

Roll No

EX - 302**B.E. III Semester**

Examination, June 2016

Electro-Magnetic Theory*Time : Three Hours**Maximum Marks : 70*

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
 ii) All parts of each question are to be attempted at one place.
 iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.
 iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Write the statement of Divergence theorem.
 b) State Gauss law.
 c) Give the physical significance of Curl.
 d) Transform the vector field $\vec{w} = 10\vec{a}_x - 8\vec{a}_y + 6\vec{a}_z$ to cylindrical co-ordinate system, at point p(10, -8, 6).

OR

Transform the vector field $F = 2r \cos \phi \vec{a}_r + a_\phi$ into Cartesian co-ordinates and evaluate it at P(4, -2, 3). Also find a unit vector a_P at P.

Unit - II

2. a) What is an electric dipole and its dipole moment?
 b) Define perfect conductor.
 c) Define magnetic flux, flux density and magnetic field intensity.
 d) A point charge of 6nC is located at the origin in free space. Find V_p if point P is located at (0.2, -0.4, 0.4) and
 i) $V = 0$ at infinity
 ii) $V = 0$ at (1, 0, 0)
 iii) $V = 20$ volts at (-0.5, 1, -1)

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OR

Verify that the expression for the potential due to an electric dipole satisfies the Laplace equation.

Unit - III

3. a) State Ampere's circuital law as applied to time varying magnetic field.
 b) State Biot Savart's law.
 c) Derive the expression for force between two current carrying wires.
 d) Derive the expression for ohm's law in point form and continuity equation.

OR

Calculate the magnetic flux density produced by a current loop of radius 'R' on the loop axis when the loop is carrying a current 'I' and situated in air.

Unit - IV

4. a) Derive an expression for induction of the solenoid and toroid.
 b) Write the statement of Faraday's law.
 c) What is the difference between magnetic vector potential and magnetic scalar potential.
 d) Write down and explain Maxwell's equations in point form and integral form.

OR

Derive the expression for the energy stored in a magnetic field.

Unit - V

5. a) State Poynting theorem.
 b) Define skin depth.
 c) Derive the EM wave equation.
 d) What is meant by polarization of a wave? When is a wave linearly polarized? When is a wave circularly polarized?

OR

Write a short note on uniform plane wave in dielectrics.