Reg. Number:	24BVD1067

VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)
CHENNAI

Continuous Assessment Test (CAT) – I AUGUST 2025

Programme	:	B.Tech (VLSI)	Semester	:	FS - 2025-26
Course Code & Course Title	:	BEVD202L & Electromagnetic Field Theory	Class Number	:	CH2025260100504
Faculty	:	Dr M Saranya Nair	Slot	:	A1+TA1
Duration	:	90 Minutes	Max. Mark	:	50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks	CO	BT Level
1.		Points P1(l, 2, 3), P2(-5, 2, 0), and P3(2, 7, -3) form a triangle in space. Calculate the area of the triangle using vector calculus.	5	1	3
2.		Line $x = 3$, $z = -1$ carries charge 20 nC/m while plane $x = -2$ carries charge 4 nC/m^2. Find the force on a point charge -5 mC located at the origin.	5	1	3
3.		Express the vector field $\mathbf{G} = (x + y^2)\,\mathbf{a}_x + xz\,\mathbf{a}_y + (z^2 + zy)\,\mathbf{a}_z$ in spherical coordinates, and determine **G** at P (8, 30°, 60°).	10	1	3
4.		A vector field $\mathbf{F}(x,y,z) = (z-y)\,\mathbf{a}_x + (x+z)\,\mathbf{a}_y + (y-x)\,\mathbf{a}_z$ circulates around a square surface in the plane $z=0$ with vertices (0,0,0), (1,0,0), (1,1,0), and (0,1,0), oriented counterclockwise. (a) Evaluate the circulation of the vector **F**, $\oint_L \mathbf{F}\cdot d\mathbf{l}$ around the edge of the square. (b) Compute the flux of $\nabla\times\mathbf{F}$ through the square surface. (c) Analyze and comment whether the Stoke's theorem holds for this case.	10	1	4
5.		Within the spherical shell, $3 \le r \le 4$m, the electric flux density is given as $\mathbf{D} = 5(r-3)^3\,\mathbf{a}_r$ C/m^2. (a) What is the volume charge density at $r = 4$? (b) What is the electric field intensity at $r = 4$? (c) How much charge is contained within the sphere $r = 4$?	10	1	3
6.		Let a uniform surface charge density of 5 nC/m^2 be present at the $z = 0$ plane, a uniform line charge density of 8 nC/m be located at $x = 0$, $z = 4$, and a point charge of 2 μC be present at P (2,0,0). If the potential at M (0,0,5) is 0V, then determine the potential at N (1,2,3).	10	1	3

**********All the best **********