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Question Paper Code : 50439

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Fourth Semester
Electronics and Communication Engineering
EC 6403 : ELECTROMAGNETIC FIELDS
(Regulations 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A**(10×2=20 Marks)**

1. State Gauss Law.
2. State stokes theorem.
3. What is polarization ?
4. Define skin depth.
5. State amperes circuital law.
6. A long straight wire carries a current $I = 10 \text{ mA}$. At what distance is the magnetic field intensity is 15 A/m ?
7. What is the inductance of a toroid for the coil of N turns ?
8. Write the Lorentz force equation for a moving charge.
9. State Faradays law.
10. What is the importance of Poynting vector ?

PART – B**(5×13=65 Marks)**

11. a) Find the electric field due to infinite long conductor and infinite sheet of charge using Gauss law. (13)
- (OR)
- b) Derive the energy stored in electrostatic field in terms of field quantities. (13)



12. a) A cylindrical capacitor consists of an inner conductor of radius 'a' and an outer conductor whose inner radius is 'b'. The space between the conductors is filled with a dielectric permittivity ϵ_r and length of the capacitor is L. Find the value of the capacitance. (13)

(OR)

- b) i) State the relationship between polarization and electric field intensity. (7)
 ii) Write down the general procedure for solving Poisson's and Laplace's equation. (6)

13. a) Derive a general expression for the magnetic flux density B, at any point along the axis of a long solenoid. (13)

(OR)

- b) Using Biot-Savart's law, determine the magnetic field intensity due to a straight current carrying filamentary conductor of finite length AB. (13)

14. a) Derive the boundary conditions for magnetostatic fields at the interface of two different medium with permeability μ_1 and μ_2 . (13)

(OR)

- b) Planes $Z = 0$ and $Z = 4$ carry current $K = -10 \mathbf{a}_x$ A/m and $K = 10 \mathbf{a}_x$ A/m, respectively. Determine H at (1, 1, 1) and (0, -3, 10). (13)

15. a) Derive the Maxwell's equation in point and integral form. (13)

(OR)

- b) Deduce the Poynting's theorem from Maxwells equation and find the total time average power, crossing a given surface S. (13)

PART - C

(1×15=15 Marks)

16. a) In a medium characterized by $\sigma = 0$, $\mu = \mu_0$, $\epsilon = 4\epsilon_0$ and $\mathbf{E} = 20 \sin(10^8 t - \beta z) \mathbf{a}_y$ V/m. Calculate β and H.

(OR)

- b) A parallel-plate capacitor with plate area of 5 cm^2 and plate separation of 3 mm has a voltage $50 \sin 10^3 t$ V applied to its plates. Calculate the displacement current assuming $\epsilon = 2\epsilon_0$.