ABES Engineering College, Ghaziabad

Department of Applied Sciences & Humanities

Session: 2025-26 **Semester: I**

Course Code: 25AS102

Course Name: Fundamentals of Linera Algebra & Statistics

Assignment 3

Date of Assignment: **Date of submission:**

S.No.	KL	CO	Question	
1	K3	CO2	Show that the function linear transformation $T: R^2 \to R^3$ is given by $T(x, y) = (x + y,\ x - y, y)$ is a linear transformation.	
2.	K3	CO2	Show that the function linear transformation $T: R^3 \to R^2$ is given by $T(x, y, z) = (2x - 3y,\ 7x + 2z)$ is a linear transformation.	
3.	K3	CO2	Let V be vector space of real n-square matrices, and let M be a fixed non zero matrix in V. Show that the following mapping $T: V \to V$ is linear, defined by T(A)=MA	
4	K3	CO2	Let $T: R^4 \to R^3$ be the linear transformation defined by $T(x, y, z, t) = (x - y + z + t, x + 2z - t, x + y + 3z - 3t)$ Find a basis and dimension of (a) Image of T (b) the kernel of T. Also verify rank nullity theorem.	
5	K3	CO2	Consider the linear mapping $T: R^2 \to R^2$ defined by $T(x, y) = (3x + 4y, 2x - 5y)$and the following bases of R^2: S= $\{u_1, u_2\} = \{(1, 2),\ (2,3)\}$ and E= $\{e_1, e_2\} = \{(1, 0),\ (0,1)\}$ (i) Find the matrix A representing T relative to basis S (ii) Find the matrix B representing T relative to basis E	

Answers:

4. (a) (1, 1, 1), (0, 1, 2) dim(Im T) = 2 (b) (2, 1, -1, 0), (1, 2,0,1),) dim(Ker T)=2

5. (i) $[A]_{\mathrm{s}} = \begin{bmatrix} -49 & -76 \\ 30 & 47 \end{bmatrix}$ (ii) $[B]_{\mathrm{E}} = \begin{bmatrix} 3 & 4 \\ 2 & -5 \end{bmatrix}$