Code No: R1621024 **R16** SET - 1

II B. Tech I Semester Supplementary Examinations, March - 2021
ELECTROMAGNETIC FIELDS
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) States the Coulomb's Law
   b) What is meant by polarization
   c) What are the applications of Biot-Savart's law
   d) What is meant by magnetic force
   e) Define the self-inductance
   f) Define Poynting vector

PART -B

2. a) Explain with the help of sketch, the principle of super position as applied to electric fields. (7M)
   b) A point charge of 40μc is located in free space. Find potential if point P is located at (0.1, 0.2, -0.2) and (i) V = 0 at infinite (ii) V = 0 at (2, 0, 0) and (iii) V = 30v at (-0.4, 2, -2) (7M)
3. a) Stater and explain the Ohm's law in point form. (6M)
   b) Determine the energy stored in the electric field of an isolated spherical conductor of radius R and the surface charge density ρ_s. (8M)
4. a) Derive the expression for field intensity due to an infinite sheet of current using Ampere's circuital law. (7M)
   b) Given a current circuit in the shape of a rectangular hexagon of side a. If the circuit carries the current I, find the magnetic induction at the center of the hexagon. (7M)
5. a) Derive the Lorentz force equation in static magnetic fields. (6M)
   b) Obtain the expression for torque on a current loop placed in a magnetic field. (8M)
6. a) Derive the expressions for Neu Mann's formula for mutual inductance. (7M)
   b) An iron ring 10 cm diameter and 20 cm^2 cross section is wound with 100 turns of wire. For a flux density of 1 tesla and $\mu_r = 500$. Find the exciting current, the inductance and stored energy. (7M)
7. a) State and prove Poynting's theorem. (7M)
   b) Compare the magnitudes of peak values of conduction current density and displacement current density in a good conductor for which $\sigma = 10^7$ seimen per meter and $\varepsilon_r = 1$ when E = Sin 120 πt. Comment on the results. (7M)
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