B.Tech.

Fourth Semester Examination, 2014-15

Electromagnetic Theory

Time: 3 Hours **Total Marks: 100**

Note: - Attempt all questions. Each questions carry equal marks.

1. Attempt any four parts of the following: **5x4=20**

(a) Convert (z/xy) $\hat{R}$ in to spherical system.
(b) Differentiate in between Green's and stokes theorem.
(c) Differentiate in between Poission's and Laplace Equation
(d) Find out the area of the surface defined by:
(e) R=1m, h=2 m, $30° < \phi < 60°$
(f) Develop an expression for $\vec{E}$ due to charge uniformly distributed over an infinite plane with density ϕ_s .
(g) State and prove Gauss Law.

2. Answer any two parts of the following: **10x2=20**

(a) Discuss divergence theorem. Calculate the Energy stored by origin centred cube if there exists electric field of $\vec{E} = 2\hat{\imath} - 3\hat{\jmath} + 4\hat{k}$, Deduce the results also.
(b) Discuss Boundary conditions for electric fields. Calculate with angle the value of E in air if it is separated by water and there exists field $\vec{E}$ as $2\hat{\jmath} + 2\hat{k}$ w.r.t. z interface.
(c) Find the magnetic flux crossing the surface defined by $-\pi/4 \leq \phi \leq \pi/4$, $0 \leq z \leq 1$m & $\vec{H} = (\cos\phi)/r\ \hat{a}_r$ A/m
Discuss Amperes Law with its conditions for applications. Hence differentiate in between Electrical & Magnetic potential.

3. Attempt any two parts of the following: **10x2=20**

(a) Calculate the capacitance of Coaxial cable using necessary & sufficient notations.
(b) Calculate the resistance of a tapered bar using necessary & sufficient notations.

(c) Calculate the Inductance of a Toriod which is having cir... cross sectional area using necessary & sufficient notations.

10x2=20

4. Attempt any two parts of the following:

(a) Discuss Maxwell's Equations for time varying fields. What is displacement current? How it is measured. Given $\vec{B}=B_0\cos(\omega t+\beta x)\hat{k}$. Calculate $\vec{D}$, $\vec{E}$ & $\vec{H}$.

(b) Justify the validity of following any four statements with proper reasons.

(i) Plane wave cannot have $\vec{E}$, $\vec{H}$ and $\vec{P}$ (Electric field, Magnetic field & Propagation Vector) in same plane.

(ii) "Depletion width in p-n diode can be calculated by Poisson's equation"

(iii) "parallel polarization provides Bwester angle"

(iv) "Metals are having problems of skin depth"

(v) "Length of antenna is doubled if it is grounded"

(vi) "Divergence of a curl of vector is zero"

(c) Draw the model of transmission line. Justify "Normalised Impedance is repeated at every distance of $\lambda/2$ in transmission line". Discuss method of stub matching using smith chart and write their mathematical expressions.

5. Write short notes on any four parts: **5x4=20**

(a) Wave guides

(b) Quarter wave transformer

(c) Continuity Equation

(d) Vector potential

(e) Smith Chart

(f) Image Method.