Reg. No. : | | | | | | | | | | |

Question Paper Code: 41042

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2015.

Fourth Semester

Electronics and Communication Engineering

01UEC403 – ELECTROMAGNETIC FIELDS

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. State divergence theorem.
2. What is an electric dipole? Write down the potential due to an electric dipole.
3. Define Biot –Savarts Law in vector form.
4. Give Lorentz force Equation.
5. Define Polarization.
6. Give the relation between mutual inductance and self inductance.
7. Write the Maxwell's equation in integral form.
8. State Poynting theorem.
9. Determine the skin depth of copper at 60Hz with $\sigma = 5.8 \times 10^7$ s/m. Given $\mu_r = 1$.
10. What is meant by polarization of a uniform plane wave?

PART - B (5 x 16 = 80 Marks)

11. (a) (i) State and prove Stokes theorem. (8)

(ii) State Coulomb's Law. Derive the vector form of Coulomb's Law. (8)

Or

(b) (i) Derive the expression for the electric field due to a straight and infinite uniformly charged wire of length '*L*' meters at a point *P*. (10)

(ii) State and prove Gauss law. (6)

12. (a) Derive an expression for magnetic field intensity on the axis of a circular loop of radius '*a*' carrying current *I*. (16)

Or

(b) (i) Derive the equation for torque on a current carrying loop. (8)

(ii) Obtain the expressions for scalar and vector magnetic potential. (8)

13. (a) Derive an expression for capacitance of concentric spheres using Laplace equation. (16)

Or

(b) (i) Derive an expression for inductance of a solenoid with *N* turns and l meter length carrying a current of *I* amperes. (8)

(ii) Derive the expression for the inductance of the Toroid. (8)

14. (a) Derive the Maxwell's equation in both differential form and integral form from (i) Ampere's law (ii) Gauss law (iii) Faraday's law. (16)

Or

(b) Derive the expression for total power flow in co-axial cable. (16)

15. (a) Derive the wave equations from Maxwell's equations. Give the illustration for plane waves in good conductors. (16)

Or

(b) (i) Explain different types of polarizations of uniform plane wave. (8)

(ii) Explain in detail on what happens when the wave is incident normally and perfect conductor. (8)

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