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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations July-2021

ELECTROMAGNETIC FIELDS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 The three vertices of a triangle are located at A(-1,2,5), B(-4,-2,-3), and C(1,3,-2). **12M**
(i) Find the length of the perimeter of the triangle. (ii) Find a unit vector that is directed from the mid point of the side AB to the midpoint of the side BC. (iii) Show that this unit vector multiplied by a scalar is equal to the vector from A to C and that the unit vector is therefore parallel to AC.

OR

- 2 The surfaces $\rho=3$, $\rho=5$, $\Phi=100^\circ$, $\Phi=130^\circ$, $z=3$, and $z=4.5$ define a closed surface. **12M**
(i) Find enclosed volume; (ii) Find the total area of enclosing surface; (iii) Find the total length of the twelve edges of the surfaces; (iv) Find the length of longest straight line that lies entirely within the volume.

UNIT-II

- 3 a State and explain Coulomb's law indicating clearly the units of quantities in the equation of force. **6M**
b Derive the expression for the electric field intensity due to line charge. **6M**

OR

- 4 a Derive Laplace and Poisson's equation. **6M**
b Derive the expression for torque on electric dipole in the presence of uniform electric field. **6M**

UNIT-III

- 5 a Derive the expression for capacitance of the spherical condenser. **6M**
b Derive the expression for parallel plate capacitor. **6M**

OR

- 6 a What is the energy stored in a capacitor made of two parallel metal plates each of 30 cm² area separated by 5mm in air? The capacitor is charged to potential difference of 500V **6M**
Given that $\epsilon_0 = 8.854 \times 10^{-12}$.
b i) Define polarization in dielectric materials **6M**
ii) Write the relation between current I and current density.
iii) Write the equation for energy stored in capacitor.

UNIT-IV

- 7 a Write down maxwell's third equation in point and integral form. **6M**
b Derive the expression for the force between two current carrying wires. **6M**

OR

- 8 a Derive an expression for the force between two current carrying wires. 6M
b i) Define Magnetic dipole moment. 6M
ii) Write Lorentz force equation.
iii) State point form of Amperes law.

UNIT-V

- 9 a A toroid has air core and has a cross sectional area of 10mm^2 it has 1000 turns and its mean radius is 10mm. find its inductance. 6M
b A coil of 500 turns is wound on a closed iron ring of mean radius 10cm and cross section of 3cm^2 . Find the self inductance of the winding if the relative permeability of iron is 800. 6M

OR

- 10 Derive an expression for the force between two straight long and parallel conductors 12M

*** END ***