C.U.SHAH UNIVERSITY
Winter Examination-2019

Subject Name : Electromagnetics

Subject Code : 4TE05EMS1   **Branch: B.Tech (EC)**

Semester : 5   **Date : 19/11/2019**   **Time : 10:30 To 01:30**   **Marks : 70**

Instructions:
   (1) Use of Programmable calculator & any other electronic instrument is prohibited.
   (2) Instructions written on main answer book are strictly to be obeyed.
   (3) Draw neat diagrams and figures (if necessary) at right places.
   (4) Assume suitable data if needed.

Q-1   **Attempt the following questions:**   **(14)**

    a) Mention Spherical to Cartesian coordination system transformation formula.
    b) Define electric field density.
    c) What is a del operator?
    d) What are Retarted potentials?
    e) Define magnetic field intensity
    f) What is Magnetization?
    g) State Uniqueness theorem.
    h) Define a vector field.
    i) Give definition of Unit Vector.
    j) Give equation of Wave Power.
    k) What is Skin effect?
    l) Define: Potential Difference
    m) State Faraday's Law
    n) State principle of conservation of charge.

Attempt any four questions from Q-2 to Q-8

Q-2   **Attempt all questions**   **(14)**
    (a) Explain electric field intensity due to surface charges.   **07**

    (b) Explain Biot-Savart's Law.   **07**

Q-3   **Attempt all questions**   **(14)**
    (a) Describe Stoke's Theorem for magnetic field.   **07**

    (b) Explain Metallic conductor and their properties.   **07**

Q-4   **Attempt all questions**   **(14)**
    (a) Explain Wave Propagation in free space   **07**
    (b) Describe Parallel plate capacitor & Coaxial capacitor   **07**

Q-5 **Attempt all questions** (14)
  (a) Explain Maxwell's equation in integral form 07
  (b) Describe Uniqueness theorem. 07

Q-6 **Attempt all questions** (14)
  (a) Describe boundary conditions for Conducting materials 07
  (b) Describe Nature of Dielectric materials. Explain Polarization. 07

Q-7 **Attempt all questions** (14)
  (a) The polarization within a region having relative permittivity of 2.7 has the 07
      uniform value $\overline{P} = -0.2\,\overline{a}_x + 0.7\,\overline{a}_y + 0.3\,\overline{a}_z$ µC / m^2. Find (i) Electric Field
      Intensity **E** (ii) Electric Field Density **D** (iii) the magnitude of the voltage
      gradient.

  (b) Find the magnitude of the current density in a conductor if (i) the electric field 07
      intensity is 0.09 V/m, the Volume charge density is -2x10^{10} C/m^3 and the electron
      mobility is 2.5 x 10^{-3} m^2/V s. (ii) There are 5 x 10^{28} conduction electrons / m^3 and
      the electron drift velocity is 0.05 mm/s (c) **E** = 0.05 V/m and the resistivity is
      2x10^{-8} Ω m.

Q-8 **Attempt all questions** (14)
  (a) Evaluate the Stokes' theorem for the field $\vec{H} = 6xy\vec{a_x} - 3y^2\vec{a_y}\frac{A}{m}$ and the 07
      rectangular path around the region, $2 \le x \le 5, -1 \le y \le 1$ and $z = 0$. Let the
      positive direction of $\vec{ds}$ be a_z.

  (b) Describe Poison's and Laplace Equations. 07