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Total No. of Printed Pages: [01]

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**B.Sc. (Hons.) Physics (Semester – 1st)
ELECTRICITY AND MAGNETISM**

Subject Code: BPHYS1101

Paper ID: [19131504]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a. State Gauss law in electrostatic and give its differential form.
- b. Show that Electrostatic field is conservative in nature.
- c. Define magnetic vector potential.
- d. State Faraday's law of electromagnetic induction and give its integral form.
- e. Differentiate soft and hard magnetic materials on the basis of B-H curve.
- f. What do you mean by Magnetic permeability?
- g. State Lenz's law and how it relates to electromagnetic induction?
- h. Explain Kirchhoff's law for AC circuits.
- i. What is displacement vector and how it relates to electric field?
- j. State maximum power transfer theorem.

Section – B

(5 marks each)

- Q2. Derive Laplace and Poission equation in electrostatics and gives its significance.
- Q3. Using Biot Savart Law, Derive an expression for magnetic field due to infinite straight wire carrying current.
- Q4. Derive expression for the differential form of Gauss Law in dielectrics.
- Q5. Derive expression for the (i) resonance frequency (ii) power dissipation in LCR circuit.
- Q6. Explain the hysteresis and energy loss in ferromagnetic materials with help of suitable diagram.

Section – C

(10 marks each)

- Q7. Define Ampere's Circuital law and use it to derive magnetic field inside the infinite solenoid.
- Q8. Define magnetic vector potential and hence deduce Biot Savart's law using its mathematical expression.
- Q9. What is ferromagnetism? Derive an expression for temperature dependence of Ferromagnetic Susceptibility.