LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **PHYSICS**

FIFTH SEMESTER – **NOVEMBER 2024**

PH 5508 – ELECTRICITY & MAGNETISM

Date: 11-11-2024   Dept. No.   Max. : 100 Marks
Time: 09:00 am-12:00 pm

SECTION A

Answer ANY FOUR of the following   **4 x 10 = 40 marks**

1. Describe Coulomb's law and derive the expression for electric intensity due to a point charge. Explain the role of permittivity.
2. State Kirchhoff's laws and explain their use in finding the EMF and internal resistance of a cell.
3. Describe the Carey Foster's bridge and its application in measuring resistance and temperature coefficients.
4. Explain Biot-Savart's law and derive the magnetic field for a straight conductor.
5. Describe the construction and working of transformers.
6. Describe the growth and decay in an LCR circuit, and explain under damping, and critical damping conditions.
7. Describe Langevin's theory for diamagnetism and paramagnetism, and explain their atomic-level behavior.
8. State Maxwell's equations and discuss their role in predicting electromagnetic waves and their transverse nature.

SECTION B

Answer ANY THREE of the following   **3 x 20 = 60 Marks**

9. State Gauss's theorem and discuss its use in finding electric fields for spherical, cylindrical, and plane charge distributions.
10. Explain the Seebeck and Peltier effects, thermoelectric laws, and methods for determining thermo EMF.
11. Discuss the Thomson effect, Thomson coefficient, and the role of thermodynamics in thermoelectric power and diagrams.
12. Derive the expressions for self-inductance, mutual inductance, and explain the coefficient of coupling and the earth inductor.
13. Derive the expression for the EMF induced in a rotating coil and explain the peak, average, and RMS values of AC.
14. Discuss the differences between diamagnetic, paramagnetic, and ferromagnetic materials, including susceptibility and permeability.

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