LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **NOVEMBER 2019**

PH 5512 – ELECTRICITY AND MAGNETISM

Date: 02-11-2019   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

Part A

Answer all questions: (10 x 2 = 20 marks)

1. State Gauss's law.
2. Define Seeback and Peltier effect.
3. Give any two uses of potentiometer
4. State Kirchoff's current laws.
5. State Biot-Savart's law.
6. State the Faraday's laws of electromagnetism
7. Find the magnetic induction at the centre of a square current loop of side 1 metre carrying a current of 1 ampere.
8. What is the principle of a transformer?
9. State any two properties of ferromagnetic materials.
10. An iron rod 0.5 m long, 10 mm in diameter and of relative permeability 1000 is placed inside a long solenoid wound with 500 turns/metre. If a current of 1 amp is passed through the rod, find the magnetic moment of the rod.

Part B

Answer any four questions: (4 x 7.5 = 30 marks)

11. Obtain the boundary conditions to be satisfied by D and E at the interface of two dielectric media.
12. Explain how thermo electric diagram is used in the determination of Peltier and Thomson coefficient.
13. Describe the experiment to determine the absolute capacitance of the capacitor.
14. a) What are the different types of losses in transformer?
    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)
15. Derive an expression for self inductance of a long solenoid. Mention the advantages of Helmholtz galvanometer?
16. Derive an expression for refraction of EM waves at the interface of non conducting media.

Part C

Answer any four questions (4 x 12.5 = 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.
18. Explain the electrical conductivity of a metal on Drude-Lawrence theory and obtain from it ohm's law. What is Wiedemann-Franz law?
19. a) Explain the principle and working of moving coil ballistic galvanometer.
    b) Derive an expression between the quantity of charge flowing through it and the throw obtained. Show how to correct the observed throw for damping. (5.5+7)
20. Discuss the principle and theory of series resonance circuit.
21. Distinguish dia, para and ferro magnetic materials. Explain the Langevin theory of diamagnetism.
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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