REG.NO.: 24BCE0298

VIT

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

SCHOOL OF ADVANCED SCIENCES

CONTINUOUS ASSESSMENT TEST - I

FALL SEMESTER 2025-2026

SLOT: A2+TA2+TAA2

Programme Name & Branch : B. Tech
Course Code and Course Name : BMAT201 and Complex Variables and Linear Algebra
Faculty Name(s) : Dr. Rajasekaran G
Class Number(s) : Common Question Paper for the Slot A2+TA2+TAA2
Date of Examination : 17. 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)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)

Q. No	Question	M	CO	BL
1.	Find the values of a and b such that the function $f(z) = x^2 + ay^2 - 2xy + i(bx^2 - y^2 + 2xy)$ is analytic. Also, find $\frac{df}{dz}$.	10	1	2
2.	Show that $\psi(x,y) = x^2 - y^2 - 3x - 2y + 2xy$ can represent the stream function of an incompressible fluid flow. Find the velocity potential $\phi(x,y)$ and hence find complex potential function $f(z) = \phi + i\psi$.	10	1	3
3.	Find the image of the triangular region in the z-plane bounded by the lines $x = 0, y = 0$ and $x + y = 1$ under the transformation $w = e^{\frac{i\pi}{4}} z$.	10	2	2
4.	Find the bilinear map which maps the points $1, i, -1$ onto the points $i, 0, -i$. Also find the image of the interior of the unit circle of the z-plane. What are the invariants points of the map?	10	2	2
5.	Find the Taylor's series to represent the function $\frac{z^2-1}{(z+2)(z+3)}$ in $\lvert z\rvert < 2$.	10	2	2