LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **APRIL 2016**

PH 5512 – ELECTRICITY AND MAGNETISM

(FROM 12-BATCH)

Date: 30-04-2016 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART A

Answer ALL questions **(10 x 2 = 20 marks)**

1. Write the differential form of Gauss law.
2. Write the relation between Electric Displacement (D),Electric Field strength (E) and Electric polarisation (P).
3. State Kirchoff 's laws of electricity.
4. Define Thomson Coefficient..
5. State Lenz's law.
6. A circular coil of radius 0.1 m has 20 turns .Calculate the magnetic induction at the centre of the coil when a current of 0.1 A flows through it.
7. Define time constant of R-L circuit.
8. What is Wattless current?
9. Define magnetic susceptibility.
10. State Snell's law.

PART B

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

11. Obtain an expression for the potential at any point due to an electric dipole.
12. . What is thermo-electric diagram? Show how Peltier and Thomson emf's and neutral temperature can be determined using this diagram.
13. Explain how (a) Charge sensitiveness and (b) Absolute capacitance of a capacitor is determined using a ballistic galvanometer.
14. Two coils A and B are placed near each other and have 200 and 800 turns respectively. A direct current of 2 amperes in coil A produces a flux of 2.5×10^{-4} Wb. In A and 1.8×10^{-4} Wb in B .Determine (i)The self inductance of A and B (ii) The Mutual inductance between A and B.(iii) The coefficient of coupling between the two coils.
15. Obtain an expression for growth of charge of a capacitor through a resistor.
16. List the properties of Dia,Para and Ferromagnetic materials

PART C

Answer any FOUR questions **(4 x 12.5 = 50 marks)**

17. Using Gauss's law obtain expressions for electric field due to a uniformly charged sphere at points a) Outside b) At the surface and c) inside the sphere.
18. State the working principle of Carey-Foster bridge. Explain how the specific resistance of the material of a wire can be determined using Carey-Foster bridge.
19. Discuss the theory of Helmholtz galvanometer. Mention its merits.
20. Explain growth of charge in LCR circuit.
21. Obtain an expression for the electric field on a molecule within a dielectric. Hence obtain Clauisus-Mossotti relation.
22. Discuss Langevin's theory of Para magnetism.

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