Code No: RT21025 **R13** SET - 1

II B. Tech I Semester Supplementary Examinations, May/June - 2016
ELECTRO MAGENETIC 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 **THREE** Questions from **Part-B**

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PART –A

1. a) Give the formula for electric field intensity at a point due to 'n' number of point charges. (3M)
   b) What is the behaviour of conductors in an electric field? (3M)
   c) What is the expression for the torque experienced by a current carrying loop, placed in a magnetic field (4M)
   d) What is the maximum torque on a square loop of 1000 turns in a field of intensity of 1 Tesla. The loop has 10 cm sides and carries 3A. What is magnetic moment of loop? (4M)
   e) A current of 2A flowing in an inductor of inductance 100mH. What is the energy stored in the inductor (4M)
   f) Distinguish between the conduction current and displacement current. (4M)

PART –B

2. a) Derive an expression for electric field intensity at point P due to an electric dipole. Also find E at the same point (8M)
   b) State and prove Gauss law. Write applications of Gauss's law. Describe any one application. (8M)

3. a) Derive an expression for the capacitance of a spherical capacitor consisting of two concentric spheres of radius 'a' & 'b'. (8M)
   b) A cylindrical capacitor consists of an inner conductor of radius 'a' & an outer conductor whose inner radius is 'b'. The space between the conductors is filled with a dielectric permittivity ε_r & length of the capacitor is L. Determine the capacitance. (8M)

4. a) List the similarities and differences between Coulomb's and Biot-Savart law (7M)
   b) Using Biot-Savart"s law, derive the magnetic field intensity on the axis of a circular loop carrying a steady current I. (9M)

5. a) Derive the expression for curl H=J. (4M)
   b) Derive the expression for torque developed in a rectangular closed circuit carrying current I in a uniform field (6M)
   c) Derive an expression for a torque on a closed rectangular loop carrying current (6M)

6. a) Derive an expression for inductance of a solenoid with N turns and L metre length carrying a current of I amperes (9M)
   b) What is the physical significance of the poynting vector? (7M)

7. a) State Maxwell's equation for static fields. Explain how they are modified for time varying electric and magnetic fields. (8M)
   b) Derive the Poynting vector from Maxwell's equation for the general case. (8M)
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