TEST

DELTA Pg No. 1

GE-2 - LINEAR ALGEBRA

TOTAL MARKS : 25

ANSWER ANY FIVE QUESTIONS :-

1. Show that the set of vectors of the form $[a, b, \frac{1}{2}a - 2b]$ in $\mathbb{R}^3$ is a subspace of $\mathbb{R}^3$ under the usual operations.

2. Check whether following is a linearly independent set or not :-

$$\left\{ \begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}, \begin{bmatrix} -1 & 0 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} 6 & -1 \\ 3 & 2 \end{bmatrix}, \begin{bmatrix} -11 & 3 \\ -2 & 2 \end{bmatrix} \right\}$$

3. Examine if $B = \{[-1, 2, -3], [3, 1, 4], [2, -1, 6]\}$ is a basis of $\mathbb{R}^3$.

4. Let $S = \{[1, 0], [1, -3]\}$ & $T = \{[3, 0], [4, -1]\}$ be two bases for $\mathbb{R}^2$

(i) Find coordinate vector $[v]_T$ of v w.r.t. T-basis.

(ii) Compute transition matrix $P_{S \leftarrow T}$ from the T-basis to the S-basis.

(iii) Find coordinate vector $[v]_S$ of v w.r.t. S-basis using $P_{S \leftarrow T}$.

5. Let $S = \{[-1, 2, -3], [3, 1, 4], [2, -1, 6]\}$ and $T = \{[1, 1, 0], [2, 0, 1], [0, 1, 2]\}$ be two bases of $\mathbb{R}^3$. Show $Q_{T \leftarrow S} = (P_{S \leftarrow T})^{-1}$ for the above two bases.

Sign.

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6. Prove that $\mathbb{R}^2$ is a vector space using the operations $\oplus$ & $\odot$ given by

$$[x, y] \oplus [w, z] = [x+w+1,\ y+z-2]$$

& $$a \odot [x, y] = [ax+a-1,\ ay-2a+2]$$

Find the zero vector $\mathbf{0}$ in V & the additive inverse $-v$ for any vector v in V.