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Question Paper Code : 91435

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Third Semester

Electrical and Electronics Engineering

EE 2202/EE 34/EE 1201 A/080280017/10133 EE 303 — ELECTROMAGNETIC THEORY

(Common to PTEE 2202 — Electromagnetic Theory for B.E. (Part-Time) Second Semester Electrical and Electronics Engineering – Regulation 2009)

(Regulation 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Divergence Theorem.
2. What are the sources of electric field and magnetic field?
3. State Coulomb's law.
4. Define potential.
5. State Biot-Savart's law.
6. Define magnetic moment.
7. State the principle of superposition of fields.
8. What is the significance of displacement current?
9. Mention the properties of uniform plane wave.
10. Define loss tangent.

PART B — (5 × 16 = 80 marks)

11. (a) Derive electric field intensity at the given point due to line charge of infinite length. (16)

Or

- (b) (i) A circular ring of radius 'a' carries a uniform charge L C/m and is placed on the XY plane with the axis same as z axis. Find the electric field intensity. (8)
- (ii) If $G(r) = 10e^{-2z}(r a_r + a_z)$, determine the flux of $G(r)$ out of entire surface of the cylinder $r = 1$. (8)

12. (a) (i) Write down the uniqueness theorem and explain. (8)
(ii) Derive the expression for capacitance of a two-wire line. (8)

Or

- (b) Write the expression for Laplace and Poisson's equation and derive it for various coordinate systems. (16)

13. (a) (i) Calculate field using Ampere's Circuital law for infinitely long solenoid. (8)
(ii) A current filament of 5.0 A in the a_y direction is parallel to the y axis at $x = 2m$, $z = -2m$. Find H at the origin. (8)

Or

- (b) (i) Derive the expression for torque developed in a rectangular closed circuit carrying current I in a uniform field. (8)
(ii) An iron ring with a cross sectional area of 3 cm square and mean circumference of 15 cm is wound with 250 turns wire carrying a current of 0.3A. The relative permeability of ring is 1500. Calculate the flux established in the ring. (8)

14. (a) (i) Derive the magnetic boundary conditions. (8)
(ii) Find the maximum torque on an 85 turn rectangular coil, 0.2 m by 0.3m, carrying current of 2.0 A in a field $B = 6.5$ T. (8)

Or

- (b) (i) Find the self-inductance of a solenoid. (8)
(ii) Obtain the expression for the energy stored in magnetic field and energy density. (8)

15. (a) Briefly explain about the wave incident
(i) Normally on perfect conductor. (8)
(ii) Obliquely to the surface of perfect conductor. (8)

Or

- (b) (i) Write note on standing wave ratio. (8)
(ii) A circular loop conductor lies in plane $z = 0$ and has a radius of 0.1 m and resistance of 5 ohms. Given $B = 0.2 \sin 103t a_z$, determine current in the loop. (8)