

S-495

Total Pages : 3

Roll No.

MSCPH-508

Electrodynamics

M.Sc. Physics (MSCPH)

2nd Semester Examination, 2022 (Dec.)

Time : 2 Hours]

Max. Marks : 70

Note : This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION-A

(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. Obtain the general expression for electric and magnetic field components for an EM wave propagating along the z-axis of a waveguide. Hence derive an expression for the cut off wavelength for a TE mode of propagation in a rectangular waveguide.

2. Derive an expression for $F_{\mu\nu}$, the electromagnetic field tensor in the covariant form. Also find the contravariant form of the electromagnetic field tensor.
3. Explain retarded potentials. Find the expressions for Lienard-Wiechert potentials.
4. Derive an expression for the power radiated by a point charge in motion.
5. Explain the phenomena of reflection at a conducting surface using suitable boundary conditions on the Maxwell's equations.

SECTION-B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. Obtain the differential form of Gauss's law from the integral form.
2. For volume currents, show that $\nabla \cdot \mathbf{B} = 0$.
3. What is a gauge transformation? Give an example.

4. What is skin depth? How it is related to the attenuation constant?
 5. Distinguish between phase velocity and group velocity.
 6. What is meant by electric dipole radiation?
 7. Write down the Lorentz transformation of a four vector.
 8. What are the boundary conditions on \mathbf{E} and \mathbf{B} for a wave guide?
-

