VIT

Vellore Institute of Technology

School of Advanced Sciences

Fall Semester 2024-2025

Continuous Assessment Test – I

Programme Name & Branch: B.Tech

Slot: B2+TB2+TBB2

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

Class Number (s): Common to all B2+TB2+TBB2 slot

Exam Duration: 90 Min. **Maximum Ma...**

General instruction(s):

Q.No.	Question	Max Marks
1.	Show that the function $f(z)=\begin{cases}\dfrac{x^3(1+i)-y^3(1-i)}{x^2+y^2}, & if \quad z\neq 0\\ 0, & if \quad z=0\end{cases}$ is not analytic at origin although Cauchy-Riemann equations are satisfied at the origin.	10
2.	In the two dimensional fluid flow, the stream function is given by $\psi(x,y)=\dfrac{\sin 2x}{\cosh 2y-\cos 2x}$. Find the complex potential function $f(z)=\phi+i\psi$ and hence find the velocity potential function $\phi(x,\ y)$.	10
3.	Find the image of the region bounded by the lines $x=2,\ x=3,$ $y=2,\ y=3$ under the transformation $w=z^2$.	10
4.	Determine the bilinear transformation that maps the points $1, i, -1$ in z-plane onto the points $i, 0, -i$ respectively in w-plane and hence find its invariant points.	10
5.	Expand $f(z)=\dfrac{1}{(z-1)(z-2)}$ as a Laurent's series in the region (i) $1<\lvert z\rvert<2$ (ii) $0<\lvert z-1\rvert<1$.	10