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(Pages : 2)

Name.....

Reg. No.....

**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION  
OCTOBER 2012**

EC 09 503—ELECTROMAGNETIC FIELD THEORY

(2009 Scheme)

Time : Three Hours

Maximum : 70 Marks

**Part A**

*Answer all questions.*

1. If  $\vec{A} = 4y \vec{a}_x - 3x \vec{a}_y$ , find the curl of  $\vec{A}$ .
2. Write down the boundary conditions at the interface separating conductor and free space.
3. Write down the maxwell's equation in point form and differential form from Ampere's circuital law.
4. What is Penetration depth ?
5. What is Skin effect ?

(5 × 2 = 10 marks)



**Part B**

*Answer four questions.*

1. Derive the expression for Energy stored in a magnetic field.
2. Derive the expression for magnetic field intensity due to magnetic dipole.
3. Derive the Maxwell's equation from Gauss's law.
4. Write the characteristics of Transverse magnetic waves.
5. Explain linear polarization of a wave.
6. Write in brief the different modes of propagation in circular waveguide.

(4 × 5 = 20 marks)

**Part C**

*Answer all questions.*

1. A point charge loope is located at (4, -1, 3) while the X-axis carries charge  $2nC/m$ . If the plane  $z = 3$  also carries a charge of  $5nC/m^2$ , find the electric field intensity at (1, 1, 1) due to all these charge distributions.

*Or*

2. Derive the expression for capacitance due to spherical capacitor.

Turn over

3. Derive the wave equations for plane waves.

*Or*

4. If  $V = \frac{20 \sin \theta}{r^3}$  in free space, find the charge density using Poisson's equation.

5. Derive the expression for field intensities due to plane waves in lossless dielectrics.

*Or*

6. Derive the expression for attenuation factor due to attenuation of TE waves between parallel planes.

7. Derive the various parameters of a transmission line.

*Or*

8. Explain  $T_m$  wave propagation in circular waveguides and field distributions.

(4 × 10 = 40 marks)

