Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

B.Sc.(Honours)Mathematics (Sem.–1)

ELECTRICITY AND MAGNETISM

Subject Code : UC-BSHP-112-19

M.Code : 77315

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 & C. have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.**
4. **Select atleast TWO questions from SECTION - B & C.**

SECTION-A

1. Answer briefly :

a) What do you mean by solenoidal field? Give example.

b) Find a unit normal to the surface $x^2y + 2xz = 4$ at (2, -2, 3).

c) Why two electric lines of force do not cross each other?

d) What is an equipotential surface? Can two equipotential surfaces intersect?

e) A sphere of radius 3 cm, has a point charge 7.6 μC located at its centre. Find the electric flux through it.

f) State the two boundary conditions for magnetostatics.

g) What is the force experienced by a charged particle moving along the direction of the magnetic field?

h) Define Poynting vector for electromagnetic waves.

i) Distinguish between conduction and displacement current.

j) Write four Maxwell's equations in integral form.

SECTION-B

2. Describe gradient of a scalar field. Explain its physical significance.

3. State and prove Gauss divergence theorem. Give its importance.

4. Using Gauss law, calculate the electric field due to a uniformly charged non-conducting solid sphere at a point (a) outside the sphere (b) on the surface of sphere and (c) inside the sphere.

5. What do you mean by an electric dipole? What is the value of the potential at a point (a) on the axis of the dipole (b) on the normal to the axis?

SECTION-C

6. Using Biot and Savart's law, find the magnetic field due to an infinite straight wire carrying current.

7. State and prove Ampere's circuital law of magnetic field. Show that the line integral of the magnetic field over a closed path is independent of the shape of the path.

8. Derive general wave equation for electric vector and magnetic vector for electromagnetic waves in a medium with finite permeability and permittivity but no conductivity.

9. State and derive Poynting Theorem for the flow of electromagnetic energy in a medium.

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.