Exam.Code:0935
Sub. Code: 6670

2074

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. (a) Express the value of differential volume in rectangular and cylindrical Co-ordinate systems.

(b) How can a vector field be expressed as the gradient of scalar field?

(c) State Poynting Theorem.

(d) What is magnetic susceptibility?

(e) What are the magnetic boundary conditions? (5x2)

UNIT - I

II. (a) Derive the expression for a potential at a point due to a point charge.

(b) Check validity of the divergence theorem considering the field $D=2xy\ a_x + x^2 a_y\ c/m^2$ and the rectangular parallelepiped formed by the planes x=0, x=1, y=0, y=2 &z=0, z=3. (2x5)

III. (a) Prove that divergence of a curl of a vector is Zerousing Stoke's theorem.

(b) Verify whether the following potential field satisfy the Laplace equation or not

i) $V = x^2 - y^2 + z^2$ ii) $V = r \cos \phi + z$ iii) $V = r \cos \theta + \phi$ (2x5)

IV. (a) Derive an expression for capacitance of co-axial cable.

(b) Derive the equation of continuity. (2x5)

UNIT - II

V. (a) Calculate the inductance of a solenoid of 200 turns wound tightly on a cylindrical tube of length 60 cm and diameter 6 cm. Derive the expression used.

(b) The circular loop conductor at z = 0 plane has a radius of 0.1 m and a resistance of 5Ω.

$B = 0.5 \sin (103t\ a_z)$ T. Find the current in the loop. (2x5)

P.T.O.

VI. (a) Derive the expression for co-efficient of coupling in terms of mutual and self-inductance.

(b) An iron ring with a cross sectional area of 3cm square and mean circumference of 15cm 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. (2x5)

VII. (a) Develop the concept of displacement current using Maxwell's equations.

(b) Explain the boundary conditions for two different dielectric mediums. (2x5)

x-x-x