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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 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 εr 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 = $-10\ a_x$ A/m and K = $10\ a_x$ 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 $\sigma = 0$, $\mu = \mu_0$, $\varepsilon = 4\varepsilon_0$ and $E = 20 \sin (10^8 t - \beta z)\ a_y$ 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 10^3tV applied to its plates. Calculate the displacement current assuming $\varepsilon = 2\varepsilon_0$.