ANNA UNIVERSITY OF TECHNOLOGY, COIMBATORE

B.E. / B.TECH. DEGREE EXAMINATIONS : NOV / DEC 2011

REGULATIONS : 2008

FOURTH SEMESTER : ECE

080290021 - ELECTROMAGNETIC FIELDS

Time : 3 Hours **Max.Marks : 100**

PART - A

(10 x 2 = 20 MARKS)

ANSWER ALL QUESTIONS

1. State Coulomb's law.
2. State the principle of superposition of fields.
3. Define Magnetic vector potential.
4. State Biot Savart's law.
5. Write Dielectric Boundary conditions.
6. Write Laplace and Poisson's equation.
7. State Poynting theorem.
8. Write Point form of Maxwell's equations.
9. Write general wave equation.
10. What are the types of polarization?

PART - B

(5 x 16 = 80 MARKS)

ANSWER ALL QUESTIONS

11. a) i) Derive the expression for electric field intensity on the axis of charged Circular disc of radius 'a' m with σ coulombs. (8)

ii) Two small identical conducting spheres have charge of 2×10^{-9} coulombs and -0.5×10^{-9} coulombs respectively. If they are brought in contact and then separated by 4cm, what is the force between them. (8)

OR

11. b) State and Prove Gauss's Law

12 a) i) Derive the expression for torque experienced by a current carrying loop, placed in a magnetic field , with neat diagram (12)

ii) A solenoid with length 10cm and radius 1cm has 450 turns. Calculate its inductance (4)

OR

12 b) Derive the expression for force on a wire carrying a current I placed in a magnetic field, with neat diagram

13 a) i) Derive Laplace and Poisson's equation (6)

ii) Find V at P(2, 1, 3) for the field of two co-axial conducting cones, with V= 50 V at $\theta = 30^{\circ}$ and V= 20 V at $\theta = 50^{\circ}$ (10)

OR

13 b) i) Show that the inductance of the cable $L = \mu l / 2\pi$ (ln b/a) H (12)

ii) Derive the expression for curl H = J (4)

14 a) Derive the field form and integral form of Maxwell's equations, from statement

OR

14 b) Show that energy produced per unit volume per second is equal to sum of energy stored per unit volume per second and the energy crossed per unit volume per second

15 a) Calculate intrinsic impedance η, the propagation constant γ and wave velocity v for a conducting medium in which σ = 58 MS/m, μ_r = 1, ε_r = 1 at afrequency of 100MHZ

OR

15 b) Explain reflection of uniform plane waves with normal incidence and oblique incidence at a plane dielectric boundary.

*****THE END*****