

Roll No.

Total Pages : 3

BT-2/M-20

32042

INTRODUCTION TO ELECTROMAGNETIC THEORY

Paper-BS-119A

Opt. No. : II

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt any *five* questions, selecting at least *one* question from each unit.

UNIT-I

1. (a) State and prove Gauss's theorem in electrostatics. What are preconditions of its applicability? 10
- (b) Show mathematically that the charge always resides on the outer surface of a charged conductor. 5
2. (a) Prove that energy density (energy /volume) in a region of a uniform electric field 'E' in vacuum is given by
$$\frac{1}{2} \epsilon_0 E^2.$$
 8
- (b) Use Gauss's theorem to find the expression for Electric field for uniformly charged infinite cylinder. 7

UNIT-II

3. What do you mean by the following :
 - (a) Bound charges. 3
 - (b) Permittivity. 3

- (c) Dielectric constant. 3
 - (d) Susceptibility. 3
 - (e) Electric displacement. 3
4. Establish the boundary conditions for the electric field on the interface between two dielectric media of different relative permittivity. 15

UNIT-III

5. (a) State Biot-Savart's law for the magnetic flux density due to a steady line current element in free space. 10
- (b) Explain divergence of magnetic field. 5
6. What do you mean by the following :
- (a) Bound currents. 3
 - (b) Linear and non-linear media. 3
 - (c) Ferromagnetism. 3
 - (d) Magnetic Susceptibility. 3
 - (e) Permeability. 3

UNIT-IV

7. (a) Write down the Maxwell's equations in differential and integral forms for time varying fields. 5
- (b) How Maxwell fixed Ampere's law? Explain briefly. 5
- (c) Explain briefly, how an EM wave propagates in linear media? 5

8. (a) Deduce the energy density (energy /volume) in a region of a uniform magnetic field of density 'B' in vacuum. 10
- (b) Draw a neat and labelled diagram of a plane electromagnetic wave. 5
