II B. Tech I Semester Supplementary Examinations, September - 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) State the Gauss's law in electrostatic fields.

   b) Define the electric dipole and dipole moment.

   c) Derive the Maxwell's third equation.

   d) Obtain the force on a current element in a magnetic field.

   e) How you determine the self-inductance of a solenoid.

   f) What is mean by displacement current?

PART -B

2. a) Prove the following expression for the electric field due to infinite charged sheet laying in x-y plane, $\overline{E} = \dfrac{\rho_s}{2\epsilon_o}\overline{a}_n$.

   b) What do you mean by potential difference and state its salient features?

3. a) Show that the displacement current in the dielectric of a parallel plate capacitor is equal to the conduction current in the leads.

   b) Explain the boundary conditions between media having dielectric and conductor.

4. a) Derive an expression for magnetic field at a point due to a finite current element.

   b) Find the field intensity at a point on the axis, 5 m from the center of a circular coil of area 100 cm^2 and carrying a current of 50 A.

5. a) Derive the expression for force between two parallel current carrying conductors, if currents are in the same direction?

   b) Find the torque which will be produced on a rectangular current loop if placed to a magnetic field **B**.

6. a) Derive an expression for the mutual inductance between two coaxial solenoids. Derive an expression for energy stored in a magnetic field.

7. a) Describe the modification of Maxwell's equations for time varying fields

   b) Explain the physical significance of Poyntings theorem.