U.S.N.										

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

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**
Course Code: 22EE3PCFTH **Max Marks: 100**
Course: 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.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)		State and explain the coulomb's law in vector form.	CO1	PO1	**06**
	b)		Develop and analyse an expression for the electric field intensity due to infinite sheet charges.	CO2	PO2	**06**
	c)		Analyse and evaluate both sides of the divergence theorem precisely for the region: $if\ the\ flux\ density\ \bar{D} = x^2\bar{a}_x + y^2\bar{a}_y + z^3\bar{a}_z; 0 < x < 2m, 0 < y < 2m, 0 < z < 4\,m.$	CO3	PO2	**08**
			UNIT - II			
2	a)		Estimate and analyse the work done in carrying a -2C charge from P_1(2, 1, -1) to P_2(8 , 2, -1) in field E= y a_x + x a_y V/m i). Along parabola x=2y^2; 2). along the straight line joining P_1 & P_2.	CO2	PO2	**06**
			Develop an expression for $\bar{E} = -\nabla V$	CO2	PO2	**06**
	b)		Develop and analyse an expression for electric boundary conditions between conductor and free space.	CO2	PO2	**08**
			OR			
3	a)		Develop an expression for the relation between current and current density (**04M)** and continuity equation(**04M). (04+04=08M)**	CO2	PO2	**08**
	b)		List out properties of dielectrics.	CO1	PO1	**04**
	c)		Develop and analyses an expression for electric boundary conditions between conductor and dielectric's space.	CO2	PO2	**08**
			UNIT - III			
4	a)		Analyse and develop an expression for Laplace and Poisson's Equations & also Verify whether Laplace equations satisfied or not: $1).V = x^2 - y^2 + z^2; 2).V = rcos\emptyset + z; 3).rcos\theta + \emptyset$	CO2	PO2	**10**

		b)	Using Laplace equation find the expression for potential distribution in the space between two plates of a parallel plate capacitor also find the capacitance of the system.	*CO3*	*PO2*	**10**
			UNIT - IV			
	5	a)	Develop and Analyses an expression for the magnetic field intensity due to axis of a circular loop.	*CO2*	*PO2*	**07**
		b)	$If\ \bar{H} = 10\sin\theta\bar{a}_{\emptyset}\ A/m$, Analyses and Evaluate both sides of the Stokes' theorem for the surface r = 3, $0 \leq \theta \leq 90^{\circ}$, $0 \leq \varphi \leq 90^{\circ}$. Let the surface have the $\bar{a}_r$ direction.	*CO3*	*PO2*	**07**
		c)	Analyses and develop an expression for Lorentz force equation	*CO2*	*PO2*	**06**
			UNIT - V			
	6	a)	State and explain faraday's law **(05M)** and Write Maxwell's equations in point form and integral for time varying field in free space**. (05M)**	*CO1*	*PO1*	**10**
		b)	Analyze and develop an expression for electromagnetic waves in free space.	*CO3*	*PO2*	**10**
			OR			
	7	a)	Analyze and develop an expression for uniform plane wave in good conductor.	*CO3*	*PO2*	**10**
		b)	State and explain Poynting theorem **(05M)** and A certain material has $\sigma = 0$ and & $\varepsilon_R = 1$. If $H = 4\sin(10^{6t} - 0.01z)a_y$ A/m, make use of Maxwell's equations to Evaluate :**a).** μ_R: **b).** E(z, t). **(05M)**	*CO3*	*PO2*	**10**

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