VIT

Vellore Institute of Technology

SCHOOL OF ADVANCED SCIENCES

Fall Semester 2023-2024

Continuous Assessment Test – II

Programme Name & Branch: B.Tech. **Slot: C1+TC1+TCC1**

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

Class Number (s): Common QP for the mentioned slot

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

General instruction(s): Answer ALL the Questions

Q.No.	Question	Max Marks	CO	BL
1.	Evaluate $\int_{-\infty}^{\infty} \frac{x^2}{(1+x^2)^3} dx$ using Cauchy's residue theorem.	10	CO3	BL2
2. (a)	Find the eigenvalue corresponding to an eigenvector $X=\begin{pmatrix} 5 \\ -2 \\ 4 \end{pmatrix}$ of a matrix $A=\begin{pmatrix} 5 & -10 & -5 \\ 2 & 14 & 2 \\ -4 & -8 & 6 \end{pmatrix}$	5	CO5	BL3
2. (b)	Let $A=\begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$. Use Cayley-Hamilton theorem to find the values of a and b such that $A^3 = aA+bI$, where $I=\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$	5	CO5	BL3
3.	Using Gauss Jordan, Solve the linear system. $x+2y-z-w=-4$; $3x-y+2z+2w=10$; $x+y-3z+w=-5$; $2x-3y+4z-7w=6$	10	CO5	BL3
4.(a)	Let $R^3(R)$ be a Vector Space and $S=\{(1,1,0),(1,0,2),(1,1,1)\}$ be a linear independent subset of R^3. Express a vector $(1,2,-1)$ as a Linear combination of the elements of S.	5	CO4	BL4
4.(b)	Let $W=\{(x,y,z,w) \in R^4 \mid x=2y,\ z=3w-y\}$ be a subspace of a vector space $R^4(R)$. Find the basis and dimension of W.	5	CO4	BL5
5.	Find the dimension of the row space of $A=\begin{bmatrix} 2 & 1 & 0 & 4 & 3 \\ 1 & 0 & 5 & 2 & 1 \\ 3 & 2 & 4 & 7 & 0 \\ 2 & 6 & 1 & 0 & 1 \end{bmatrix}$	10	CO4	BL2