[Total No. of (i) Printed Pages 4 (ii) Questions 7]

**Sub Code :** 0150 (1048) **Exam Code :** 0002

**Exam :** B.A./B.Sc. (General) 2nd Semester

**Subject :** Physics

**Paper :** Paper : C Electricity and Magnetism-II

***Time : 3 Hours*** ***Maximum Marks : 44***

**Note:** Attempt **five** questions in all by selecting **two** questions from each of **Unit I** and **II**, **Unit III** is **compulsory**. Use of non-programmable calculator is alloved.

## UNIT - I

**1.** Explain the significance of invariance of charge ? Show that the surface integral of electric field is independent of the frame of reference. 4

**2.** (a) What is ferromagnetism ? Explain ferromagnetism on the basis of domain theory. 2.5

P.T.O.

(b) A current in a solenoid produces a magnetising field of 167 A/m. What is the magnetic induction in rode it when it has (a) air core (b) Iron core of magnetic susceptibility 5000. 2.5

3. (a) Distinguish between para, ferro and diamagnetic substances. 2

(b) An electric field in the laboratory frame is given by $\vec{E} = \left(4\hat{i} + 6\hat{j}\right) Vm^{-1}$. Calculate this field as measured in a moving frame with a velocity $\vec{V} = \left(8i + 6\hat{j}\right) \times 10^7 \, m\,sec^{-1}$. 2

## UNIT - II

4. (a) State and explain Biot Savart's law. Derive an expression for the magnetic field at a point on the axis of a circular coil carrying current. 2.5

(b) Calculate the magnetic field at the ends of a 20 cm long solenoid having 300 turns and carrying current of 2A. 1.5

5. State and prove reciprocity theorem of mutual Induction. 4

**6.** (a) An A.C. Circuit having an inductor and a resistance in series drews a power of 560W from an a.c. some marked 210 V, 60 Hz, If the power factor of circuit is 8 calculate : 2

(i) The impedence of circuit

(ii) The impedence of inductor used.

(b) What is Hall effect ? How does it help in deciding that the current in a metallic conductor is due to motion of electrons. 2

## UNIT - III

**7.** Attempt any **six** : 6×1=6

(a) Motion of a charged particle is in a direction ⊥ ar to magnetic field. What will charge; it speed, direction of motion, K.E. of momentum.

(b) Coils in a resistance box are made of double up insulated wire. Why ?

(c) Power factor can often be improved by the use of capacitor of appropriate capacitance in the circuit. Explain.

(d) What is the nature of current versus potential difference graph for Ohmic and non Ohmic resistor ?

(e) Write down the transformation equations of electric field $\vec{E}$ .

(f) What is Bohr magnetion ? Calculate its value.

(g) What is the value of $\vec{\nabla}.\vec{B}$ and $\vec{\nabla} \times \vec{B}$ for points inside the current loop ?