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

School of Advanced Sciences
Fall Semester 2023-24
Continue Assessment Test -II

Programme Name and Branch: B.Tech. **Slot: A1+TA1+TAA1**
Course Name: Complex Variables and Linear Algebra **Course Code:** BMAT201L
Exam Duration: 90 Min. **Maximum Marks: 50**

General instruction(s): Attempt all questions

Q. No.	Question	Max Marks	CO	BL
1.	Evaluate the following real improper integral using Cauchy's Residue theorem: $\int_{-\infty}^{\infty} \frac{1}{(x^2+1)(x^2-4x+5)}dx$.	**10**	3	5
2.	Discuss the type of consistency and hence find the solution set of the following system of equations using Gauss Elimination method: $x_1+x_2+2x_3+x_4=7$, $2x_1+x_2+2x_3-x_4=6$, $3x_1+5x_2+10x_3+9x_4=37$	**10**	5	2
3.	**a)** Find the Eigen values and Eigen vectors of the matrix $A=\begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}$. Also verify the Cayley-Hamilton Theorem.	**5**	5	5
	b) A matrix $B_{2\times 2}$ has Eigen values 2 and 3. The corresponding Eigen vectors are $\begin{bmatrix}1\\1\end{bmatrix}$ and $\begin{bmatrix}1\\2\end{bmatrix}$ respectively. Then find the matrix B.	**5**		
4.	Show the space $U=\{(k+l+m,\ k-3l,\ l-2m,\ m+k);\ k,l,m\in\mathbb{R}\}$ is forming a subspace of $\mathbb{R}^4$. Also, find basis and dimension of subspace U.	**10**	5	3
5.	Examine whether the following set of vectors and linearly independent or linearly dependent: **a)** $W_1=\{4t^2-t+2,\ 3t^2-4-t,\ 1-t\}$. **b)** $W_2=\left\{\begin{bmatrix}1 & 1 & 0\\ 0 & 0 & 2\end{bmatrix},\begin{bmatrix}2 & 0 & 1\\ 0 & -1 & 0\end{bmatrix},\begin{bmatrix}1 & 1 & 0\\ 0 & 2 & 3\end{bmatrix}\right\}$.	**5+5**	5	4

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