VIT

Vellore Institute of Technology

REG.NO.: 24BMT0014.

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

SLOT: B2+TB2+TBB2

Programme Name & Branch	: B. Tech.
Course Code and Course Name	: BMAT201L - Complex Variables and Linear Algebra
Faculty Name(s)	: Common Question paper for B2+TB2+TBB2 slot
Class Number(s)	: Common Question paper for B2+TB2+TBB2 slot
Date of Examination	: 18/08/2025
Exam Duration	: 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- CO1: Construct analytic functions and find complex potential of fluid flow and electric fields.
- CO2: Find the image of straight lines by elementary transformations and to express analytic functions in power series.

Q. No	Question	M	CO	BL
1.	If $u(x,y)$ and $v(x,y)$ be defined on $\mathbb{R}^2-\{(0,0)\}$ by: $u(x,y)=\frac{-x}{x^2+y^2}$ and $v(x,y)=y^2-x^2$. Then show that $u(x,y)$ and $v(x,y)$ are harmonic but the function $f(z)=u+iv$ is not analytic.	10	1	2
2.	In two-dimensional fluid flows, the $\Phi(x,y)$ and $\Psi(x,y)$ represent velocity potential and stream function, respectively, associated with complex potential $f(z)=\Phi+i\Psi$. If $\Phi-3\Psi=x^2+2xy-y^2$, Subsequently, compute the velocity potential, stream function, and corresponding complex potential.	10	1	3
3.	a) Under the inversion transformation $w(z)=z^{-1}$, determine the image of the infinite strip $1\le x\le 2$ in the z-plane onto the w-plane.	5		
	b) Find the invariant points of the bilinear transformation $w=\frac{3z+5}{z+2}$.	5		2
4.	Find the bilinear transformation which maps three given points $0, i, \infty$ in the z-plane into three given points $-2, 0, 2$ in the w-plane. Find the image of the interior unit circle in z-plane into the w-plane under this transformation.	10	2	
5.	Obtain the Laurent series expansion of the function $f(z)=\frac{z}{z^2-6z+5}$ in the regions $0<\lvert z-1\rvert<4$ and $\lvert z\rvert>5$.	10	2	2

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