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

B. Tech II Year I Semester Supplementary Examinations November-2022

ELECTROMAGNETIC FIELDS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

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

UNIT-I

- 1 a Find the distance from A ($r=4, \theta=20^\circ$ & $\phi=120^\circ$) B ($r=2, \theta=80^\circ$ & $\phi=30^\circ$) **L3 6M**
 b Give the cartesian coordinates of the Point whose cylindrical are $r=4, \phi=45^\circ$ & $Z=2$. **L3 6M**

OR

- 2 a Determine the divergence of these vector fields if $P=x^2yz a_x + xz a_z$ **L3 6M**
 b Find the gradient of the following scalar fields if $V= e^{-z} \sin 2x \cosh y$ **L3 6M**

UNIT-II

- 3 a An infinitely long uniform line charge is located at $y=3, Z=5$. If $\rho_L = 30 \text{ n C/m}$, find the field intensity E at i) origin, ii) P(0,6,1) and iii) P (5,6,1) **L3 6M**
 b A circular disc of 10 cm radius is charged uniformly with total charge of $100\mu\text{c}$. Find E at a point 20cm on its axis. **L3 6M**

OR

- 4 a Two point charges 1.5nC at (0,0,0.1) and -1.5nC at (0,0,-0.1) are in free space. Treat the two charges as a dipole at the origin and find the potential at P(0.3,0,0.4) **L3 6M**
 b In free space $V= x^2y(z+3)$. Find E at (3, 4, -6) and The charge within the cube $0 < x, y, z < 1$. **L3 6M**

UNIT-III

- 5 Explain the boundary conditions between conductor and free space. **L2 12M**

OR

- 6 a A parallel plate capacitor has an area of 0.8 m^2 separation of 0.1 mm with a dielectric for which $\epsilon_r = 1000$ and a field of 10^6 V/m . Calculate C and V. **L3 6M**
 b Derive Laplace's and Poisson's Equation. **L4 6M**

UNIT-IV

- 7 A Point charge of $Q=-1.2 \text{ C}$ has a velocity $V=(5 a_x + 2 a_y - 3 a_z)\text{m/s}$. Find the magnitude of the force exerted on the charge if i) $E= -18 a_x + 5 a_y - 10 a_z \text{ V/m}$ and ii) $B=-4 a_x + 4 a_y + 3 a_z \text{ T}$ **L3 12M**

OR

- 8 a Calculate the inductance of a 10 m length of coaxial cable filled with a material for which $\mu_r = 80$ and radii inner and outer conductors are 1 mm and 4 mm respectively. **L3 6M**
 b Calculate the inductance of a solenoid of 200 turns wound tightly on a cylindrical tube of 6 cm diameter. The length of the tube is 60 cm and the solenoid is in air. **L3 6M**

UNIT-V

- 9 Explain faradays law of electromagnetic induction and derive the expression for induced e.m.f. **L4 12M**

OR

- 10 Write Maxwell's equation in good conductors for time varying fields and static fields both in differential and integral form. **L4 12M**

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