18A5

B. Tech. EXAMINATION, 2021

(First Semester)

(C Scheme) (Main & Re-appear)

(ME, AER, AE & ECE)

PHY101C

Introduction to Electromagnetic Theory

Time : 2½ Hours]   [*Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Draw neat diagram wherever applicable.

1. (a) Drive expression for energy of a continuous charge distribution in terms of electric field.

    (b) Discuss relation between electric polarization vector and electric field.

    (c) Drive electric potential due to a dipole.

2. (a) Drive expression for boundary conditions in electrostatics. Where these are used ?

    (b) Differentiate between divergence and curl of electrostatic field vector.

    (c) Drive Poisson's equations for electrostatic potential.

3. (a) What you understand by magnetization and associated bound currents ?

    (b) Drive boundary conditions for B and H.

    (c) Define magnetic susceptibility and permeability.

4. (a) Define Bio-Savart Law. State the terms used.

(b) What is vector potential ? Calculate vector potential due a given magnetic field using Stoke's theorem.

(c) Differentiate between ferromagnetic, paramagnetic and diamagnetic materials on the basis of magnetic moment and domain alignment.

5. (a) Drive expression for energy stored in magnetic field.

(b) State continuity equation for current densities. Drive modified equation for the curl of magnetic field to satisfy continuity equation.

6. (a) Define Faraday's law and express Faraday's law in differential form.

(b) Drive expression for flow of energy in electromagnetic field. Define Poynting vector and its units.

7. (a) Find expression for energy and momentum carried out by electromagnetic waves in vacuum.

(b) Prove the transverse nature of electromagnetic waves in vacuum.

(c) State basic principle of transmission lines. Draw equivalent circuit representation.

8. (a) Drive expression for reflection and transmission coefficients for normal incidence of electromagnetic waves at non-conducting medium.

(b) Explain wave characteristics on finite transmission lines.

(c) What are primary constants in transmission lines ?

9. (a) What are bound charges ? How they are different from free charges ?

(b) What is auxiliary magnetic field ? Define its units.

(c) Define the terms magnetic flux and motional EMF.

(d) How electromagnetic waves polarize the materials ?

(e) Define resultant pressure of electromagnetic waves.