

(i) Printed Pages: 3

Roll No.

(ii) Questions : 7

Sub. Code :

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Exam. Code :

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B.A./B.Sc. (General) 1st Semester
(2123)

PHYSICS

Paper—C Electricity & Magnetism—I

Time Allowed : Three Hours] [Maximum Marks : 44

Note :—(1) Attempt **five** questions in all, selecting **two** questions from Unit I and II. Unit III is compulsory.

(2) Use of non-programmable calculator is allowed.

UNIT-I

1. (a) State and prove Gauss's Divergence Theorem.
(b) Explain the physical meaning of the curl of a vector field. 6,3
2. (a) What is Electric dipole ? Derive an expression for Electric field due to a dipole at any point.
(b) Charges of $1c$, $2c$, $-4c$ and $2c$ are placed in order at the four corners of square side of 1 m . Calculate the electric field strength at the centre of the square. 5,4
3. (a) Derive an expression for Electric field intensity due to finite linear distribution of charge.
(b) Prove that divergence of $\text{curl } \vec{A}$ is zero. 6,3

UNIT-II

4. (a) What is a Quadrupole ? Derive an expression for electric potential at a point due to quadrupole.
(b) Is it possible for electric potential in a charge free region to be given by $v = x^2 + y^2 + z^2$ if not, find the charge density. 5,4
5. (a) Define Polarizability. Give its S.I. Unit. Establish the relation between Polarizability and Dielectric constant.
(b) Show that Electric field is always perpendicular to Equipotential surface. 7,2
6. (a) Show that the work done in moving a test charge in an electric field between two points is independent of path followed.
(b) Why Electric field inside dielectric decreases due to Polarisation ? 6,3

UNIT-III

(Compulsory)

7. Attempt any **eight** parts :
- (a) What is solenoidal field ?
- (b) What are limitations of Coulomb's Law ?
- (c) If the Electric field is zero at Point P, is it necessary that electric potential should also be zero there ? Explain.

- (d) Differentiate between free and bound charges.
- (e) An electric field is curl free. Explain why.
- (f) What is unit of atomic polarizability ?
- (g) Explain the difference between Flux due to positive and negative charges.
- (h) Show that Lamellar field is irrotational vector field.
- (i) Why two equipotential surface do not intersect each other ?
- (j) What is value of electric potential at a point right bisector of an electric dipole ? $1 \times 8 = 8$