18A5

B. Tech. EXAMINATION, 2020

(Second Semester)

(C Scheme) (Re-appear Only)

INTRODUCTION TO ELECTROMAGNETIC THEORY

PHY101C

(Common for All Branches)

Time : 3 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 *Five* questions in all, selecting *one* question from each Unit. Q. No. **9** is compulsory. All questions carry equal marks. Draw neat diagram wherever applicable.

Unit I

1. (a) Derive expression for electric field due to a continuous charge distribution. **7**

   (b) What are free and bound charges ?   **3**

   (c) Derive boundary conditions in terms of electric displacement vector.   **5**

Or

2. (a) State Laplace and Poisson's equations.   **7**

   (b) Define curl of electrostatic field vector.   **3**

   (c) Explain the electric field produced by a uniformly polarized sphere.   **5**

Unit II

3. (a) What do you understand by divergence and curl of magnetic field ?   **4**

(b) Derive boundary conditions for **B** and **H.**   **7**

(c) Discuss magnetization in materials.   **4**

Or

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

(b) Define vector potential. Calculate vector potential due to a given magnetic field using Stokes' theorem.   **7**

(c) Differentiate between ferromagnetic, paramagnetic and diamagnetic materials.

4

Unit III

5. (a) Derive expression for energy stored in magentic field.   **7**

(b) State Poynting theorem. Derive expression for flow of energy in electromagnetic field.   **8**

Or

6. State continuity equation for current densities. Derive modified equation for the curl of magnetic field to satisfy cointinuity equation.   **15**

Unit IV

7. (a) Derive wave equation for electromagnetic waves in vacuum using Maxwell's equations and state the momentum carried by electromagnetic waves in vacuum.   **7**

(b) Explain wave characteristics on finite transmission lines.   **5**

(c) What are primary constants in transmission lines ?   **3**

Or

8. (a) Find expression for energy and resultant pressure carried out by electromagnetic waves in vacuum. **5**

(b) State basic principle of transmission lines. **3**

(c) Prove the transverse nature of electromagnetic waves. **7**

Compulosry Questions from Entire Syllabus

9. (a) Differentiate between bound charges and free charges. **3**

(b) Define magnetic susceptibility. **3**

(c) Write Maxwell's equation in vacuum. **3**

(d) Discuss polarization of materials by electromagnetic waves. **3**

(e) Define Poynting vector. **3**