Exam.Code:0935
Sub. Code: 33763

2124

B.E. (Electrical and Electronics Engineering)
Fifth Semester
PC-EE-503: Electromagnetic Fields Theory

Time allowed: 3 Hours Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit. Use of scientific calculator is allowed.

x-x-x

I. Attempt the following:-

a) Define Stoke's theorem. Give its importance.

b) How would you relate the electric field intensity and electric flux density?

c) Find the energy stored in inductor having current of 3A flowing through the inductor of 100mH.

d) Write the Maxwell's expression for free space.

e) How does displacement current different from conduction current. (5x2)

UNIT - I

II. a) Given that $D = (4y^2 a_x + 3x^2 y a_y + 15a_z)$ C/m^2. Verify both the sides of the divergence theorem and evaluate charge enclosed within $0 < x, y, z < 2$.

b) State and explain coulomb's law and deduce the vector form of force equation between the two-point charges. (2x5)

III. a) If potential of $V=x^2yz+Ay^3z$ Volts, (i) find A so that the Laplace's equation is satisfied. (ii) With that value A, determine the electric field at a point p whose coordinates are (2, 1, -1).

b) The capacitance of the condenser formed by two parallel metal sheets each of 100 cm^2 in area, are separated by a dielectric of 2 mm thick is $2x10^{-4}$ μF. A potential of 20 kV is applied to it. Find

(i) Electric flux (ii) Potential gradient (iii) The relative permittivity of the material. (2x5)

IV. a) Given that, $H = 20r^2 a_\phi$ A/m. Determine the current density J, also determine the total current that crosses the surface $r = 1m$, $0 < \varphi < 2\pi$ and $z = 0$ in cylindrical coordinate.

b) State and prove Gauss law and obtain the point form of gauss law. (2x5)

P.T.O.

UNIT - II

V. a) Using Biot-Savart's law, derive the magnetic field intensity on the axis of a circular loop of radius R carrying a steady current I.

b) Write the expression for Maxwell's curl equation for magnetic field from Ampere circuital law. (2x5)

VI. a) Describe about the magnetic boundary condition at the interface between two magnetic medium and derive the necessary boundary conditions.

b) A solenoid has an inductance of 20mH. If the length of the solenoid is increased by two times and the radius is decreased to half of its original value, Compute the new inductance. (2x5)

VII. a) Starting from Maxwell's equations, derive the wave equation for sinusoidal waves in good dielectric medium.

b) State and explain Poynting Theorem. (2x5)

x-x-x