

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.

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