(i) Printed Pages :3] Roll No. .....

(ii) Questions :7]

Sub. Code :	0	1	4	8
Exam. Code:	0	0	0	2

B.A./B.Sc.(General) 2nd Semester
1055
PHYSICS
Paper : C : Electricity and Magnetism-II

Time : 3 Hours] **[Max. Marks : 45**

Note :- (i) Attempt five questions in all, selecting two questions from each of Units 1 and II.
(ii) Unit III is compulsory.
(iii) Use of non-programmable scientific calculator is allowed.

UNIT-I

1. (i) Derive the equation of continuity $\vec{\nabla} . \vec{j} + \frac{\partial \rho}{\partial t} = 0$ where ρ and $\vec{J}$ are charge and current densities respectively. What form It will take for steady currents .

(ii) Calculate the average time between collisions for an electron Of electron gas colliding with positive ion of Copper Wire Having 10^{29} electrons m^{-3} .Given resistivity of copper Is 1.7×10^{-8} ohm m . 5,4

2. Derive an expression for the electric field of a point charge moving with constant velocity . How does it differ from the field due to stationary charge .Illustrate with diagrams. 9

3. (i) Explain Langevin Theory of Diamagnitism .
(ii) Find the percent increase in magnetic induction when the space with current carrying toroid is filled with magnitism .
Given that the susceptibility of Magnesium is 1.2×10^{-5}. 6,3

UNIT-II

4. (i) State and prove the reciprocity theorem of Mutual Induction.
(ii) What is Hall Effect? Show that the Hall coefficient $R_H=1/m$. 6,3

5. (i) Drive Gauss Law in Magnetism.
(ii) Explain the term Surface current density. Give its application
(iii) Show that the magnetic field at a point inside the toroid will inversely as its distance from the centre. 3,3,3

6. (i) Define vector potential and derive and expression for it.
(ii) Show that the energy stored per unit volume in the magnetic Field 'B' set up Solenoid is $B^2/2\mu_0$ 5,4

UNIT-III

7. Attempt any **six** parts :-

(i) In a certain material drift velocity is quadratic function of electric field. Will the material on ohmic or non-ohmic.?

(ii) Can a free electron show diamagnetic effect ? Explain.

(iii) Is the electric field due to a moving charge conservative?

(iv) Show that the magnetic scalar potential satisfies Laplace's Equation.

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

(vi) Define displacement current. What is its cause?

(vii) The magnetic flux linked with a close loop changes with time as $\phi = At^2 + Bt$. What are the Units of A and B.

6x1½=9