U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: IV**

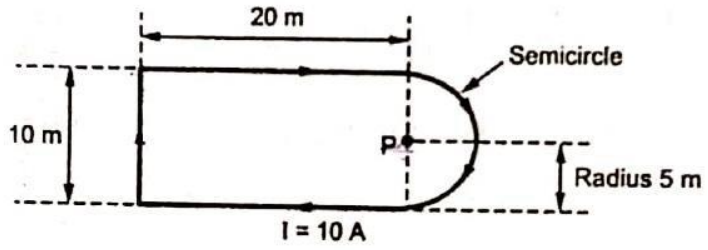
Branch: Electronics and Instrumentation Engineering **Duration: 3 hrs.**

Course Code: 19EI4PCEMF **Max Marks: 100**

Course: Electro Magnetic Field Theory

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

		UNIT - I	CO	PO	Marks
1	a)	State and explain Divergence theorem.	CO1	PO1	**06**
	b)	Derive the expression for Electric Field Intensity due to infinite line charge lying on z-axis.	CO1	PO1	**08**
	c)	A charge Q_1 = -20μC is located at P(-6, 4, 6) and charge Q_2 = 50μC is located at R(5,8,-2) in a free space. Find the force exerted on Q_2 by Q_1 in a vector form. The distances given are in meters.	CO1	PO1	**06**
		OR			
2	a)	State and explain Coulomb's Law.	CO1	PO1	**06**
	b)	Derive the expression for Electric Field Intensity at a point due to an infinite sheet charge lying on XY plane using Gauss Law.	CO1	PO1	**08**
	c)	Find the divergence of $\bar{A}$ at point P (5, π/2, 1) where $\bar{A} = rzsin\emptyset\bar{a}_r + 3rz^2\, cos\emptyset\bar{a}_\emptyset$	CO1	PO1	**06**
		UNIT - II			
3	a)	Develop the relation of the Electric field intensity and Electric flux density at boundary conditions between conductor and free space of infinite extent.	CO2	PO2	**10**
	b)	A point charge of 6nC is located at origin in free space. Evaluate the potential at point P located at (0.2,-0.4, 0.4) if, (i) V= 0 at infinite, ii) V = 0 at (1, 0, 0), iii) V = 20V at P(-0.5, 1, -1).	CO2	PO2	**10**
		OR			
4	a)	Analyze the relation of the Electric field intensity and Electric flux density at boundary conditions between two perfect dielectrics with different permittivity.	CO2	PO2	**10**

		b)	Determine whether the given potential fields are satisfy the Laplace's equation $i)\ V = x^2 - y^2 + z^2$ and $ii)\ V = r cos\emptyset + z$	*CO2*	*PO2*	**10**
			UNIT - III			
	5	a)	State and explain Biot-Savart Law.	*CO3*	*PO1*	**06**
		b)	A current filament carries a current of a 10A in the $\bar{a}_z$ direction on the z-axis. Find the magnetic field intensity $\bar{H}$ at point P(1,2,3) due to this filament if its extends from a) z= -∞ to ∞, b)z= 0 to 5m and c) z= 5 to ∞.	*CO3*	*PO2*	**10**
		c)	Find the curl of a vector $\bar{H}$ for the given current equation $\bar{H} = [y\cos(ax)]\bar{a}_x + (y + e^x)\bar{a}_z$.	*CO3*	*PO2*	**04**
			OR			
	6	a)	State and explain Ampere's circuital law	*CO3*	*PO1*	**06**
		b)	Find the Magnetic field intensity and Magnetic flux density at the point P for the circuit shown in below figure.  	*CO3*	*PO2*	**10**
		c)	Describe briefly on different types of Magnetic materials.	*CO3*	*PO1*	**04**
			UNIT - IV			
	7	a)	Analyze and develop an expression for displacement current and displacement density and important conclusion.	*CO4*	*PO2*	**10**
		b)	Write the Maxwell's equation for free space in point form and integral form.	*CO4*	*PO2*	**06**
		c)	List the difference between field theory and circuit theory.	*CO4*	*PO2*	**04**
			OR			
	8	a)	Develop an expression for Maxwell's equations in differential form and integral form for time varying fields using Faraday's, Ampere's circuit and Gauss law.	*CO4*	*PO2*	**10**
		b)	State and explain Lenz's Law.	*CO4*	*PO2*	**05**
		c)	Write the Maxwell's equation for good conductor in point form and integral form.	*CO4*	*PO2*	**05**
			UNIT - V			
	9	a)	Describe the terms EMI and EMC.	*CO4*	*PO6* *PO7*	**06**

		b)	Discuss the Biological effects of Electromagnetic radiations	*CO4*	*PO6* *PO7*	**08**
		c)	What are sources of intra system and inter system EMI causes. Explain them in details.	*CO4*	*PO6* *PO7*	**06**
			OR			
	10	a)	Explain the different sources of EMI.	*CO4*	*PO6* *PO7*	**06**
		b)	Discuss the common methods to employed for controlling EMI	*CO4*	*PO6* *PO7*	**08**
		c)	Describe the standards of EMC.	*CO4*	*PO6* *PO7*	**06**

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