



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FIFTH SEMESTER – NOVEMBER 2013

PH 5508/PH 5505/PH 4500 – ELECTRICITY AND MAGNETISM

Date : 07/11/2013
Time : 9:00 - 12:00

Dept. No.

Max. : 100 Marks

PART – A

Answer ALL questions:

(10 x 2 = 20)

1. A dipole consists of an electron and proton 4×10^{-10} m apart. Calculate the electric field at a distance of 2×10^{-8} m on a line making an angle of 45° with the dipole axis from the centre of the dipole.
2. Define the capacitance of a capacitor.
3. State the relation between Peltier and Thomson coefficient.
4. Mention any two applications of potentiometer.
5. State BiotSavart's law.
6. Define Lorentz force.
7. A solenoid of length 30 cm and area of cross section 10 sq cm has 1000 turns wound over a core of relative permeability 600 Another coil of 500 turns is wound over the same coil at its middle. Calculate the mutual inductance between them.
8. Explain why a choke coil is preferred over ohmic resistance for diminishing current in an electrical circuit?
9. State the significance of Poynting vector.
10. Distinguish between antiferromagnetic and ferromagnetic materials.

PART – B

Answer ANY FOUR questions:

(4x 7.5 =30)

11. Prove that there is loss of energy due to sharing of charges between two capacitors.
12. Explain the determination of specific conductivity of electrolytes.
13. Show that the ballistic reduction factor in a moving coil galvanometer is given by $(T/2\pi) (c/NBA)$.
14. Obtain an expression for resonant frequency of a parallel resonant circuit.
15. Prove that the velocity of electromagnetic waves in vacuum is the same as that of light.

PART – C

Answer ANY FOUR questions:

(4 x 12.5 = 50)

16. Obtain an expression for potential and field due to an electric dipole.
17. State the laws of thermoelectricity. Explain the method of measurement of thermo emf using potentiometer.

18. a) Derive an expression for magnetic induction at a point on the axis of a circular coil carrying current.
- b) A circular coil has a radius of 0.1 m and a number of turns 50. Calculate the magnetic induction at
i) a point on the axis of a circular coil and at a distance of 0.2 m from the centre ii) at the centre of the coil when a current of 0.1 A flows in it.
19. Discuss the growth and decay of charge in an LCR circuit.
20. State the properties of diamagnetic materials. Explain Langevin's theory of diamagnetism.

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