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

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 $\varepsilon = 2\varepsilon_0$.