

SHIV NADAR UNIVERSITY CHENNAI, KALAVAKKAM – 603110
MATHEMATICS - SCHOOL OF SCIENCE & HUMANITIES

REGULATION 2021

MA1001

LINEAR ALGEBRA

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3 1 0 4

(Common to B. Tech AI & DS, B. Tech CSE (IoT) & B.Tech CSE (Cybersecurity))

Periods / Week: 5

No. of Credits: 4

Course Objectives:

The objective of this course is to enable the student to

1. Find the basis and dimension of vector space.
2. Obtain the nullity and rank of linear transformation.
3. Find the eigenvalues and eigenvectors of the transformations.
4. Find an orthonormal basis of inner product space.
5. Perform matrix decomposition and find a least square approximation.

UNIT I VECTOR SPACES

12

Semigroup, group, ring, field (Definitions and examples)–vector space, subspace, linear independence and dependence-basis and dimension

UNIT II LINEAR TRANSFORMATION

12

Linear transformation-range space and null space-rank and nullity-dimension theorem

UNIT III EIGEN VALUES AND EIGEN VECTORS

12

Matrix representation of linear transformation-eigenvalues and eigenvectors of the linear transformation

UNIT IV INNER PRODUCT SPACES

12

Inner product and norms-properties-orthogonal, orthonormal vectors - Gram Schmidt orthonormalization process

UNIT V MATRIX DECOMPOSITION

12

QR decomposition - Singular value decomposition -Least square approximations

OUTCOMES:

After the completion of the course, the student will be able to

1. find the basis and dimension of vector space.
2. obtain the nullity and rank of a linear transformation.
3. find the eigenvalues and eigenvectors of linear transformations.
4. find an orthonormal basis of inner product space.
5. apply matrix decomposition in engineering and find least square approximations to the system of equations.

TOTAL HOURS: 60

TEXTBOOKS

1. Friedberg A.H, Insel A.J. and Spence L, Linear Algebra, Prentice Hall of India, New Delhi, 2004.