**18EC304**

**Hall Ticket Number:**

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| **II/IV B.Tech(Regular / Supplementary) DEGREE EXAMINATION** | | | |
| **February, 2021** | **Electronics & Communication Engineering** | | |
| **Third Semester** | **Electromagnetic Field Theory** | | |
| **Time:** Three Hours | | **Maximum:**50 Marks | |
| *Answer ALL Questions from PART-A.* | | | (10X1 = 10 Marks) |
| *Answer* ***ANY FOUR*** *questions from PART-B.* | | | (4X10 = 40 Marks) |

**Part-A**

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| --- | --- | --- | --- | --- |
| 1 | Answer all questions | | (10X1=10 Marks) | |
|  | a) | State Gauss’s law and write it mathematical form. |  |  |
|  | b) | Write relationship between electric flux density and electric field intensity in free space. |  |  |
|  | c) | Write the Maxwell’s equations for static electric fields |  |  |
|  | d) | Define current density. |  |  |
|  | e) | What are the applications of Poisson’s equations? |  |  |
|  | f) | State Biot-Savart’s circuital law. |  |  |
|  | g) | Classify the magnetic materials based on dipole moments. |  |  |
|  | h) | Write the Maxwell’s equations for steady magnetic fields. |  |  |
|  | i) | What is meant by polarization? |  |  |
|  | j) | Define Faraday’s law of induction. |  |  |
|  |  |  |  |  |
| **Part-B** | | | | |
| 2 | a) | State and explain the Coulomb’s law and derive its mathematical form between two-point charges. |  | 5M |
|  | b) | Find the fore exerted by charge Q1 = 1ηC located at M(5, 0, -7) on Q2 = -2 ηC located at N(0, 2, -1). |  | 5M |
|  |  |  |  |  |
| 3 | a) | Discuss potential field of a point charge and system of charges. |  | 5M |
|  | b) | State and explain Gauss’s law with an example. |  | 5M |
|  |  |  |  |  |
| 4 | a) | Derive the Poisson’s and Laplace’s equations. |  | 5M |
|  | b) | Determine the boundary conditions at a boundary between perfect dielectrics. |  | 5M |
|  |  |  |  |  |
| 5 | a) | State and derive the current continuity equation. |  | 5M |
|  | b) | Obtain the capacitance of a parallel plate capacitor. |  | 5M |
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| 6 | a) | What is Ampere’s circuital law? Explain how Ampere’s circuital law can be used to obtain the magnetic field intensity due to an infinite sheet of current. |  | 5M |
|  | b) | Discuss the magnetic flux and magnetic flux density. And write the Maxwell’s equations for static electric and steady magnetic fields. |  | 5M |
|  |  |  |  |  |
| 7 | a) | Obtain the boundary conditions for the magnetic fields between two magnetic materials. |  | 5M |
|  | b) | Assume that  in region 1 where , while  in region 2 where . Moreover,  A/m on the surface . If  in region 1, find . |  | 5M |
|  |  |  |  |  |
| 8 | a) | State and explain the Pointing theorem. Also derive an expression for the Poynting vector. |  | 5M |
|  | b) | Explain the wave propagation in free space medium. |  | 5M |
|  |  |  |  |  |
| 9 | a) | Discuss the Maxwell’s equations for time varying fields. |  | 5M |
|  | b) | With neat sketches, explain the different types of wave polarization. |  | 5M |