Mahindra University Hyderabad
École Centrale School of Engineering,
Minor-1 Examination Program: B.Tech
Branch: Computation & Mathematics Year: III Semester: I
Subject: Advanced Linear Algebra (MA3117)

Date: 13/09/2024 **Start Time: 02.00 PM**
Time Duration: 1.5 Hours **Max. Marks: 20**

Instructions: All questions are compulsory.

Q 1: 5 marks

Find the null space of A, where $A = \begin{bmatrix} 1 & 3 & 4 \\ 2 & -1 & 1 \\ 3 & 2 & 5 \\ 5 & 15 & 20 \end{bmatrix}$. Also find a basis of this null space.

Q 2: 5 marks

Prove that the null space of a matrix is orthogonal complement of its row space.

Q 3 : 5 marks

In the following matrix A, find the Schur complement of $(1,1)$ element.

$$A = \begin{bmatrix} 2 & 1 & 2 \\ 6 & 2 & 4 \\ 1 & -1 & 0 \end{bmatrix}.$$

Q 4: 5 marks

Prove that the diagonal elements and eigenvalues of a positive definite matrix A are all positive.