Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: B. Tech.

Branch	**: CSE, ECE, EEE**	**Semester**	**: 2nd**
Title of the Course	**: Linear Algebra and Complex Analysis**	**Course Code**	**: MAL 151**

Time: 2 Hours **Maximum Marks: 25**

Note : All questions are compulsory

Q.1. Give an example of a square real matrix that has rank 2 and all of whose Eigen values are zero. **(01 Mark)**

Q.2. If a matrix A is invertible then it is diagonalizable. Prove or give a counter example. **(02 Marks)**

Q.3. Construct a matrix A having Eigen values –1, 2, 2 and corresponding Eigen vectors (1,2,3), (1,1,0), (0,1,1) respectively. **(05 Marks)**

Q.4. Find the basis for the column space of A "Col A" and basis for the null space of A "Nul A" where $A=\begin{bmatrix} 1 & 4 & 8 & -3 & -7 \\ -1 & 2 & 7 & 3 & 4 \\ -2 & 2 & 9 & 5 & 5 \\ 3 & 6 & 9 & -5 & -2 \end{bmatrix}$. **(05 Marks)**

Q.5. State and prove the spanning set theorem. **(04 Marks)**

Q.6. (A) Show that the Eigen values of the Skew Hermitian matrix are pure imaginary or zero.

(B) Show that if λ is Eigen value of non singular matrix A then $\frac{1}{\lambda}$ is Eigen value of A^{-1}.

(04 Marks)

Q.7. Use the Gram - Schmidt process to produce an orthogonal basis for W from the basis of W given by {(1,-1,-1,1,1), (2,1,4,-4,2), (5,-4,-3,7,1)}. **(04 Marks)**