UNIT-I Import Questions

1) if H, K are subspace of V(F) then p.T $H \cap K$ is subspace of V(F) and $H \cup K$ is not subspace of V(F)

2) let $V_1, V_2 \dots V_p$ are vectors in V(F) Then p.T span $\{V_1, V_2 \dots V_p\}$ is subspace of V(F)

3) if $U_1, U_2, \dots U_p, V_1, V_2 \dots V_p$ are vectors in V(F) and $H = \text{span}\{U_1, U_2 \dots U_p\}$, $K = \text{span}\{V_1, V_2 \dots V_p\}$ then p.T $H + K = \text{span}\{U_1, U_2 \dots U_p, V_1, V_2 \dots V_p\}$

4) if $T: V \to W$ is a Linear Transformation then p.T
   a) ker(T) is subspace of W
   b) Range(T) is subspace of W.

5) Define Lin. dep & Lin. Independent and state and prove spanning set Theorem.

6) Define Basis. state and prove Unique Representation theorem.

7) let $B = \{b_1, b_2 \dots b_n\}$ is a basis set of a vector space V(F). Then p.T any set which is containg more than n-vectors is Lin. Independent.

8) state and prove Basis Theorem.

9) Define Null space and column space. A Null space of order $m \times n$ matrix of 'A' is subspace of R^n?

UNIT-II

1) Define Rank of a matrix. state and prove Rank Theorem.

2) Determine Basis of Row space, column space, Nullspace following matrices. And verify Rank Theorem

ⓐ $A = \begin{bmatrix} 1 & -4 & 9 & -7 \\ -1 & 2 & -4 & 1 \\ 5 & -6 & 10 & 7 \end{bmatrix}$ ⓑ $A = \begin{bmatrix} 1 & 0 & -1 & 5 \\ 0 & -2 & 5 & -6 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

3) P.P Eigen values of a Triangular matrix is same as its diagonal element.

4) if $A = \begin{bmatrix} 4 & 0 & 1 \\ -2 & 1 & 0 \\ -2 & 0 & 1 \end{bmatrix}$ Then find the basis of the eigen space corresponding $\lambda = 1, 2, 3$

5) find Eigen values and eigen vectors of $A = \begin{bmatrix} 4 & -1 & 6 \\ 2 & 1 & 6 \\ 2 & -1 & 8 \end{bmatrix}$

6) If $v_1, v_2 \ldots v_r$ are Eigen vectors of corresponding distinct Eigen values $\lambda_1, \lambda_2 \ldots \lambda_r$ of $n \times n$ matrix of "A" then The set $\{v_1, v_2 \ldots v_r\}$ is Lin. Independent.

7) If $A = \begin{bmatrix} 4 & 2 & 3 \\ -1 & 1 & -3 \\ 2 & 4 & 9 \end{bmatrix}$ Then find Eigen vector corresponding Eigen values $\lambda = 3$

UNIT-III

1) if "A" and "B" are two similar matrices. Then P.T they have the same char. poly and hence has the same Eigen values.

2) state and prove Diagonalisation theorem

3) Test the Diagonalisabuling of $A = \begin{bmatrix} 1 & 3 & 3 \\ -3 & -5 & -3 \\ 3 & 3 & 1 \end{bmatrix}$

4) $A = \begin{bmatrix} 1 & 3 & 3 \\ -3 & -5 & -3 \\ 3 & 3 & 1 \end{bmatrix}$ Test the daigonaliseabuling then find A^{e}.

5) if $P = \begin{bmatrix} 5 & 7 \\ 2 & 3 \end{bmatrix}$ $D = \begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix}$ then compute A^2, A^4 if $A = PDP^{-1}$

UNIT-IV

1) state and prove pythegorian theorem

2) state and prove parallelogram theorem

3) if $S = \{U_1, U_2 \cdots U_n\}$ is a orthogonal set of vector in R^n. Then P.T "S" is Lin. Ind. where "S" has Non zero vectors

4) If $\{U_1, U_2 \cdots U_n\}$ is a orthogonal basis for a subspace "w" of R^n. for each "y" in "W" in the weight on the linear combination $y = c_1U_1 + c_2U_2 + \cdots + c_nU_n$ is Given by

$$c_i = \frac{y \cdot c_i}{U_i \cdot U_i} \quad (i = 1, 2 \cdots n)$$

5) If "U" is a $m \times n$ matrix of $m \times n$ if "U" has orthogonal column $\Leftrightarrow U^T U = I$

6) if $U_1 = \begin{bmatrix} 3 \\ -3 \\ 0 \end{bmatrix}$, $U_2 = \begin{bmatrix} 2 \\ 2 \\ -1 \end{bmatrix}$, $U_3 = \begin{bmatrix} 1 \\ 1 \\ 4 \end{bmatrix}$ and $x = \begin{bmatrix} 5 \\ -3 \\ 1 \end{bmatrix}$

then show that $\{U_1 U_2 U_3\}$ is orthogonal basis of R^3. Express x is lin. comb. of $U_1 U_2 U_3$.

7) $S = \left\{ \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} \begin{bmatrix} -1 \\ 4 \\ 1 \end{bmatrix} \begin{bmatrix} 2 \\ 1 \\ -2 \end{bmatrix} \right\}$ and $x = \begin{bmatrix} 8 \\ -4 \\ -3 \end{bmatrix}$ then s.T $\{U_1 U_2 U_3\}$ is orthogonal basis of R^3. Express "x" is lin. comb. of $U_1, U_2 -- U_3$

8) Find The projection of $y = \begin{bmatrix} 7 \\ 6 \end{bmatrix}$ and $u = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$ also write y is some of two orthogonal vectore one in span $\{u\}$ and orthogonal to u.

9) problems on projection

(a) $y = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ $u = \begin{bmatrix} -1 \\ 3 \end{bmatrix}$

(b) $y = \begin{bmatrix} 2 \\ 6 \end{bmatrix}$ $u = \begin{bmatrix} 7 \\ 1 \end{bmatrix}$