



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

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

	product.			
Q-4	Verify that the set $\{(1,0),(0,1)\}$ is orthonormal in $R^2$ 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 $R^3$ and compute angles between basis vectors.	4	2	Understand
Q-6	1) What is the difference between an orthogonal set and an orthonormal set of vectors?  2) Normalize the vector $v=(3,4)$ , to obtain a unit vector.  3) If $A=(3,4)$ and $B=(-4,3)$ , determine the angle between them.	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 $R^3$ , use the Gram-Schmidt process to find an orthonormal basis for their span. Verify the result with dot products.	4	4	Analyze

