

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FIFTH SEMESTER – November 2009

PH 5505/PH 4500 - ELECTRICITY & MAGNETISM

Date & Time: 05/11/2009 / 9:00 - 12:00 Dept. No.

Max. : 100 Marks

PART - A

Answer ALL questions. All questions carry equal marks.

(10 x 2 = 20 marks)

1. State Coulomb's inverse square law.
2. If a capacitor of $0.01\mu\text{F}$ capacity is charged to 1500 volts, find the energy stored.
3. What is Seebeck effect?
4. Write Gibbs-Helmholtz equation. Rewrite it for Daniel cell.
5. A solenoid having an air core of 10 cm long has 100 turns. It's area of cross section is 5 sq.cm. Find the coefficient of self inductance.
6. Define Ampere.
7. A capacitor of capacitance $0.1\mu\text{F}$ is charged and discharged through a resistance of 10 megaohms. Find the time the charge will take to fall to half of its original value.
8. What is the mean value of a.c.?
9. Define susceptibility and permeability.
10. What is displacement current?

PART - B

Answer any FOUR questions.

(4 x 7.5 = 30 marks)

11. Derive an expression for the capacitance of a cylindrical condenser.
12. Define temperature coefficient of resistance? How is it determined using Carey-Foster bridge?
13. Using Biot-Savart law calculate the value of magnetic field due to a straight conductor, carrying current.
14. a) Explain the principle of a choke coil.
b) An electric lamp which runs at 100 volts D.C. and 10 amp current is connected to 220 V 50 Hz a.c. Calculate the inductance of the choke coil.
15. Define Poynting vector. Obtain an expression for Poynting vector.

PART - C

Answer any FOUR questions.

(4 x 12.5 = 50 marks)

16. What is an electric dipole? Derive expressions for the electric field at a point on the
(a) axial line (b) equatorial line due to a dipole.
17. Define Thomson coefficient. Derive expressions for Peltier and Thomson coefficients.
18. Give the construction and working of a moving coil galvanometer. Derive an expression for the charge flowing through it and apply correction for damping.
19. Obtain an expression for the growth of charge in a LCR circuit.
20. Discuss Langevin theory of paramagnetism.

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