

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**

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 moment
- 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 $\frac{1}{2} \mathbf{D} \cdot \mathbf{E}$, where \mathbf{D} and \mathbf{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 $\epsilon_r = 2$ 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 \mathbf{D} , \mathbf{E} and \mathbf{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