

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.	Why work 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 $K \mathbf{a}_x$ 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 Savart'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.