B.E (Full Time) DEGREE END SEMESTER EXAMINATIONS, MAY 2012

ELECTRONICS AND COMMUNICATION ENGINEERING

THIRD SEMESTER

EC271 – ELECTROMAGNETICS FIELDS AND WAVES

(REGULATIONS 2004)

Time: 3Hrs Max Marks: 100

Answer ALL Questions

Part – A (10x2=20)

1. State coulomb's law and give its significance.
2. Find the gradient for the scalar field $A=x^2y+xyz$
3. Using amperes law find the magnetic field around the infinitely long current carrying conductor.
4. State gauss law for magnetic fields.
5. Define polarization
6. Define dielectric strength.
7. Explain conduction current and displacement current.
8. Give any two comparisons between circuit theory and field thery
9. Define skin depth
10. Define Brewster angle.

Part –B (5x16=80)

11. (i) Using gauss law find the electric filed intensity for the uniformly charged sphere of radius a. find the **E** everywhere. (10)

    (ii) State and prove divergence theorem. (6)

12. a. Derive vector magnetic potential from BiotSavart law. (16)

OR

12.b.(i)Find the magnetic flux density for the infinite current sheet in the xy plane with current density $\mathbf{K}=\mathbf{K_y a_y}$ A/m current. (8)

(ii) Derive the equation to find the force between the two current elements. (8)

13. a. Derive the boundary condition for the E-field and H-field in the interference between dielectric and free space. (16)

OR

13.b(i) Find the capacitance for a coaxial capacitor with inner radius 'a' and outer radius 'b' with length L. (8)

(ii). Derive the equation for the magnetization for the materials and show that

$J_b = \nabla \times m$ and $K_b = m \times a_n$. (8)

14. a. From the basic laws derive the time varying Maxwell's equation and explain the significance of each equation in detail. (16)

OR

14b.(i) State and derive poynting theorem. (8)

(ii) Explain the transformer emf using Faraday's law. (8)

15a. Starting from Maxwell's equation derive the equation for E field in the form of wave in free space. (16)

OR

15b. Explain the condition and propagation of uniform plane waves in good conductors. (16)