LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc.DEGREE EXAMINATION –**PHYSICS**

FOURTH SEMESTER – **APRIL 2019**

17/16UPH4MC01– ELECTRICITY AND MAGNETISM

Date: 03-04-2019   Dept. No.   Max. : 100 Marks

Time: 09:00-12:00

PART –A

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

1. Define the unit coulomb?

2. Give the differential form of Gauss law.

3. What do you mean by electric potential energy?

4. What is an electric dipole?

5. Define Lorentz force.

6. State Ampere's circuital law.

7. What is self induction?

8. List out the energy losses in a transformer.

9. What is meant by Poynting vector?

10. State Snell's law.

PART –B

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

11. Derive an expression for the mechanical force per unit area of a charged conductor.

12. Define electric potential. Show that the potential difference between any two points in an electric field is given by the line integral of the electric field taken over any path joining those points.

13. Explain the construction and theory of Helmholtz tangent galvanometer.

14. What is meant by coefficient of coupling? Obtain an expression for the coefficient of coupling between two coils.   (2+5.5)

15. List out the differential form of Maxwell's equations. Solve the equation to deduce the electromagnetic wave equation and determine the velocity of light in free space.   (2+5.5)

16. An electron (charge –e) is placed at each of the eight corners of a cube of side *a*, and an -particle (+2e) at the centre of the cube. Evaluate the potential energy of the system.

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

17. Apply Gauss's law to calculate the electric field intensity due to a uniformly charged sphere at points (a) outside the sphere, (b) on the surface of the sphere and (c) inside the sphere.

18. Deduce an expression for the electric potential and field due to a dipole at an arbitrary point.

19. Describe how you can use ballistic galvanometer to determine the absolute capacitance of a capacitor including damping correction.

20. Define mutual induction. Discuss the experimental method to determine the mutual inductance using d.c. source and ballistic galvanometer.   (2+10.5)

21. A plane electro magnetic wave is incident normally at the boundary of two non-conducting media. Discuss the phenomenon of reflection and transmission.

22. a) Deduce Faraday's law of electromagnetic induction in the form of differential and integral.

    b) Derive an expression for the magnetic induction due to a toroid by applying Ampere's law.

                                                                (5+7.5)

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