



K21P 0541

Reg. No. :

Name :

**First Semester M.Sc. Degree (CBSS – Reg./Suppl. (Including Mercy
Chance)/Imp.) Examination, October 2020
(2014 Admission Onwards)**

PHYSICS

PHY1C03 : Electrodynamics

Time : 3 Hours

Max. Marks : 60

SECTION – A

Answer both questions either **a** or **b**. **Each** question carries **12** marks.

- I. a) Write Maxwell's equations for free space. Hence obtain an expression for plane electromagnetic wave. Discuss the orthogonality of \vec{E} , \vec{B} and \vec{K} vector.

OR

- b) Explain Brewster's angle. Describe the method of determining the refractive index of a material using Brewster's angle.
- II. a) Explain the concept of retarded potential. Derive the Lienard-Wiechart potentials.

OR

- b) Explain radiation damping and radiation reaction. Obtain the Abraham-Lorentz formula. (2×12=24)

SECTION – B

Answer **any four** questions. Question **(a)** carries **1** mark, **(b)** carries **3** marks, **(c)** carries **5** marks.

- III. a) What is Ampere's law ?
b) Explain what you understand by magnetic monopoles.
c) Explain the law using the example of a magnetic field of current loops.

P.T.O.



- Reg. No. :
- Name :
- IV. a) State Poynting's theorem.
 b) What is the significance of the Poynting's vector ?
 c) Derive the Poynting theorem.
- V. a) What is a wave guide ?
 b) For a rectangular wave guide with a wall separation of 0.03m and desired frequency of operation of 6 GHz. Calculate the cut off frequency and cut off wavelength.
 c) Explain the TE and TM mode of propagation.
- VI. a) What is a Hertzian dipole ?
 b) Explain radiation resistance of a Hertzian dipole antenna.
 c) Discuss Magnetic dipole radiation and arrive at the equation for magnetic dipole radiation.
- VII. a) Give the Lorentz transformation equations.
 b) Prove that Lorentz transformations are orthogonal.
 c) Show that $\vec{E} \cdot \vec{B}$ and $E^2 - C^2 B^2$ are invariant under Lorentz transformations.
- VIII. a) What is Tensor ?
 b) What is a contravariant tensor ?
 c) Explain the physical significance of Tensors. **(4×9=36)**

SECTION - B