LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FOURTH & FIFTH SEMESTER – APRIL 2017

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

Date: 22-04-2017   Dept. No.   Max. : 100 Marks
01:00-04:00

PART –A

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

1. What is permittivity?

2. Define electrical capacity of a condenser.

3. State Kirchoff's laws of current electricity.

4. List out the applications of Carey – Foster's bridge.

5. What is the mutual induction of a pair of coil?

6. Define Ampere's circuital law.

7. Write a note on rejector circuit.

8. Distinguish between mean current and r.m.s. current.

9. Give a note on diamagnetic materials.

10. State Poynting vector.

PART –B

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

11. Obtain an expression for the potential and intensity at any point due to a dipole.

12. Explain the Kohlraush bridge method to determine the specific conductivity of an electrolyte.

13. Discuss the construction and theory of moving coil galvanometer.

14. Obtain an expression for the growth of current in a circuit having inductance and resistance. State time constant of LR circuit.   **(5.5+2)**

15. a) A magnetic induction of 2×10^{-4} Wb m^{-2} in vacuum produces a magnetic flux of 2.4×10^{-8} Wb in a bar of area of cross-section 2×10^{-5} m^2. Calculate the intensity of magnetization.

    b) Define and explain the terms - coercivity and retentivity.   **(3.5+4)**

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

16. Derive an expression for the capacity of a spherical condenser in which the outer sphere is earthed and the inner sphere is given positive charge. Explain how the capacity of the spherical condenser is altered if the inner sphere is earthed and the outer sphere is given a positive charge.

17. a) Describe a lead accumulator and mention the chemical action that takes place during charging and discharging.

    b) Deduce Gibbs-Helmholtz equation for the E.M.F. of a reversible cell.

    (6.5+6)

18. a) Describe an earth inductor. Deduce an expression for the emf induced in it when rotated uniformly in a magnetic field.

    b) Describe how the earth inductor can be used to determine.

    (i) Earth's horizontal field induction B_H at a place.

    (ii) Earth's vertical field induction B_V at a place.

    (iii) Angle of dip ϕ at a place. (6.5+6)

19. Describe the theory of transformer and discuss its working. Explain the various losses occurring in a transformer. (10+2.5)

20. a) Describe the domain theory of ferromagnetism.

    b) Solve the Maxwell's equations to deduce the e.m. wave equation and determine the velocity of light in vacuum. (6.5+6)

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