Reg. No.:

Name :

VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test I – September 2022

Programme	:	B. Tech (ECE)	Semester	:	FS 2022-23
Course	:	Engineering Electromagnetics	Code	:	BECE205L
			Slot	:	B1+TB1
Faculty	:	Dr. Niraj Kumar	Class Nbr	:	CH2022231001168
		Dr. Saranya Nair M			CH2022231001169
		Dr. Chandrasekar N			CH2022231001171
		Dr. Ravi Prakash Dwivedi			CH2022231001173
		Dr. D. Thiripurasundari			CH2022231001175
Time	:	90 Minutes	Max. Marks	:	50

Answer ALL the questions

Q. No.	Sub. Sec.	Questions	Marks
1.	a.	Express the vector field $\boldsymbol{H} = xy^2z\hat{a}_x + x^2yz\hat{a}_y + xyz^2\hat{a}_z$ in cylindrical coordinates and determine H at (3, -4, 5).	[7]
	b.	Determine the divergence of the vector fields: $\hat{P} = x^2yz\hat{a}_x + xz\hat{a}_z$	[3]
2.		Find **E** at the origin if the following charge distributions are present in free space: point charge, 12 nC at P (2, 0, 6), uniform line charge density, 3 nC/m, at $x = -2$, $y = 3$; uniform surface charge density, 0.2 nC/m^2 at $x = 3$.	[10]
3.		A cube is defined by $1 < x < 1.2$, $1 < y < 1.2$, $1 < z < 1.2$. If $\boldsymbol{D} = 2x^2y\hat{a}_x + 3x^2y^2\hat{a}_z \frac{C}{m^2}$ (i) Apply Gauss's law to find the total flux leaving the closed surface of the cube. (ii) Evaluate $\nabla \cdot \mathbf{D}$ at the center of the cube (iii) Estimate the total charge enclosed within the cube	[10]
4.		Given the potential $V = \frac{10}{r^2} sin\theta cos\varphi$ (i) Find the electric flux density D at (2, π/2, 0) (ii) Calculate the work done in moving a 10μC charge from point A(l, 30°, 120°) to B(4, 90°, 60°)	[10]
5.		Find **H**: (i) in rectangular components at P (2, 3, 4) if there is a current filament on the z axis carrying 8 mA in the $\hat{a}_z$direction. (ii) Repeat if the filament is located at $x = -1$, $y = 2$. (iii) Find **H** if both filaments are present.	[10]

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