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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MODEL EXAMINATION

QUESTION PAPER-1

SUBJECT CODE: EC2253

SUBJECT NAME: ELECTROMAGENTIC FIELDS   **MARKS:100**

PART-A (10X2=20)

1.State Divergence Theorem.

2.Find whether the following field is solenoid F=Xi-2Yj+Zk.

3.State BIOT-SAVART's Law.

4.Give Ampere's Circuital Law in point form.

5.Give the continuity equation of current. And give the physical importance of the equation .

6.Define Self Inductance

7.Give the four Maxwell's equation in point form.

8.State Poynting theorem.

9.Define skin depth

10.Define Brewster's Angle.

PART-B (5X16=80)

11. (a) (i) Find the total electric field at the origin due to 10^{-8}C charge located at P(4,0,4)m and a

-0.5x10^{-8}C charge at Q (2, 0, 2) m (8)

(ii) Derive the expression for the potential, electric field and torque due to dipole (8)

Or

(b) State and prove Gauss's Law. Explain the variation of the electric field with respect to the radius of the sphere for the following geometries (16)

1) Single sphere of charge

2) Two Concentric shells of charge q1 and q2.

3) Spherical volume distribution of charge.

12. (a) (i) Using BIOT-SAVART'S Law, derive the magnetic field intensity of a circular disc along the axis of the disc. And deduce the equation to the center of the circular disc (8)

(ii) Derive the applications of Ampere's Circuital Law (8)

Or

(b) (i) Derive the scalar and magnetic vector potential of a magnetic field(10)

(ii) Derive an expression for the torque of a current carrying loop (6)

13. (a) (i) Solve the Laplace's equation for the potential field in a homogenous region between two concentric conducting spheres with radius 'a' and 'b' where b>a, V=0 at r=b and V=V_o at r=a. Find the capacitance between two concentric spheres. (10)

(ii) Derive the Poisson's and Laplace's equation. (6)

Or

(b) (i) Derive the equation of the inductance of a toroid(8)

(ii) Derive an expression for the energy and energy density of a magnetic field (8)

14. (a) (i) Derive the expression for displacement current density and conduction current density? (8)

(ii) Justify the inconsistency of Ampere's circuital law and derive the proof of modified form of ampere's circuital law (8)

Or

(b) (i) Derive the expression for the equation of instantaneous ,reactive and complex power(8)

(ii) Derive the expression for the power of co-axial cable (8)

15. (a) (i)From the Maxwell's equation , Find the electromagnetic wave equation in the conducting medium in the E and H fields(10)

(ii) Explain about the depth of penetration (6)

Or

(b) (i) Explain the types of polarization of uniform plane waves(10)

(ii) Derive an expression for Brewster's angle (6)