**Sub Code: KEE301**

**Paper Id:** | **120321** | **Roll No:**

**B.TECH**
**(SEM III) THEORY EXAMINATION 2019-20**
**ELECTROMAGENETIC FIELD THEORY**

*Time: 3 Hours* *Total Marks: 100*

**Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

**1.** **Attempt** *all* **questions in brief.** **2 x 10 = 20**

| | |
|---|---|
| a. | Explain the significance of continuity equation in a good conductor. |
| b. | Explain parameters of a transmission line. |
| c. | Explain Ampere's circuital law for magneto statics. |
| d. | Explain relaxation time constant. |
| e. | Whywork done on a charge is zero when it is moved in a close path. |
| f. | Explain Gauss's law for electrostatics. |
| g. | Explain behaviour of a conductor at high frequency. |
| h. | Explain refraction coefficient and reflection time constant in contest to EM wave propagation. |
| i. | Explain Poynting vector. |
| j. | Write an equation for an EM wave propagating in a conductor. |

**SECTION B**

**2.** **Attempt any** *three* **of the following:** **10x3=30**

| | |
|---|---|
| a. | Convert a point P (4,-3, 6) and a vector $\mathbf{R}$= z $\mathbf{a_x}$+ y $\mathbf{a_z}$ into cylindrical co-ordinate systems. |
| b. | Derive an expression for electric field intensity in space due to infinite length uniformly Charged wire. |
| c. | Derive an expression for magnetic field intensity in space due to current sheet having current density $\mathbf{Ka_x}$ A/m. |
| d. | Derive expressions of Voltage and Current in a Transmission Line. |
| e. | Write and explain all forms of all Maxwell's equation in detail. |

**SECTION C**

**3.** **Attempt any** *one* **part of the following:** **10 x 1= 10**

| | |
|---|---|
| a. | Explain and prove Stroke's theorem. |
| b. | Explain all possible forms of surface vector, line vector and volume integral in Spherical system. |

**4.** **Attempt any** *one* **part of the following:** **10 x 1= 10**

| | |
|---|---|
| a. | Derive an expression for capacitance of a spherical shaped capacitor. |
| b. | Derive and explain Boundary conditions for static electric fields. |

**5.** **Attempt any** *one* **part of the following:** **10 x 1= 10**

| | |
|---|---|
| a. | Derive an expression for magnetic field of a coaxial cable. |
| b. | Explain Biot Savert's law for magnetic fields. How this concept can be used to determine Magnetic field in space due to a close loop current carrying wire. |

**6.** **Attempt any** *one* **part of the following:** **10 x 1= 10**

| | |
|---|---|
| a. | Explain the concept of Displacement constant in an electrical circuit. Also determine the condition when conduction current becomes equal to displacement current. |
| b. | Derive and explain differential form of Faraday's law of electromagnetic induction in vector form. |

**7.** **Attempt any** *one* **part of the following:** **10 x 1= 10**

| | |
|---|---|
| a. | Derive all expressions of a EM Wave like attenuation constant, phase constant and intrinsic impedance when it is propagating through a free space. |
| b. | Derive an expression for characteristic impedance, input impedance of a transmission line. |