**20EC304**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **March, 2022** | **Electronics and Communications Engineering** | | |
| **Third Semester** | **Electromagnetic Field Theory** | | |
| **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) | | What is the use of Coulomb’s law? | CO1 |  |
|  | b) | | Define electric field intensity. | CO1 |  |
|  | c) | | What is potential gradient? | CO1 |  |
|  | d) | | Give the relationship between electric field intensity and electric Potential. | CO2 |  |
|  | e) | | Define capacitance. | CO2 |  |
|  | f) | | Define current and current density. | CO2 |  |
|  | g) | | Write the continuity equation in point form. | CO3 |  |
|  | h) | | State Ampere’s circuital law. | CO3 |  |
|  | i) | | What is permeability? | CO3 |  |
|  | j) | | Define magnetic flux density. | CO3 |  |
|  | k) | | Define scalar magnetic Potential. | CO4 |  |
|  | l) | | State Faraday’s Law. | CO4 |  |
|  | m) | | What is displacement current? | CO4 |  |
|  | n) | | Define uniform plane wave. | CO4 |  |
| **Unit - I** | | | | | |
| 2. | a) | Derive the expression for electric field intensity due to infinite line charge. | | CO1 | 7M |
|  | b) | State and explain Coulomb’s law with suitable equations. | | CO1 | 7M |
| **(OR)** | | | | | |
| 3. | a) | Derive Gauss’s law with necessary equations. | | CO1 | 7M |
|  | b) | Prove that electric field intensity is equal to the negative gradient of the potential. | | CO1 | 7M |
| **Unit - II** | | | | | |
| 4. | a) | Derive the expression for capacitance of a parallel plate capacitor having two dielectric media. | | CO2 | 7M |
|  | b) | Derive the boundary conditions at a boundary between two perfect dielectrics. | | CO2 | 7M |
| **(OR)** | | | | | |
| 5. | a) | Discuss Poisson’s and Laplace’s equations from Gauss’s law. | | CO2 | 7M |
|  | b) | If a potential , (a) find so that Laplace’s equation is satisfied.  (b) With the value of , determine electric field at | | CO2 | 7M |
| **Unit - III** | | | | | |
| 6. | a) | State and prove magnetic boundary conditions. | | CO3 | 7M |
|  | b) | Derive an expression for force on a current element in a magnetic field. | | CO3 | 7M |
| **(OR)** | | | | | |
| 7. | a) | State and prove Ampere’s circuital law. | | CO3 | 7M |
|  | b) | Derive Lorentz force equation. | | CO3 | 7M |
| **Unit - IV** | | | | | |
| 8. | a) | Explain the wave propagation in free space with necessary equations. | | CO4 | 7M |
|  | b) | State and Prove Poynting theorem. | | CO4 | 7M |
| **(OR)** | | | | | |
| 9. | a) | Write Maxwell’s equations in integral form and differential form for time varying fields. | | CO4 | 7M |
|  | b) | Discuss the concept of Wave polarization. | | CO4 | 7M |

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