JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, October - 2020
ELECTROMAGNETIC FIELDS
(Electrical and Electronics Engineering)

Time: 2 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

1.a) Solve the electric field at a point on the axis of a uniformly charged infinite sheet.
  b) Three point charges 3, 4, 5 coulombs are situated in free space at the three corners of an equilateral triangle with side 5 cm. Calculate the energy density within the triangle. [8+7]

2.a) Derive the expression for Electric Potential at anypoint due to a point charge located at the origin.
  b) Point charges of 50 nC each are located at A(1,0,0), B(-1,0,0), C(0,1,0) and D(0,-1,0) in free space. Determine the total force on the charge at A. [8+7]

3. Derive the boundary conditions for (i) Dielectric-Dielectric interface (ii) Conductor-Dielectric interface. [15]

4.a) Obtain the expression for Ohm's Law in point form.
  b) Determine force with which the plates of a parallel plate capacitor attract each other? [7+8]

5.a) Derive the expression for the force between two finite current carrying loops?
  b) Evaluate H everywhere for an infinitely long coaxial transmission line of radius 'a' placed along z-axis which carries current along a_z. Sketch magnitude of H as a function of current. [8+7]

6.a) Obtain the relation between Magnetic vector potential and Magnetic flux density.
  b) If $H = y\, a_x - x\, a_y$ A/m on plane z=0, determine the current density. [8+7]

7.a) Given the fields $V = 80z \cos x \cos^3 \times 10^8\, t$ kV and $A = 26.7z \sin x \sin 3 \times 10^8\, t\, a_x$ mWb/m in free space, Evaluate E and H.
  b) Explain the Faradays laws of electromagnetic induction. [7+8]

8.a) A uniform plane wave at a frequency of 1 GHz is travelling in a large block of dielectric with $\epsilon_r = 55$, $\mu_r = 1$ and $\sigma = 0.05$ S/m. Determine γ, η, β and λ.
  b) Express Maxwell equations in Phasor form. [8+7]

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