LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION - **PHYSICS**

FIFTH SEMESTER – NOVEMBER 2015

PH 5512 - ELECTRICITY AND MAGNETISM

Date : 07/11/2015 Dept. No. Max. : 100 Marks

Time : 09:00-12:00

PART – A

Answer ALL questions: **(10x2 =20 marks)**

1. What is meant by electric potential?
2. Define charge density.
3. Give any two uses of potentiometer.
4. Mention the uses of thermoelectric diagram.
5. State Biot-Savart's law.
6. Under what conditions does a moving coil galvanometer behave as ballistic?
7. State the Faraday's laws of electromagnetism.
8. Define RMS value of alternating current.
9. What is meant by magnetic susceptibility?
10. What is Snell's law?

PART – B

Answer any FOUR questions: **(4x7.5 =30 marks)**

11. State Gauss's law. Obtain the differential form of Gauss law.
12. Explain how thermo electric diagram is used in the determination of Peltier and Thomson coefficient.
13. Derive an expression for self inductance of a long solenoid. Mention the advantages of Helmholtz galvanometer? (5+2.5)
14. Explain the construction and theory of transformer.
15. a) What is displacement current?

    b) An inductance of 500 *mH* and a resistance of 5 ohms are connected in series with an e.m.f of 10 volts. Find the final current. If now the cell is removed and the two terminals are connected together, find the current after (i) 0.05 sec and (ii) 0.2 sec. (2+5.5)

16. Two coils, a primary of 600 turns and a secondary of 30 turns, are wound on an iron ring of mean radius 0.1 m and cross-section $4x10^{-2}$ m diameter. Find their mutual inductance (μ_r for iron = 800).

PART –C

Answer any FOUR questions: **(4x12.5 =50 marks)**

17. What is meant by molecular polarisability? Deduce an expression for the electric field on a molecule within a dielectric. Hence obtain Clausius – Mossotti relation. (2+10.5)

18. Explain the electrical conductivity of a metal on Drude –Lawrence theory and obtain from it ohm's law. What is Wiedemann – France law? (10.5+2)

19. Discuss with necessary theory, the construction and working of a moving coil Ballistic galvanometer.

20. Explain the theory of the rise and decay of current of a capacitor through a resistor.

21. Distinguish dia, para and ferro magnetic materials. Explain the Langevin theory of diamagnetism. (6+6.5)

22. a) State Poynting vector.

    b) Deduce the equation for the propagation of the plane electromagnetic waves in free space. (2+10.5)

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