ROILNO.						i – 1	

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc.(CS) (Sem.-1) ELECTRODYNAMICS Subject Code : BCS-104 M.Code : 70881 Date of Examination : 19-01-23

Time: 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. Answer briefly:

- a) State the principle of superposition of electric fields.
- b) Explain the curl of a vector field. What is it's physical significance?
- c) Evaluate the gradient of the scalar field $\phi(x, y, z) = x^2 y^3 z$.
- d) What do you understand by the current and current density.
- e) Prove that $\overrightarrow{A} = 3y^2z^2\overrightarrow{i} + 3x^2z^2\overrightarrow{j} + 3x^2y^2\overrightarrow{k}$ is a solenoidal vector.
- f) Give the statement and physical significance of Gauss divergence theorem.
- g) Is volume a scalar or a vector quantity? Explain.
- h) Calculate the Laplacian of the scalar field $f(x, y, z) = xy^2 + z^3$.
- i) What are failures of Ohm's law?
- j) What are diamagnetic materials? Give a few examples of diamagnetic materials.

SECTION-B

- 2. a) Derive an expression for the divergence of a vector field in Cartesian coordinates. Explain it's physical significance.
 - b) Prove the following :

$$\overrightarrow{\nabla} . (\overrightarrow{A} \times \overrightarrow{B}) = \overrightarrow{B} . (\overrightarrow{\nabla} \times \overrightarrow{A}) - \overrightarrow{A} . (\overrightarrow{\nabla} \times \overrightarrow{B})$$

- 3. Derive an expression for the electric field \vec{E} due to a surface charge distribution with charge density (σ) using Coulomb's law.
- 4. a) Explain and derive the Gauss law's in differential form for the electric fields. Give the physical significance of electric flux density.
 - b) Using Gauss's law, calculate the electric field due to infinite line charge.
- 5. a) Show that the electric field intensity at a point equals the negative gradient of potential at that point.
 - b) The electric potential in the certain region is given by $V(x, y, z) = 20x^2 + 15y^2 2z^3$. Evaluate the electric field at the point P(2, 4, -1).
- 6. a) Find an expression for the field of a point charge moving with uniform velocity. How does it differ from the field due to a stationary charge?
 - b) Describe the behaviour of ferromagnetic, diamagnetic, and paramagnetic materials in magnetic fields.
- 7. a) Using the differential form of Gauss's law, develop the Poisson's and Laplace's equations in rectangular coordinate system.
 - b) Obtain the Laplacian operator in the cylindrical coordinate system.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.