

Question Paper Code : 53133

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2010.

Third Semester

Electrical and Electronics Engineering

EE 2202 — ELECTROMAGNETIC THEORY

(Regulation 2008)

Time : Three hours

Maximum : 100 Marks

Answer ALL questions

PART A — (10 × 2 = 20 Marks)

1. State divergence theorem.
2. Show that the vector $H = 3y^4 z^2 \mathbf{a}_x + 4x^3 z^2 \mathbf{a}_y + 3x^2 y^2 \mathbf{a}_z$ is solenoidal.
3. Define electric dipole and electric dipole moment.
4. Write Poisson's equation and Laplace equation for a simple medium.
5. State Biot-Savart's law.
6. What is the expression for inductance of a toroid?
7. State Faraday's law of electromagnetic induction.
8. State Maxwell's I and II equation.
9. State the Poynting theorem.
10. Mention any two properties of uniform plane wave.

PART B — (5 × 16 = 80 Marks)

11. (a) Transform the vector $\bar{A} = 4\mathbf{a}_x - 2\mathbf{a}_y - 4\mathbf{a}_z$ at $p(x = +2, y = +3, z = 4)$ to spherical coordinate.

Or

(b) Write short notes on the following :

- (i) Gradient (4)
- (ii) Divergence (4)
- (iii) Curl and (4)
- (iv) Stokes theorem. (4)

12. (a) Find the potential at any point along the axis of a uniformly charged disc of $\sigma \text{ C/m}^2$. The disc has radius of 'a' m.

Or

- (b) Deduce an expression for the capacitance of a parallel plate capacitor having two dielectric media.

13. (a) (i) Obtain an expression for the magnetic field intensity due to finite length current carrying conductor.
- (ii) Find the magnetic field intensity at any point on the axis of a circular coil carrying current with a loop radius of 'a' m.

Or

- (b) State and explain Ampere's circuital law and show that the field strength at the end of a long solenoid is one half of that at the centre.

14. (a) Obtain the expression for energy stored in the magnetic field and also derive the expression for magnetic energy density.

Or

- (b) Derive and explain Maxwell's equation in point and integral form using Ampere's circuital law and Faraday's law.

15. (a) Derive the relationship between electric field and magnetic field. Derive the wave equation for magnetic field in phasor form.

Or

- (b) Define Brewster angle and derive its expression.