

A-1192

Total Pages : 3

Roll No.

PHY-552

M.Sc. Physics (MSCPHY)

Electromagnetic Theory and Spectroscopy

Examination February, 2026

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.

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(1)

P.T.O.

1. Explain Gauss's law in electrostatics. Derive the expression for the electric field due to :
 - (a) An infinitely long straight charged wire, and
 - (b) A uniformly charged spherical shell
2. Describe magnetostatics in detail. Derive Ampere's circuital law and discuss its application to find the magnetic field due to a long current-carrying conductor.
3. What are electromagnetic waves ? Derive the wave equation in free space and explain the physical significance of these.
4. Explain the Raman effect in detail. Describe the principle of Raman spectroscopy with the help of an energy level diagram. Discuss Stokes and anti-Stokes lines and explain why Stokes lines are more intense than anti-Stokes lines.
5. Describe the rotational spectra of diatomic molecules. Derive the expression for rotational energy levels and explain the selection rules.

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. State and explain Coulomb's law. Write its mathematical form and mention its limitations.
2. What is meant by Raman shift ? On what factors does it depend ?
3. What are Lienard-Wiechert potentials ? Write the expressions for scalar and vector potentials.
4. Explain the Zeeman effect. How does it differ from the Paschen-Back effect ?
5. Write a short note on the Stark effect.
6. Explain L-S coupling in atoms and mention its importance in atomic spectra.
7. Explain the Franck-Condon principle ?
8. Write a short note on vibrational spectra of diatomic molecules.
