Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026

Fourth Semester

Electronics and Communication Engineering

UECT24401 - ELECTROMAGNETIC FIELDS

Regulations - 2024

Duration : 3 Hrs ***Maximum : 100 Marks***

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

Q.No	Questions	BTL	CO	Marks
1.	Transform the Cartesian coordinates x=3 y=1, z=2 into spherical coordinates.	L2	1	2
2.	State Helmholtz's theorem.	L1	1	2
3.	Write the expression for electric field intensity due to various charge distributions.	L1	2	2
4.	Locate the Poisson and Laplace equation for electric field.	L1	2	2
5.	Outline the significance of magnetic vector potential.	L2	3	2
6.	State Ampere's Circuital Law.	L1	3	2
7.	What is meant by displacement current.	L1	4	2
8.	Infer the purpose of the continuity equation in electromagnetics?	L2	4	2
9.	List any four properties of good conductors.	L1	5	2
10.	Compare the intrinsic impedance of free space and a lossless medium.	L2	5	2

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

Q.No			Questions	BTL	CO	Marks
11.	a	i	Explain the Gradient of scalar, divergence and curl of the vector.	L2	1	7
		ii	Find the Gradient of the scalar fields $U = x^2y + xyz$ and $U = e^{-z}\sin 2x \cos y$	L2	1	9
			Or			
	b	i	Compute divergence and curl of the vector field $A = yz\overline{a_x} + 4xy\overline{a_y} + y\overline{a_z}$ and evaluate it at the point (1,-2,3)	L3	1	9
		ii	Convert points P(1,3,5) and T(0,-4,3) from Cartesian to cylindrical and Spherical coordinates.	L3	1	7
12.	a		Determine the Electric field intensity (E) of an infinitely long, straight, line charge of a uniform density ρ in air medium.	L2	2	16
			Or			
	b		A spherical capacitor consists of an inner conducting sphere of radius Ri and outer conductor with a spherical inner wall of radius Ro. The space between the conductors is filled with a dielectric of permittivity ϵ. Determine the capacitance of the capacitor.	L2	2	16
13.	a		Show how Biot–Savart's law is applied to find the magnetic field intensity on the axis of a circular loop carrying current	L3	3	16
			Or			
	b		Implement magnetic vector potential and find the magnetic flux density	L3	3	16

around an infinitely long straight conductor.

14.	a	Solve Maxwell's equations for a harmonically time-varying electric field in point form, integral form, and phasor form.	L3	4	16
		Or			
	b	Using Maxwell's equations, derive the electromagnetic wave equation and discuss the properties of uniform plane waves in free space.	L3	4	16
15.	a	Analyze electromagnetic power flow in a medium and examine the significance of the Poynting vector in determining the direction and magnitude of energy propagation.	L4	5	16
		Or			
	b	Examine the wave reflection and transmission at normal incidence at the boundary between two linear media.	L4	5	16

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