PVP 14

Code: EE3T5

II B.Tech - I Semester – Regular/Supplementary Examinations
November 2019

ELECTROMAGNETIC FIELDS
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks
11x 2 = 22 M

1.

a) State Gauss Law.
b) Identify the unit vector and its magnitude corresponding to the given Vector $A=5\,\hat{a}_x + \hat{a}_y + 3\,\hat{a}_z$.
c) Give the expression for the electric torque experienced by a force in vector form. Why the electrostatic potential is continuous at boundary?
d) State Ohm's law in Point form.
e) List the applications of Ampere's Circuital law.
f) State Biot-Savart's law.
g) Express the inductance of a toroid for the coil of N turns.
h) State the Lorentz force equation for a moving charge.
i) State Faraday's laws of electromagnetic induction in point form.
j) State Poynting theorem and write the expression in integral form.

k) Define self and mutual inductance.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 3 x 16 = 48 M

2. a) State and explain Coulomb's law for the vector force between two point charges in free space. 8 M

b) Solve Laplace's equation for the potential field in the homogeneous region between two concentric conducting spheres with radii 'a' and 'b', b>a, if V = 0 at r = b, and $V = V_o$ at r = a. 8 M

3. a) Obtain the expression for electric field intensity due to an electric dipole. 8 M

b) Derive the equations for Dielectric - Dielectric boundary conditions. 8 M

4. a) State Ampere's circuital law and hence derive $\nabla X \vec{H} = \vec{J}$. 8 M

b) Obtain an expression for the magnetic flux density and field intensity due to finite long current carrying conductor. 8 M

5. a) Derive an expression to obtain relation between magnetic torque (T) and dipole moment (m). 8 M

b) Obtain the expression for energy stored in magnetic field and also derive an expression for magnetic energy density. 8 M

6. a) Derive the expression for displacement current density. 8 M

b) In a given lossy dielectric medium, conduction current density $J_c=0.02\sin 10^9 t$ A/m^2 . Find the displacement current density, if $\sigma = 10^3$ S /m and $\in_r = 6.5$ 8 M