Roll No ....

EX - 302

B.E. III Semester

Examination, June 2014

Electro-Magnetic Theory

Time : Three Hours

Maximum Marks : 70

Note:
  i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

  ii) All parts of each question are to be attempted at one place.

  iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

  iv) Except numericals, Derivation, Design and Drawing etc.

1. a) State Gauss law.   2
   b) State Coulomb's law.   2
   c) Give the physical significance of Curl.   3
   d) Two point charges of 0.7 mC and 4.9 μ C are situated in free space at (2,3,6) and (0,0,0). Calculate the force acting on the 0.7mC charge.   7

OR

Determine the electric field due to line charge.   7

2. a) Write Laplace's and Poisson's equations.   2
   b) Define perfect conductor.   2
   c) Define Convection and Conduction currents.   3
   d) Derive an expression for energy density in the electrostatic field.   7

OR

Derive the continuity equation for time varying field.   7

3. a) State Biot-Savart law.   2
   b) What is magnetic dipole?   2
   c) Explain Ampere's circuital law.   3
   d) Write short note on "Magnetic Torque".   7

OR

A circular loop of radius 'b' is in the xy plane and carries a current 'I'. Obtain an expression for the magnetic flux density at a point on the positive z-axis.   7

4. a) State Faraday's law of induction.   2
   b) What is displacement current?   2
   c) What is the difference between magnetic vector potential and magnetic scalar potential?   3
   d) The electric field in a source fee dielectric region is given as $\overline{E} = C\sin\alpha x\cos(\omega t - kz)\overline{a}_y \, V/m$. Determine the magnetic field intensity.   7

OR

Write Maxwell's equations in point and integral form.   7

5. a) Explain the difference between plane wave and uniform plane wave.   2
   b) What do you mean by polarization of wave?   2
   c) Explain the Brewster angle.   3
   d) The electric field intensity of a uniform plane wave in free space is given by $\overline{E} = 94.25\cos(\omega t + 6z)\overline{a}_x$. Determine the velocity of propagation, the wave frequency, and the wavelength.   7

OR

State and prove Poynting theorem.   7

******