

A-0591

Total Pages : 3

Roll No.

MSCPH-508

M.Sc. PHYSICS (MSCPH)

(Electrodynamics)

2nd Semester Examination, Session December 2024

Time : 2:00 Hrs.

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. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.***

Section-A

Long Answer Type Questions **2×19=38**

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.

1. What is the meaning of boundary conditions ? Explain first and second uniqueness theorems.
2. Find the magnetic field a distance s from a long straight wire carrying a steady current I . Also find the expression of magnetic force acting between two current carrying parallel wires.
3. What is magnetic vector potential ? Express Ampere's circuital law in terms of magnetic vector potential.
4. Derive an expression for the energy stored in magnetic field. Compare the expressions of energy stored in magnetic and electric field.
5. Establish Poynting theorem. Discuss physical interpretation of each term of this theorem.

Section–B

Short Answer Type Questions 4×8=32

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.

1. Find the electric field a distance z above the midpoint of a straight-line segment of length $2L$ that carries a uniform line charge λ .

2. Find the energy of a uniformly charged spherical shell of total charge q and radius R .
3. Find the magnetic field a distance s from a long straight wire carrying a steady current I .
4. Find the vector potential of an infinite solenoid with n turns per unit length, radius R , and current I .
5. What is electromagnetic induction ? Explain Faraday laws and discuss its integral and differential forms.
6. Derive the expression for equation of continuity.
7. Establish a wave equation for E and B , and determine the speed of light in vacuum.
8. Discuss the propagation of TEM wave in a coaxial transmission line.
