



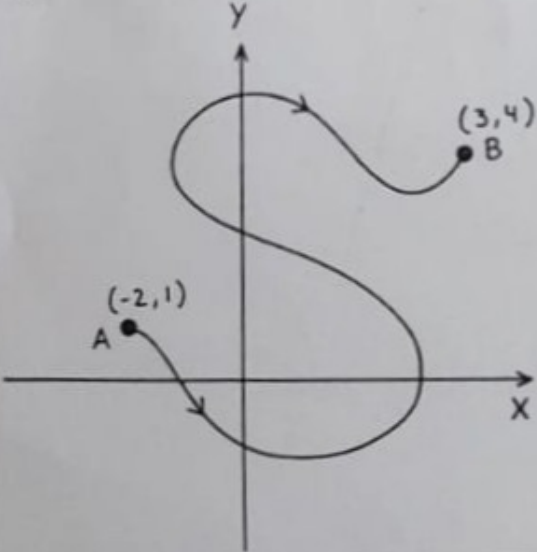
Continuous Assessment Test (CAT) – 2 OCTOBER 2025

Programme	: B.Tech.	Semester	: Fall 2025-2026
Course Code & Course Title	: BMAT201L – Complex Variables and Linear Algebra	Slot	: A2+TA2+TAA2
Faculty	: Dr. P. Vijay Kumar, Dr. M. Dhivya, Dr. P. Durgaprasad, Dr. Harshavarthini, Dr. N. Nathiya, Dr. Abhishek Kumar Singh, Dr. Om Namha Shivay, Dr. Mohit Kumar, Dr. R. Jayagopal, Dr. S. Balaji, Dr. Durga, Dr. P. T. Sowndarrajan	Class Number	: CH2025260100823, 0826, 0828, 0830, 0831, 0834, 0837, 2221, 2222, 2223, 2225, 2226
Duration	: 90 mins	Max. Mark	: 50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks	CO	BT Level
1	a)	Evaluate $\int_c (2z + 4 - 2i) dz$, where 'c' is a contour given in the following figure 	6	CO3	K3
	b)	Find the residue of $f(z) = \frac{z^2 + 3}{z^2 + 3z + 2}$ at its singular points.	4	CO3	K2
2	a)	Evaluate $\int_0^{\infty} \frac{2x^4 + 3x^2}{x^6 + 1} dx$.	10	CO3	K3
3	a)	Let $W = \{(x, y, z) \in \mathbb{R}^3 : x + y + z = 0\}$. Show that W is a subspace of $\mathbb{R}^3$ over a field $\mathbb{R}$. Also, find its basis and dimension.	5	CO5	K3

	b)	Let $\{u, v, w, x\}$ be a linearly independent set of vectors in a vector space V . Determine whether the set $\{u + v, v + w, w + x, x + u\}$ is linearly independent or not. Justify your answer.	5	CO5	K3
4		Find the basis and dimension of row space and null space of the matrix $A = \begin{bmatrix} 1 & 3 & 1 & -2 & -3 \\ 1 & 4 & 3 & -1 & -4 \\ 2 & 3 & -4 & -7 & -3 \\ 3 & 8 & 1 & -7 & -8 \end{bmatrix}$	10	CO5	K2
5	a)	Check whether M can be expressed as a linear combination of the matrices A, B, C , where $M = \begin{bmatrix} 2 & 3 \\ 1 & 1 \end{bmatrix}$ and $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, C = \begin{bmatrix} 1 & 1 \\ 4 & 5 \end{bmatrix}$. If so, determine such a linear combination of A, B, C .	5	CO5	K2
	b)	Let $M_{2 \times 2}(\mathbb{R})$ be the vector space over the field $\mathbb{R}$ that consists of all 2×2 matrices with entries in $\mathbb{R}$. Consider a mapping $T: M_{2 \times 2}(\mathbb{R}) \rightarrow M_{2 \times 2}(\mathbb{R})$ defined by $T\left(\begin{bmatrix} a & b \\ c & d \end{bmatrix}\right) = \begin{bmatrix} a - 2c & b - 2d \\ a + 4c & b + 4d \end{bmatrix}$. Check whether T is a linear transformation or not?	5	CO5	K2

*****All the best *****