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

Question Paper Code: 34403

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

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 Stoke's theorem.
2. Define curl and gradient of a vector.
3. What is magnetic flux density?
4. Define Biot Savart's law.
5. Define mutual inductance.
6. Define capacitance and state the factors on which it depends.
7. Moist soil is having the conductivity of 10^{-3} *s/m* and $\varepsilon_r = 2.5$. If $E = 4 \sin 8t$, then find the conduction current density.
8. Define electric dipole and dipole moment.
9. What is skin effect?
10. What are the standing waves?

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Develop an expression for an electric field due to an infinite sheet of charge having uniform charge density ρ_s C/m^2,placed in *xy* plane cut a point *P* on *z*-axis at a distance of '*z*' *m* from the origin. (10)

(ii) Show the expressions to find the '*E*' for charged infinite line, charged finite line and charged circular disc. (6)

Or

(b) State and prove divergence theorem. (16)

12. (a) (i) Derive the expression for torque developed in a rectangular closed circuit carrying current I in a uniform field. (8)

(ii) State Ampere's circuital law and explain any two applications of Ampere's Circuital law. (8)

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 the boundary conditions of the normal and tangential components of magnetic field at the inter face of two media with different dielectrics. (16)

Or

(b) Derive the capacitance of the spherical capacitor and parallel plate capacitor using Laplace equation. (16)

14. (a) State Ampere's circuital law and prove the modified form of Ampere's circuital law as Maxwell's first equation in integral form. (16)

Or

(b) (i) State and prove poynting theorem. (8)

(ii) Derive the expression for total power flow in co-axial cable. (8)

15. (a) Derive the electromagnetic wave equations in frequency domain and obtain the expressions for intrinsic impedance and propagation constant for free space, conductor and dielectric medium. (16)

Or

(b) Explain about the wave incident normally on perfect conductor and obliquely to the surface of perfect conductor. (16)