Code: 9A04406

R09

B.Tech II Year II Semester (R09) Supplementary Examinations December/January 2015/2016
ELECTROMAGNETIC THEORY & TRANSMISSION LINES
(Electronics & Communication Engineering)

Time: 3 hours   Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Prove that energy density in an electro static field is $\frac{1}{2}\epsilon E^2$ in order to align 'n' charges.
   (b) Four point charges of 2nC, -2nC and 4nC are placed at points (2, 4, 6), (0, 0, 8), and (7, 9, 4,) respectively. Find the energy stored in the system.

2 (a) Derive the conditions for current density at the conductor – conductor interface.
   (b) Find the current density in a circular wire of radius 2 mm, when the current density is:
        $$J = 100(1 - e^r)i_z \, A/m^2 \, .$$

3 (a) Introduce the concept of magneto static field through Faraday's law.
   (b) Derive an expression for the magnetic field due to infinite plane sheet of uniform surface current density.

4 (a) Discuss about the inconsistency of Ampere's law and concept of displacement current density.
   (b) Explain the importance of displacement current.

5   Obtain wave equations in loss less and conducting medium for sinusoidal time variations.

6   Determine the normal incidence reflection coefficients for sea water, fresh water, and good earth at frequencies of 60 Hz, 1 MHz, 1 GHz, use ε_r = 80, σ = 4 s/m, for sea water; ε_r = 80, σ = 5 x 10^{-3} s/m for fresh water; and ε_r = 15, σ = 10 x 10^{-3} s/m for good earth.

7   The characteristic impedance of a certain line is $710 \angle -16^0$ when the frequency is 1 KHz. At this frequency the attenuation is 0.01neper/km and the phase constant is 0.035 rad/Km. Calculate the primary constants and the phase velocity.

8   Describe about smith chart and transients on transmission lines.

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