VIT

Vellore Institute of Technology

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

School of Advanced Sciences

Fall Semester 2024-2025

Continuous Assessment Test – I

Programme Name & Branch: B.Tech. & ALL

Slot : A1+TA1+TAA1

Course Name & code : Complex Variables and Linear Algebra & BMAT201L

Class Number (s): VL2024250102491, 2492, 2500, 2501, 2503, 2505, 2493, 2506, 2495, 2494, 2497, 2498, 2499, 2489, 2496

Exam Duration: 90 Min. **Maximum Marks: 50**

General instruction(s) Answer ALL questions (5x10=50 Marks)

Q.No.	Question	Max Marks
1.	Determine the analytic function $f(z) = u + iv$, given that $3u + 2v = y^2 - x^2 + 16xy$.	10
2.	Show that $\psi(x, y) = x^2 - y^2 - 3x - 2y + 2xy$ can represent the stream function of an incompressible fluid flow. Also find the corresponding velocity potential and complex potential.	10
3.	If the points $1, i, -1$ in the z-plane are mapped onto the points $i, 0, -i$ in the w-plane respectively, then (i) Find the corresponding bilinear transformation $w = f(z)$. (ii) Find the invariant points of this transformation.	10
4.	Show that the transformation $w = \dfrac{5-4z}{4z-2}$ maps the circle $\lvert z\rvert=1$ into a circle of radius unity in w-plane and find the centre of the circle.	10
5.	Express the function $f(z) = \dfrac{(z-2)(z+2)}{(z+1)(z+4)}$ in Laurent series about (i) $1 < \lvert z\rvert < 4$ (ii) $\lvert z\rvert > 4$	10