LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION –**PHYSICS**

FOURTH& FIFTH SEMESTER – **APRIL 2018**

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

Date: 03-05-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART-A

Answer **ALL** Questions **(10x2=20)**

1. Calculate the electric potential at a distance of 9 m from a charge of 100 μC.
2. Define the capacity of a capacitor. Give its unit.
3. What is the principle of a potentiometer ?
4. What are thermoelectric diagrams?
5. State Ampere's circuital law.
6. Define self- inductance of a coil.
7. What is the time taken for the charge in a capacitor of capacitance 2 μF to leak to half its original value through a 100 MΩ resistor?
8. Why the choke coil is considered superior to a rheostat ?
9. What is meant by spin exchange interaction ?
10. Write down the Maxwell's equations.

PART-B

Answer ANY **FOUR** Questions **(4x7.5=30)**

11. Derive an expression for the capacitance of a cylindrical capacitor.
12. Describe the Kohlrausch bridge experiment to determine the specific conductivity of an electrolyte.
13. State Biot-Savart law. Use it to calculate the magnetic induction at a point inside a solenoid.
14. An electrical circuit consists of a resistance of 50 Ω, a 0.3 H inductor having a resistance of 2 Ω and a 40 μF capacitor all connected in series across an ac voltage source of 200 V and frequency 50 Hz. Find the total impedance and current in the circuit. Check whether the current lags or leads the applied EMF.
15. Using Maxwell's equations, show that the electromagnetic waves are transverse in nature.

PART–C

Answer **ANY FOUR**Questions : **(4x12.5 = 50)**

16. What is an electric dipole? Derive an expression for the potential and field at an arbitrary point due to an electric dipole. **(2+10.5)**

17. i) Explain with necessary theory how a Carey Foster bridge may be used to find the specific resistance of a given wire. **(7.5)**

ii) Explain Thomson effect an define Thomson coefficient. **(3+2)**

18. Explain the principle and construction of a moving coil ballistic galvanometer. Derive the relation between the quantity of charge flowing through it and the throw produced. Discuss the correction to the observed throw for damping effect. **(5.5+4+3)**

19. i) Obtain an expression for the growth of charge in an LCR circuit. **(6.5)**

ii) Distinguish between series and parallel resonance circuits (Any three). **(3)**

iii) Mention three advantages of a 3- phase system. **(3)**

20.i) DiscussLangevin's theory of diamagnetism. **(8.5)**

ii) Define the terms a) Magnetic susceptibility b)Magnetic permeability. **(2+2)**

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