SCHOOL OF ADVANCED SCIENCES

Fall Semester 2023-2024

Continuous Assessment Test – I

Programme Name & Branch : B.Tech

Slot: B2+TB2+TBB2

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

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

Q.No.	Question	Max Marks	CO	BL
1.	If $w = f(z) = x^2 + ay^2 - 2xy + i(bx^2 - y^2 + 2xy)$ is analytic, then find the values of a and b, also find $f'(z)$.	10	CO1	BL3
2.	If $w = f(z) = \phi + i\psi$ represents the complex potential function for an electric field and $\phi(x, y) = e^{x^2 - y^2}\cos 2xy$, then find $\psi(x, y)$.	10	CO1	BL3
3	Find the image of the infinite strip $\frac{1}{4} \le y \le \frac{1}{2}$ in the z-plane under the transformation $w = \frac{1}{z}$.	10	CO2	BL4
4	Obtain the Laurent series expansion of the function $f(z) = \frac{1}{z(1-z)}$ in the region (i) $0 < \lvert z+1 \rvert < 1$ and (ii) $1 < \lvert z+1 \rvert < 2$.	10	CO2	BL2
5	Evaluate $\int_C \frac{z^2 + 2z}{(z+1)^2(z^2+4)} dz$ where C is $\lvert z \rvert = \frac{3}{2}$ using Residue theorem.	10	CO3	BL5