LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION –**PHYSICS**

FOURTH SEMESTER – **APRIL 2018**

16UPH4MC01– ELECTRICITY AND MAGNETISM

Date: 20-04-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART –A

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

1. State Coulomb's law in electrostatics.
2. Show that curl of an electric field is zero.
3. What is meant by an electric dipole?
4. Define electrostatic energy.
5. State Ampere's circuital law.
6. What is a toroid?
7. Define self induction.
8. State Faraday's laws of electromagnetic induction.
9. Define Snell's law.
10. What is meant by displacement current.

PART –B

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

11. Obtain the Laplace and Poisson's equations from Gauss's law.
12. Show that the potential due to an electric at point & quadrupole is given by the relation: $(qa^2(3\cos^2\theta - 1)/4\pi\varepsilon_o r^3)$.
13. Give the theory and working of Helmholtz galvanometer.
14. Discuss the construction and working of a transformer.
15. State and prove Poynting theorem for the flow of energy in an electromagnetic field.
16. With a neat circuit diagram, describe the method to determine the absolute capacitance of a capacitor.

PART –C

Answer any FOUR questions: **(4x12.5 =40)**

17. Derive an expression for the force per unit area on the surfaces of a charged conductor.

18. Define electric potential. Deduce the equation for electric potential at a point on the axis of a uniformly charged disc.

19. Explain the principle, theory and construction of moving coil ballistic galvanometer.

20. Describe suitable methods to measure self inductance and mutual instance of the coil using BG.

21. Discuss the reflection and refraction of electromagnetic wave at an interface of a non-conducting medium.

22. a).Calculate the potential and field due to a dipole of moment $4.5x10^{-10}$ cm^{-1} at a distance 1 m from it, (i) on its axis, (ii) on its perpendicular bisector.

b) Obtain the relation for the coefficient of coupling between two coils. (7.5+5)

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