Code No: 113BY

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, February/March - 2016
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) What do mean by Electrostatic field and how can you say it is conservative. [2]
b) Determine the force between two charges 3×10^{-4} C at P (1, 2, 3) and -10^{-4} C at Q (2, 0, 5) in vacuum. [3]
c) Distinguish between conductors and dielectrics. [2]
d) What is the capacitance of a capacitor consisting of two Parallel plates 30cm × 30cm separated by 5 mm on air. [3]
e) State Biot-Savarts law. [2]
f) Derive Maxwell's third equation. [3]
g) Write about Lorentz force equation. [2]
h) A Toroid has air core and has a cross-sectional area of $10mm^2$. It has 1000 turns and its mean radius is 10mm. Find its inductance. [3]
i) What is meant by the term displacement current? [2]
j) Explain how maxwell's equations are modified for time varying electric and magnetic fields. [3]

PART- B **(50 Marks)**

2.a) Determine the potential a (0,0,4) m caused by a total charge 10^{-8} C distributed uniformly along a disc of radius 4m lying in the z=0 plane and centered at origin.
b) Define work done and electric potential. Show that the electric field intensity is negative gradient of potential. [5+5]

OR

3.a) Find the value of electric field intensity at any point along the axis of a uniformly charged disc.
b) State Gauss law and mention few applications of it. [5+5]

4.a) What is an electric dipole and dipole moment? Derive an expression for torque experienced by an electric dipole.
b) A parallel plate capacitor has conducting plates of area equal to $0.04m^2$. The plates are separated by a dielectric material whose $\epsilon_r = 2$ with the plate separation of 1cm. Find its capacitance value. [5+5]

OR

5.a) Derive the boundary conditions of two dielectric media.
b) Explain about equation of continuity in electrostatic fields. [5+5]

6.a) Using ampere's circuital law, find MFI due to an infinite sheet of current.

b) What is the magnetic field, H in Cartesian coordinates due to z- directed current element? Find **J** if I=2A. [5+5]

OR

7.a) What is meant by Curl? Give its significance.

b) A steady current of I amperes flow in a circular bent in the form of square loop of side 'a'. Find the MFI (H) at the center of the loop. [4+6]

8.a) Find the force between two straight long and parallel current carrying conductors in the same and opposite directions.

b) Explain the concept of scalar and vector magnetic potentials. [6+4]

OR

9.a) Find the inductance of Solenoid.

b) Derive the expression for energy stored and energy density in a magnetic field. [4+6]

10. Write Maxwell's equations in point form and explain physical significance of the equations. [10]

OR

11.a) State and explain the Faraday's laws in electromagnetic induction.

b) Explain statically and dynamically induced e.m.fs. [10]

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