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

Question Paper Code: 31443

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

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. Define Electric potential.
3. State Ampere's circuital law.
4. Define magnetic vector potential.
5. Define polarization.
6. Distinguish between scalar and magnetic vector potential.
7. State Lenz's law.
8. What is displacement current density?
9. Write the equation for skin depth of a conductor.
10. What are the standing waves?

PART - B (5 x 16 = 80 Marks)

11. (a) Using Gauss's law, calculate the E due to infinitely large uniformly charged plate. (16)

Or

(b) Given point $P(-1, 4, 3)$ and vector $A = y a_x + (x + z) a_y$, express P and A in cylindrical and spherical coordinates. Evaluate A at P in the Cylindrical and spherical systems. (16)

12. (a) Derive the expression for the magnetic field intensity inside and outside a co-axial conductor of inner radius a, outer radius b and carrying a current of I amperes in the inner and outer conductors. (16)

Or

(b) Derive a general expression for the magnetic flux density B at any point along the axis of a long solenoid. Sketch the variation of B from point to point along the axis. (16)

13. (a) State and derive electric boundary conditions for a dielectric to dielectric medium and a conductor to dielectric medium. (16)

Or

(b) Conducting spherical shells with radii $a = 10$ cm and $b = 30$ cm are maintained at a potential difference of 100 V such that $V(r = b) = 0$ and $V(r = a) = 100$ V. Determine V and E in the region between the shells. If $\varepsilon_r = 2.5$ in the region, determine the total charge induced on the shells and the capacitance of the capacitor. (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) Derive and explain Maxwell's equations both in integral and point forms. (16)

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) Discuss about normal incidence and oblique incidence with respect to plane waves. (16)

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