(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2110 Roll No.

B.Tech.

(SEM. V) ODD SEMESTER THEORY EXAMINATION 2013-14

FUNDAMENTALS OF E.M. THEORY

Time : 2 Hours *Total Marks : 50*

Note :– Attempt **all** questions.

1. Attempt any **four** parts : **(3.5×4=14)**

(a) Explain the physical significance of Gradient, Divergence and Curl.

(b) Prove the electric field vector E = – (gradV). Where V is a scalar potential field.

(c) Prove the relation between angular velocity and linear velocity i.e. w = ½ Curl v.

(d) Verify the scalar field $S = r^2 z \cos 2\Phi$ in cylindrical coordinates. Is it a solution of Laplace's equation ?

(e) State the Gauss's law and derive the related Maxwell Equation.

(f) Derive expression for electric field due to infinite sheet charge on y-z plane.

2. Attempt any **two** parts : **(6×2=12)**

(a) Explain the tangential and normal boundary conditions between two dielectrics.

(b) Derive the expression for capacitance of cylindrical capacitor using Gauss's Law.

(c) Two radial planes are inclined to each other at an angle α, there is an insulating gap at $r = 0$. Using Laplace's Equation obtain vector E as a function of ϕ.

3. Attempt any **two** parts : **(6×2=12)**

(a) Derive the magnetic field at some point on perpendicular bisector of infinite long straight current conductor.

(b) Derive the expression for inductance per unit length of coaxial conductors.

(c) Derive the time varying Maxwell Equation for Curl of H and also mention its physical significance.

4. Attempt any **two** parts : **(6×2=12)**

(a) The electric field intensity of an electromagnetic wave in free space is given by $E = E_{y_0} e^{jw\left(t - x/v\right)} \hat{a}_y$. Find the expressions for the magnetic field intensity by using Maxwell equation.

(b) Discuss the solution of plane wave equation in conducting media (Lossy Dielectric). Derive the above upto Propagation Constant, Attenuation Constant and Phase Constant.

(c) Explain the reflection of plane wave for the normal incidence. Discuss about Reflection and Transmission coefficient for E and H.