativistic dynamics.

5(b) Answer the following question (any one).

(4)

- (1) Explain time dilation.
- (2) Obtain expression for Einstein's velocity addition rule.

5(c) Answer the following question (any three).

(3)

- (1) Write the equation of time dilation.
- (2) Moving clocks run
- (3) Moving objects are
- (4) Write an equation for relativistic energy.
- (5) Which dimension of an object does not contract?
