II B. Tech I Semester Supplementary Examinations, May - 2019
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 Coulomb's law in electrostatic fields

   b) State the Ohm's law in point form

   c) State the point form of Ampere's circuital law

   d) Define magnetic dipole movement

   e) Define the self inductance

   f) Write Maxwell's equations in integral forms

PART -B

2. a) Explain the work done in moving a point charge in an electrostatic field

   b) Explain electric potential and its properties

3. a) Prove that the derivative of the energy stored in an electrostatic field with respect to volume is ½ D.E, where D and E are electric flux density and electric field intensity respectively

   b) A parallel plate capacitor consists of two square metal plates of side 500mm and separated by a 10 mm slab of Teflon with ε_r = 2 and 6 mm thickness is placed on the lower plate leaving an air gap of 4mm thick between it and upper plate. If 100v is applied across the capacitor, find D, E and V in Teflon and air.

4. Derive an expression for magnetic flux density at any point on the axis of a plane circular current loop.

5. a) Derive the expression for torque on a current loop placed in a magnetic field

   b) Two long parallel conductors carrying currents 100A and 150A respectively. If the conductors are separated by 20mm. Find the force/meter length of each conductor, if the current flow is in opposite direction?

6. Derive an expression for the mutual inductance if two straight filamentary circuits of length L and of infinitesimal cross sections which are parallel to each other and a distance D apart.

7. a) Describe the Poynting theorem and derive its necessary expression

   b) Write the Maxwells equations for harmonically varying fields