Electromagnetic wave theory GT-6513

ws Oct Sacn- 10 85
Con. 6011-10.

(3 Hours) [Total Marks : 100]

N.B. : (1) Question No.1 is compulsory.
  (2) Attempt any four questions out of remaining six questions.
  (3) Figures to right indicates full marks.

1. Answer the following : (20)
 a). State and explain Coulomb's law.
 b). Explain Divergence.
 c). What do you mean by method of images?
 d). Define Poynting Vector.

2. a). Derive an expression for the electric field intensity due to an infinite surface charge (10)
 b). Calculate the total charge within the indicated volume $0 \le \rho \le 0.1, 0 \le \Phi \le \pi, 2 \le z \le 4$;
  given $\rho_v = \rho^2 z^2 \sin 0.6\Phi$. (10)

3. a). State and prove Gauss's law. Using Gauss's law, find an expression for flux density
  due to an infinite uniform surface charge. (10)
 b). Given the electric flux density, $D = 0.3r^2 a_r nc/m^2$ in free space: find the total electric
  flux leaving the sphere r = 4. (10)

4. a). Given the potential $V = 2x^2y - 5z$ and a point P (-4, 3, 6), find V, E D and ρ_v at P. (10)
 b). Find the amount of energy required to move a 4 C charge from B(1,0,0) to A (0,2,0)
  in the field $E = 5xa_x + 5ya_y$ V/m along the straight line path y = 2-2x, z = 0. (10)

5. a). Find out the capacitance of a spherical capacitor formed of two concentric spherical
  shells of radius a and b, b>a . (10)
 b). Derive an expression for magnetic field intensity due to finite long straight element.
   (10)

6. a). Two circular coils are located at the z = 0 plane and z = 5 m plane centered about the z
  axis. The first coil having a radius of 1 m carries a current of 10 Amp. The second coil
  having a radius of 0.5 m carries a current of 20 Amp. Calculate the magnetic field
  intensity H at(0,0,2.5m). (10)
 b). Derive Maxwell's equation in point form and integral form. (10)

7 . Write short notes on any two : (20)
  a) VSWR
  b) Laplace & Poisson's equation.
  c) scalar and vector magnetic potential.