Assignment for Academic Year 2024-2025 (Beginning January 2025)

CLASS: BA-3rd Year **Course Name: Linear Algebra**

Course Code: MATH303TH

ASSIGNMENT-1

Attempt any **TWO** of the following questions:

Ques 1. Prove that any field forms a vector space over itself.

Ques 2. Show that $U_1 = \{(a,b,c,d): b+c+d=0\}$ is a subspace of R^4.

Ques 3. Prove that the linear span $L(s)$ of any subset S of a vector space $V(F)$ is subspace of $V(F)$.

Ques 4. If W is a Subspace of a finite dimensional vector space $V(F)$, prove that $\dim W \leq \dim V$.

ASSIGNMENT-2

Attempt any **TWO** of the following questions:

Ques 1. If u, v, w are linearly independent vectors in vector space $V(F)$, then show that $u+v, u-v, u-2v+w$ are linearly independent.

Ques 2. Extend $B = \{(1,1,1,1),(1,2,1,2)\}$ to a basis of $R^4(R)$.

Ques 3. Show that $T: R^2 \to R^3$ defined by $T(x,y) = (x+y, x-y, y)$ is a linear transformation.

Ques 4. Fine the basis of $B = (V_1, V_2)$ of R^2 over R, where $V_1 = (1,2), V_2 = (1,5)$.

ASSIGNMENT-3

Attempt any **TWO** of the following questions:

Ques 1. Find the eigen value and eigen vector of $\begin{bmatrix} 1 & i \\ 0 & i \end{bmatrix}$.

Ques 2. Diagonalize the matrix $\begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$.

Ques 3. Find the characterstic polynomial for $\begin{bmatrix} 5 & -2 \\ 8 & 3 \end{bmatrix}$

Ques 4. Let $T: V_3(R) \to V_3(R)$ defined by $T(x,y,z) = 3x, x-y, 2x+y+z$.