Mahindra University Hyderabad
École Centrale School of Engineering
End Semester-Regular Examination, December 2024
Program: B.Tech Branch: Computation & Mathematics Year: III
Semester: I
Subject: Advanced Linear Algebra (MA3117)

Date: 19/12/2024
Time Duration: 3 Hours

Start Time: 10.00 AM
Max. Marks: 100

Instructions:

1. All questions are compulsory.

Q 1: 20 marks

Suppose T is both upper triangular and normal with real entries. Prove that T must be a diagonal matrix.

~~Q 2:~~ 20 marks

Find the singular value decomposition of the matrix $A = \begin{bmatrix} 3 & 0 \\ 4 & 5 \end{bmatrix}$.

Q 3: 20 marks

Compute the Jordan matrix J in Jordan canonical form of the matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$.

Q 4: 20 marks

Find the QR factorization of the following matrix using modified Gram-Schmidt orthogonalization method.

$$A = \begin{bmatrix} 1 & 4 & 8 \\ 2 & 0 & 1 \\ 0 & 5 & 5 \\ 3 & 8 & 6 \end{bmatrix}$$

Q 5: 20 marks

Convert the matrix $A = \begin{bmatrix} 3 & 1 & 1 \\ 1 & 3 & 1 \\ 1 & 1 & 3 \end{bmatrix}$ into tridiagonal form

---