**20EE303**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **March, 2022** | **Electrical and Electronics Engineering** | | |
| **Third Semester** | **Electromagnetic Fields** | | |
| **Time:** Three Hours | | **Maximum: 7**0 Marks | |
| *Answer Question No.1 compulsorily.* | | | (14X1 = 14 Marks) |
| *Answer ONE question from each unit.* | | | (4X14=56 Marks) |

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| 1. | a) | | Find the divergence of vector **D**=5z2aρ +10ρz az at P (3, -450, 5). | CO1 |  |
|  | b) | | What is the formula for electric field potential | CO1 |  |
|  | c) | | Write equations for gradient in Cartesian and Cylindrical coordinate systems. | CO1 |  |
|  | d) | | Briefly explain the nature of dielectric materials. | CO2 |  |
|  | e) | | What is electric dipole. | CO2 |  |
|  | f) | | List any two Properties of conductor | CO2 |  |
|  | g) | | Define torque | CO3 |  |
|  | h) | | Write any two differences between dia, para and ferromagnetic materials. | CO3 |  |
|  | i) | | Write Lorentz force equation | CO3 |  |
|  | j) | | Give the relation between magnetic flux density and magnetic field intensity. | CO3 |  |
|  | k) | | State faraday’s law of electromagnetic induction. | CO4 |  |
|  | l) | | Give fourth Maxwell’s equation for time varying fields. | CO4 |  |
|  | m) | | Define uniform plane wave. | CO5 |  |
|  | n) | | Define skin depth. | CO5 |  |
| **Unit - I** | | | | | |
| 2. | a) | State and explain Coulomb’s Law of force | | CO1 | 7M |
|  | b) | Express the vector A=x2yz ax + xy2z ay + xyz2 az at the point P (6.324, 108.43°, 3) in the cylindrical coordinate system | | CO1 | 7M |
| **(OR)** | | | | | |
| 3. | a) | Find the electric field intensity at a point ‘P’ due to an infinite sheet of charge distribution | | CO1 | 7M |
|  | b) | Two-point charges of 1 μC and –1μC are located at (0, 0, 1) and (0, 0, –1) respectively n free space. Find the electric field intensity at (0, 3, 4). | | CO1 | 7M |
| **Unit - II** | | | | | |
| 4. | a) | Derive the expression for energy density in an electrostatic field. | | CO2 | 7M |
|  | b) | A parallel plate capacitor has a plate area of 1.5m2 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 second has a thickness of 2mm with a relative permittivity of 4. Find the capacitance. | | CO2 | 7M |
| **(OR)** | | | | | |
| 5. | a) | State and explain current and different types of current densities. | | CO2 | 7M |
|  | b) | Derive the Expressions for Poison’s and Laplace’s equation. | | CO2 | 7M |
| **Unit - III** | | | | | |
| 6. | a) | What is a Magnetic Dipole? Explain the concept of Magnetization in materials. | | CO3 | 7M |
|  | b) | Determine the expression for force on a differential current element placed in a magnetic field. | | CO3 | 7M |
| **(OR)** | | | | | |
| 7. | a) | State and Explain Amperes Circuit law | | CO3 | 7M |
|  | b) | Derive Boundary conditions between two magnetic mediums | | CO3 | 7M |
| **Unit - IV** | | | | | |
| 8. | a) | State and explain Faraday’s law of electromagnetic induction | | CO4 | 7M |
|  | b) | What is normal incidence. Obtain the expressions for reflection coefficient & transmission coefficient for dielectric interface under Normal Incidence. | | CO5 | 7M |
| **(OR)** | | | | | |
| 9. | a) | What is the Inconsistency in Ampere’s law? How Maxwell modified it to suit for time-varying fields. | | CO4 | 7M |
|  | b) | Derive wave equation for electromagnetic fields in free space. | | CO5 | 7M |

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