Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

Third Semester

Electrical and Electronics Engineering

EE3301 - Electromagnetic Fields

Regulations – 2021

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BTL*	*CO*	*Marks*
1.	State Stoke's theorem and its application.	L2	1	2
2.	Prove that the Curl Gradient is Zero.	L1	1	2
3.	State Poisson's equations and Laplace equations.	L1	2	2
4.	Write the boundary conditions for the interface between two perfect dielectric, Conductor dielectric.	L1	2	2
5.	Define magnetic field intensity and show the relationship between magnetic flux density and Magnetic field intensity.	L2	3	2
6.	State Amperes Circuital law.	L2	3	2
7.	What is meant by displacement current.	L1	4	2
8.	State Faradays Law and Write Continuity equation.	L2	4	2
9.	State Pointing theorem and write its significance.	L2	5	2
10.	Define Intrinsic Impedance and estimate its value for free space.	L1	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	State and Prove Divergence Theorem and Stoke's Theorem.	L2	1	16
		Or			
	b	Explain how Gauss's Law can be used to determine the electric field due to a uniformly charged circular disc. Describe the assumptions and symmetry involved in the setup	L2	1	16
12.	a	Examine the symmetry and charge distribution of a uniformly charged circular disc of radius R (in meters) with surface charge density σ (in C/m²), and analytically determine the electric potential at a point located a distance h (in meters) along the axis perpendicular to the disc's surface.	L4	2	16
		Or			
	b	Analyze the interface between a perfect conductor and a dielectric medium to determine the boundary condition for electrostatic fields. Utilize Gauss's Law and examine the behavior of the electric field components at the boundary to derive the governing expression.	L4	2	16

13.	a	State Biot Savart's law and Deduce the expression for the magnetic field at a point on the axis of a current carrying circular loop of radius is 'R' distance 'X' from the center.	L2	3	16
		Or			
	b	Explain the boundary conditions for magnetic field vectors at the interface between two magnetic materials with different permeabilities (μ_1 and μ_2). Describe how the normal and tangential components of magnetic flux density ($\mathbf{B}$) and magnetic field intensity ($\mathbf{H}$) behave across the boundary.	L2	3	16
14.	a	In a material for which σ = 2.5 mho/m and εr = 1. The electric field intensity E = (150 sin109 t ux) V/m. Evaluate the conduction and displacement current densities. Also determine the frequency at which they have equal magnitudes.	L3	4	16
		Or			
	b	Write Maxwell's Equation in Integral and differential forms. Also deduce them for harmonically varying fields.	L3	4	16
15.	a	Derive the wave equation from Maxwell's equation for lossy dielectric materials.	L3	5	16
		Or			
	b	Derive the Pointing vector in integral and differential forms.	L3	5	16