D 30951 (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 ?

$(5 \times 2 = 10 \text{ marks})$

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.

$(4 \times 5 = 20 \text{ marks})$

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 $V = \dfrac{20\sin\theta}{r^3}$ 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.

$(4 \times 10 = 40 \text{ marks})$