

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)**

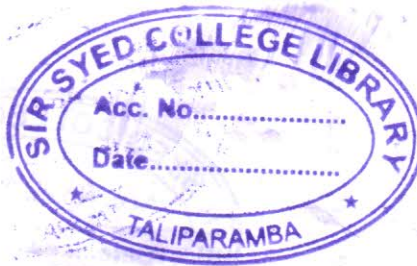
SECTION – B

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.

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- 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)