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

II B. Tech I Semester Supplementary Examinations, October/November - 2019
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) Derive Laplace's and Poisson's equations. (4M)
   b) What is the behavior of conductors in electric field? (4M)
   c) States the Ampere's circuit law? (3M)
   d) What are the moving charges in a magnetic field? (3M)
   e) Define toroid? (4M)
   f) Write the Maxwell's equations for time varying fields. (4M)

PART -B

2. a) State and Explain coulombs law in electrostatics. (8M)
   b) Two point charges Q_1 = 5nC and Q_2 = -4nC are kept at (3, 0, 0) and (5, 0, 0). Determine electric field at (5, -2, 1). (8M)

3. a) Derive an expression for capacitance of a parallel plate capacitor with two dielectric media. (8M)
   b) Show that the family of equipotential for a dipole may be given by $r^2 = d_1 \cos\theta$. Further show that $r = d_2 \sin^2\theta$ represents the line of force of the dipole, where d_1 and d_2 are constants. (8M)

4. a) Explain the Oesterd's experiment with neat diagram. (8M)
   b) A filamentary current of 15A is directed in from infinity to the origin on the positive x axis, and then back out to infinity along the position y axis. Use the Biot-Savarts law of find $\overline{H}$ at P (0, 0, 1) ? (8M)

5. a) Derive the expression for force between two parallel current carrying conductors, if currents are in the same direction? (8M)
   b) Find the torque which will be produced on a rectangular current loop if placed to a magnetic field **B**. Show that **T= m ×B** also holds for the system. (8M)

6. a) Derive the expression for energy stored in magnetic field? (8M)
   b) Calculate the inductance of a solenoid of 1500 turns wound uniformly over a length of 600mm on cylindrical paper tube 100mm in diameter. The medium is air ($\mu = \mu_o$). (8M)

7. a) Describe the Statically and Dynamically induced EMFs (8M)
   b) Derive the Maxwell's second equation from Faraday's laws of electromagnetic induction. (8M)

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