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

B.Tech II Year I Semester Supplementary Examinations August-2021

ELECTROMAGNETIC FIELDS
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

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| 1 | a | What are the types of coordinate system? | 2M |
| | b | Define dipole moment. | 2M |
| | c | Write the relation between current I and current density J. | 2M |
| | d | What is the inductance of Solenoid? | 2M |
| | e | Define skin depth. | 2M |

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

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|---|---|-----|
| 2 | The surfaces $\rho=3$, $\rho=5$, $\Phi=100^\circ$, $\Phi=130^\circ$, $z=3$, and $z=4.5$ define a closed surface. (a) Find enclosed volume; (b) Find the total area of enclosing surface; (c) Find the total length of the twelve edges of the surfaces; (d) Find the length of longest straight line that lies entirely within the volume. | 10M |
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OR

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| 3 | Three vectors extending from the origin are given as $r_1 = (7,3,-2)$, $r_2=(-2,7,-3)$ and $r_3=(0,2,3)$. Find: (i) a unit vector perpendicular to both r_1 and r_2 ; (ii) a unit vector perpendicular to the vectors r_1-r_2 and r_2-r_3 ; (iii) The area of the triangle defined by r_1 and r_2 ; (iv) The area of the triangle defined by the heads of r_1, r_2 , and r_3 . | 10M |
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UNIT-II

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| 4 | a | Derive the expression for electric field intensity at a point due to electric dipole. | 5M |
| | b | Derive Maxwell first equation. | 5M |

OR

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| 5 | Four point charges each of $10\mu\text{C}$ are placed in free space at the points $(1, 0, 0)$, $(-1, 0, 0)$, $(0, 1, 0)$ and $(0, -1, 0)$ m respectively. Determine the force on a point charge of $30\mu\text{C}$ located at a point $(0, 0, 1)$ m? | 5M |
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UNIT-III

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|---|---|---|----|
| 6 | a | Derive the expression for capacitance of a co-axial cable. | 5M |
| | b | A parallel plate capacitor has a plate area of 1.5m^2 and a plate separation of 5mm . There are two dielectrics in between the plates. The first dielectric has a thickness of 3mm with a relative permittivity of 6 and the second has a thickness of 2mm with a relative permittivity of 4. Find the capacitor? | 5M |

OR

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| 7 | A parallel plate capacitor consists of two square metal plates with 500mm side and separated by 10mm . a slab of sulphur ($\epsilon_r= 4$) 6mm thick is placed on the lower plate and air gap of 4mm . find capacitance of capacitor? | 10M |
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UNIT-IV

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| 8 | a | A circular loop is located on $X^2+Y^2=9$ and $Z=0$ carries a direct current of 10A along direction. Determine H at $(0, 0, 5)$ m. | 6M |
| | b | State and explain ampere's circuital law. | 4M |

OR

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

UNIT-V

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

OR

- 11 Explain faradays law of electromagnetic induction and there from derive Maxwell's equation in differential and integral form. 10M

END