



Parul University
Faculty of Engineering and Technology
Parul Institute of Engineering and Technology
CSE/IT Department

Subject Name	Linear Algebra	A.Y	2025-2026	
Subject Code	03019102BS01	Semester	II	
Assignment-4				
Sr No	Question	COs	B.T	Competence
Q-1	Consider the matrix $B = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ 1 & 3 & 2 & 5 \end{bmatrix}$. Find the dimension of the column space and determine its columns form a linearly independent set or not.	1	3	Apply
Q-2	Let $A = \begin{bmatrix} 1 & 1 & 1 & 0 & 2 \\ 0 & 1 & 2 & 3 & 1 \\ 0 & 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ be a 4×5 matrix. What is the dimension of the null space?	1	3	Apply
Q-3	Given the vectors $v_1=(2,0,1)$ and $v_2=(1,1,0)$ in R^3 , Apply the Gram-Schmidt process to find an orthonormal basis for the subspace they span. Verify orthogonality by computing the dot	4	3	Apply

	product.			
Q-4	Verify that the set $\{(1,0),(0,1)\}$ is orthonormal in \mathbb{R}^2 and compute the projection of $(2,3)$ onto $(1,0)$.	4	4	Analyze
Q-5	Find an orthonormal basis for the plane $x+y+z=0$ in \mathbb{R}^3 and compute angles between basis vectors.	4	2	Understand
Q-6	<p>1) What is the difference between an orthogonal set and an orthonormal set of vectors?</p> <p>2) Normalize the vector $v=(3,4)$, to obtain a unit vector.</p> <p>3) If $A\vec{v}=(3,4)$ and $B\vec{v}=(-4,3)$, determine the angle between them.</p>	4	3	Apply
Q-7	Define an inner-product space and give an example of a space that is normed but not an inner-product space.	4	2	Understand
Q-8	Given $v_1=(1,0,1)$ and $v_2=(2,1,0)$ in \mathbb{R}^3 , use the Gram-Schmidt process to find an orthonormal basis for their span. Verify the result with dot products.	4	4	Analyze

