

B.Tech. (AEIE) 4th Semester F. Scheme Examination,
May-2015

ELECTROMAGNETIC THEORY

Paper-EE-208-F

Time allowed : 3 hours [Maximum marks : 100]

Note : Question No. 1 is compulsory, and attempt one question from each of the four sections. All questions carry equal marks.

1. (a) State Coulomb's law and write the mathematical expression. 3
- (b) State the equation of continuity. 3
- (c) What is Lorentz law of force ? 3
- (d) What do you mean by displacement current density ? 3
- (e) Write down the physical interpretation of Poynting vector. 3
- (f) What is the velocity of electromagnetic wave in free space and in lossless dielectric ? 2
- (g) What is polarization ? 3

Section-A

2. (a) Derive the Stoke's theorem and give any one application of theorem in electromagnetic fields. 10

- (b) Prove that the cylindrical coordinate system is orthogonal. 10
3. (a) Derive the expression of capacitance between two coaxial cylinders of radii a and b such that $b > a$.
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- (b) Derive the Laplace's equation. Discuss the use of Laplace's equation in rectangular, cylindrical and spherical coordinates. 12

Section-B

4. (a) Define 10
 - (a) Dipole
 - (b) Dipole moment
- (b) What is the method of images ? Explain its use by taking a specific example. 10
5. (a) Derive the boundary conditions for electric fields at the interface between two dielectrics. 10
- (b) Derive the equation for energy density in an electrostatic field. 10

Section-C

6. (a) State Ampere's law and briefly discuss its applications. 10
- (b) Write short note on magnetic vector potential. 10

7. (a) Briefly explain : 10
(a) Magnetic dipole
(b) Energy in magnetic field
(b) Derive magnetic boundary conditions at magnetic surfaces. 10

Section-D

8. (a) State and derive Maxwell's equation in differential and integral form. 10
(b) Define and derive skin depth. Calculate the skin depth for a medium with conductivity 100mho/m, relative permeability 2, relative permittivity 3, at 50 Hz, 1 Mhz and 1 Ghz. 10
9. (a) Define wave and derive the wave equation for a non-dissipative medium. 10
(b) Derive the transmission and reflection coefficient for the electromagnetic waves. Discuss the above for an open loop and a short circuited line. 10

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