



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FIFTH SEMESTER – APRIL 2013

PH 5508/PH 5505/PH 4500 - ELECTRICITY & MAGNETISM

Date: 10/05/2013
Time: 9:00 - 12:00

Dept. No.

Max. : 100 Marks

PART – A

Answer all questions. All questions carry equal marks: (10x2=20marks)

1. Define one farad.
2. State Gauss's law in electrostatics.
3. What is Seebeck effect?
4. State Kirchoff's laws.
5. A circular coil has a radius of 0.1m and the number of turns is 50. Calculate the magnetic induction at the centre of the coil when a current of 0.1A flows in it.
6. Define mutual inductance between pair of coils.
7. What do you understand by the time constant of a circuit containing inductance and resistance?
8. Obtain an expression for average value of an alternating current.
9. What is meant by hysteresis?
10. What is displacement current?

PART – B

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

11. a) Derive an expression for the electric field at any point due to an electric dipole. (5.5)
b) An electric displacement $2.5 \times 10^{-8} \text{ cm}$ is placed in a uniform field of intensity $2.0 \times 10^5 \text{ N/c}$. How much work is done on turning the dipole end to end? (2)
12. Explain with theory, how Carey Foster bridge is used to find the resistance of a coil of wire.
13. Give the theory of Helmholtz galvanometer.
14. Discuss the theory of parallel resonant circuit. Mention its use.
15. Give an account of Maxwell's equations and obtain an expression for velocity of light in free space.

PART – C

Answer any four questions. (4x12.5=50marks)

16. a) Obtain an expression for the capacity of a cylindrical condenser. (7.5)
b) A cable of wire $3 \times 10^{-3} \text{ m}$ in diameter and insulated with $3 \times 10^{-3} \text{ m}$ material of relative permittivity 4.26 is placed in water. Calculate the capacitance for 5km length of the cable. (5)
17. a) Describe Kohlrausch bridge experiment to determine the specific conductivity of an electrolyte. (7.5)
b) Derive Gibbs Helmholtz equation for the emf of a reversible cell. (5)
18. Obtain an expression for charge flowing through the moving coil galvanometer and show how to correct the observed throw for damping.
19. Discuss the theory of growth of charge in an LCR circuit.
20. How will you use deflection magnetometer in Tan A position to compare the magnetic moments of two magnets by deflection method and null deflection method. (6 + 6.5)

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