Printed Pages : 1 **EC-402**

(Following Paper ID and Roll No. to be filled in your Answer Books)										
PAPER ID :	**Roll No.**									

B.TECH.
Theory Examination (Semester-IV) 2015-16
ELECTROMAGNETIC FIELD THEORY (EMFT)

Time : 3 Hours ***Max. Marks : 100***

SECTION –A

1. Attempt all the parts. **(2 ×10 = 20)**

a) What is the divergence of curl of a vector?
b) Write the Poisson's and Laplace equation.
c) State Gauss's Law for magnetic field.
d) Write the wave equation in a conducting medium.
e) Write the condition for distortion less transmission line.
f) Verify that the vectors A = 4ax - 2ay + 2az and B = - 6ax + 3ay - 3az are parallel to each other.
g) Give the relationship between potential gradient and electric field.
h) Write the Maxwell's equations in integral & differential form.
i) Write the various parameters of a transmission line.
j) What is complex pointing vector?

SECTION-B

2. Attempt any 5 questions from this section. **(5 x 10=50)**

a) i) Find the divergence of a vector A = $8x^2i_x + 5x^2y^2i_y + xyz^3i_z$ and del ∇ of a scalar function x^2 yz.
ii) Described the gradient of a scalar field.
b) Given point P (-2, 6, 3) and vector A= yax + (x+z)ay. Evaluate A and at P in the Cartesian, cylindrical and spherical systems
c) Determine the self –inductance of coaxial cable of inner radius **a** and outer radius **b.**
d) Point charges +3μC and -3μC are located at (0, 0, 1 mm) and (0, 0, -1 mm) respectively in free space.
i) Find the dipole moment $\bar{P}$.
ii) Find the electric field intensity vector $\overline{E}$ in spherical components at point P(r = 2, $\theta = 40°$, $\emptyset = 50°$)
e) State and derive ampere circuital law. A single turns circle coil of 50 meters in diameter carries current 28×10^4 Amp.Determine the magnetic field intensity H at a point on the axis of coil and 100 meters from the coil. The relative permeability of free space surrounding the coil is unity.
f) Derive transmission line differential equation. Derive the condition of loss-less transmission from it.
g) Using the concept of Maxwell's equation explain how waves propagates in guided waves.
h) Determine the magnetic flux density B at a distance d meter from an infinite straight wire carrying current I. Also find out when the length of the wire is semi-infinite.

SECTION-C

Attempt any 2 questions from this section. **(2 x 15=30)**

3. (a) Discuss and proof the Poynting's theorem and also mention its application.
(b) Establish the following vector identity:
(i) $A \times (B + C) = (A.C)B - (A.B)C$
(ii) $\nabla.(\nabla \times A) = 0$

4. (a) Derive the electric field for each possible case due to an uniformly charged sphere of radius R and volume charge density ρ.
(b) Define dielectric – dielectric boundary conditions.

5. (a) What is meant by distortionless line? Compare the advantage and disadvantage of coaxial cables and two wire transmission line.
(b) Discuss the following terms as applied to vector field:
(i) Gradient
(ii) Curl and its physical interpretation