Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50532

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Third/Seventh Semester

Electrical and Electronics Engineering

EE 8391 — ELECTROMAGNETIC THEORY

(Common to Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Divergence theorem.
2. Name few applications of Gauss Law in electro statics.
3. Define dielectric strength.
4. Give the relationship between potential gradient and electric field.
5. State Biot-Savarts law.
6. Write down the magnetic boundary conditions.
7. What is significance of displacement current density?
8. State Faraday's law of induction.
9. Mention the properties of uniform plane wave.
10. What is lossy dielectric medium?

PART B — (5 × 13 = 65 marks)

11. (a) Explain three co-ordinate system. (13)

Or

(b) A vector field D=[5r²/4]lr is given in spherical co-ordinates. Evaluate both sides of divergence theorem for the volume enclosed between r=1 and r=2. (13)

12. (a) Derive the boundary conditions of the normal and tangential components of electric field at the interface to two media with different dielectrics. (13)

Or

(b) (i) Explain Poisson's and Laplace's equations. (7)

(ii) A uniform line charge L=25 Nc/m lies on the x = 3 m and y = 4 m in free space. Find the electric field intensity at a point (2,3,15)m. (6)

13. (a) Derive the expressions for boundary conditions in magnetic fields. (13)

Or

(b) Derive the expression for magnetic flux intensity due to solenoid of the coil. (13)

14. (a) Derive general field relation for time varying electric and magnetic fields using Maxwell's equations. (13)

Or

(b) What are the different ways of EMF generation? Explain with the governing equations and suitable practical examples. (13)

15. (a) Briefly explain about the wave incident

(i) Normally on perfect conductor. (6)

(ii) Obliquely to the surface of perfect conductor. (7)

Or

(b) Derive the one dimensional general wave equation and find the solution for wave equation. (13)

PART C — (1 × 15 = 15 marks)

16. (a) A solenoid 25cm long 1cm mean diameter of the coil turns a uniformly distributed windings of 2000 turns, the solenoid is placed in uniform field of 2 tesla flux density, a current of 5A is passed through the winding. Determine the

(i) Maximum torque on the solenoid (5)

(ii) Maximum force on the solenoid (5)

(iii) Compute the magnetic moment on the solenoid. (5)

Or

(b) A plane wave propagating through a medium with r=8, ur=2 has E=0.5 sin (108t-Z)aZ V/m

Determine

(i) The loss tangent (4)

(ii) Wave impedance (4)

(iii) Wave velocity (4)

(iv) H field. (3)