

Malabar Christian College, Calicut
 Fourth Semester Internal Examination, February 2026
 Major Course in Mathematics
 Basic Linear Algebra: MAT4CJ204

Time: 1 Hr

Max Marks: 35

Name:	Marks Scored	Section A		Total Marks
Class:		Section B		
		Section C		

Section A

(Each question carries 3 marks, Max marks for section : 7)

1. Let V be a vector space. Prove that $0\mathbf{u} = \mathbf{0}$, for any vector $\mathbf{u} \in V$.
2. Let $A = \begin{bmatrix} 1 & -3 & -2 \\ -5 & 9 & 1 \end{bmatrix}$ and let $\mathbf{u} = \begin{bmatrix} 5 \\ 3 \\ -2 \end{bmatrix}$. Determine whether $\mathbf{u} \in \text{Nul } A$.
3. If A is a 7×9 matrix with a two-dimensional null space, what is the rank of A ?

Section B

(Each question carries 6 marks, Max marks for section : 18)

4. (a) Let H be the set of all vectors of the form $\begin{bmatrix} 2t \\ 0 \\ -t \end{bmatrix}$. Show that H is a subspace of \mathbb{R}^3 .
 (b) Is $\begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix} \in H$?
5. (a) Let H be the set of all vectors in \mathbb{R}^4 whose coordinates a, b, c, d satisfy the equations $a - 2b + 5c = d$ and $c - a = b$. Show that H is a subspace of \mathbb{R}^4 .
 (b) Is $\begin{bmatrix} 1 \\ -1 \\ 0 \\ 3 \end{bmatrix} \in H$?