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

PAPER ID : 3036 Roll No. | | | | | | | | | | |

B.Tech.

FOURTH SEMESTER EXAMINATION, 2004-2005

ELECTROMAGNETIC FIELD THEORY

Time : 3 Hours *Total Marks : 100*

Note : *(i) Attempt **ALL** the questions.*

(ii) All questions carry equal marks.

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

(a) What is vector field ? Discuss cross product and dot product in details between two vectors in cartesian coordinate systems.

(b) Discuss the physical interpretaition of gradient, Divergence and curl operation.

(c) What is stoke's theorem ? State and prove the theorem in spherical coordinate system.

(d) What is Gauss's law ? State and prove in a particular coordinate system.

(e) Discuss the vector representation of surfaces in details.

(f) Compare the scalar and vector fields and show the difference between the two.

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

(a) Discuss various boundary conditions as applied to electric field between two dielectric media.

(b) Discuss boundary conditions for magnetic fields between two media.

(c) What is difference between Laplace and Poisson's equations ? Discuss Poisson's equation in one dimension taking an example of your own.

(d) What is method of images as applied to plane boundries ? Discuss in detail taking a suitable example.

(e) What is electrostatic energy ? Discuss the energy stored in a capacitor which is charged to a voltage V.

(f) Discuss how you will find the electric field due to point charges at a particular point.

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

(a) What is Ampere's circuital law ? State and obtain the necessary relation of force due to a current I in a conductor.

(b) What is Faraday's law ? Give the statement and prove it.

(c) Disucss the energy stored in magnetic field, where the magnetic field internsity is given by H.

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

(a) Write the maxwell's equations and give the physical interpretation of each.

(b) Derive the wave equation for electric field and indicate how the propagation constant controls the wave propagation in a medium.

(c) Discuss the following terms :

(i) Phase velocity.

(ii) Group velocity.

(iii) Impedance of the medium.

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

(a) What is Poynting vector ? Discuss the Poynting theorem and explain the physical meaning of each integral involved therein.

(b) What do you mean by polarization of a wave ? Show that linear polarization is related to circular polarization of the wave.

(c) What is skin effect ? Discuss depth of penetration of a wave in a conducting medium.