

**R13**

Code No: 113BY

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, December-2014

ELECTROMAGNETIC FIELDS

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

**Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

**Part- A****(25 Marks)**

- 1.a) Describe what are the source of electric field and magnetic fields? [2M]
- b) What are the limitations of Gauss's Law? [3M]
- c) What are the boundary conditions of dielectrics? [2M]
- d) Define Polarization. [3M]
- e) State Biot-Savart's Law. [2M]
- f) Write the point form of Amperes circuit law. [3M]
- g) What is the difference between scalar and vector magnetic potential? [2M]
- h) What is the expression for the torque experienced by a current carrying loop, placed in a magnetic field? [3M]
- i) Define dynamically induced e.m.f. [2M]
- j) Give the Maxwell's equation – IV in both integral form and point form. [3M]

**Part-B****(50 Marks)**

- 2.a) Find the total electric field at the origin due to  $10^{-8}$  C charge at P(0,4,4)m and  $-0.5 \times 10^{-8}$  C charge at P(4, 0, 2)m.
- b) Find the electric field intensity of a straight uniformly charged wire of length 'L' m and having a linear charge density of +q C/m at any point at a distance of 'h' m. Hence deduce the expression for infinitely long conductor.

**OR**

- 3.a) Find the electric field intensity produced by a point charge distribution at P(1, 1, 1) caused by four identical 3nC point charges located at P1(1, 1, 0), P2(-1, 1, 0), P3(-1, -1, 0) and P4(1, -1, 0).
  - b) A circular disc of radius 'a' m is charged with a charge density of  $\sigma$ C/m<sup>2</sup>. Find the electric field intensity at a point 'h' m from the disc along its axis.
4. Obtain an expression for Ohm's law in point form and integral form.

**OR**

5. Derive an expression for energy stored and energy density in an Electrostatic field.
6. Derive the expression for H due to finite length wire carrying a steady current I.

**OR**

7. Obtain the expression for H at any point on the axis of circular loop carrying current I and deduce H in the center of the circular loop.

- 8.a) Explain the characteristics and applications of permanent magnets.
- b) Obtain an expression for self inductance of a solenoid.

**OR**

- 9.a) Derive an expression for force between two straight parallel current carrying conductors.
- b) Obtain an expression for Lorentz force equation.

- 10. State and explain Faraday's Laws of electromagnetic induction.

**OR**

- 11. Derive the expression for displacement current density.

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