VIT

Vellore Institute of Technology

Continuous Assessment Test – 2

Programme Name & Branch: B.Tech*

Course Name: Applied Linear Algebra | **Course Code:** MAT3004

Slot: A1+TA1+TAA1+V1 | **Exam Duration:** 90 min.

Maximum Marks: 50

General instruction(s):

1. Attempt all questions.
2. Missing data, if any, may be assumed suitably.
3. Marks are indicated in the right.

S.No.	Questions		Course Outcome (CO)
1	Find bases of $row(A), col(A)$ and $null(A)$ where $A=\begin{bmatrix}1 & 0 & -1\\ 1 & 1 & 1\end{bmatrix}$	[10]	CO2
2(a)	If A is a 3×5 matrix, what may be the possible values of nullity(A)?	[5]	CO2
2(b)	Give an example in which $rank(AB) < rank(B)$.	[5]	
3	Find the standard matrix of the given linear transformation from R^2 to R^2: a) Projection onto the line $y=-x$ b) Reflection about the line $y=-x$	[10]	CO2
4(a)	Let $T: R^2 \to R^2$ be a linear transformation such that $T(2,-1)=(1,1), T(-1,1)=(2,3)$. Find $T(x,y)$ for any $(x,y)\in R^2$.	[5]	CO3
4(b)	Prove that rank and nullity are similarity invariant.	[5]	CO3
5	Let $T: R^2 \to R^2$ be a linear transformation defined by $T\left(\begin{bmatrix}x_1\\ x_2\end{bmatrix}\right)=\begin{bmatrix}x_1+x_2\\ -2x_1+4x_2\end{bmatrix}$ and let $B=\{u_1,u_2\}$ be the basis where $u_1=\begin{bmatrix}1\\ 1\end{bmatrix}$, $u_2=\begin{bmatrix}1\\ 2\end{bmatrix}$ Find $[T]_B$.	[10]	CO3

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