

# GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Semester: III

## Communication Systems Engineering

Subject Name: **Applied Linear Algebra in Engineering (Major Elective - IV)**

Sr. No	Course content
1.	<b>Introduction to Vector Spaces, Subspace, Linear Independence, Basis:</b> Representation of linear transformations with respect to basis.
2.	Inner product spaces, Subspace, linear functions; Riesz representation theorem and adjoints. Riesz representation theorem.
3.	Projections, products of projections, orthogonal projections, direct sums; Unitary and orthogonal transformations, Complete orthogonal sets and Parseval's identity; Closed subspaces and the projection theorem for Hilbert spaces.
4.	The Algebra of polynomials, matrix polynomials, annihilating polynomials and invariant subspaces, Jordal forms.
5.	<b>Applications:</b>  Complementary orthogonal spaces in networks, properties of graphs and their relation to vector space properties of their matrix representation ; Solution of state equations in linear system theory; Relation between the rational and Jordan forms.
6.	<b>Numerical Linear Algebra:</b>  Direct and iterative methods of solutions of linear equations: Matrices, norms, complete metric spaces and complete normal linear spaces (Banach spaces); Least squares problems (constrained and unconstrained); Eigenvalue problem.

### Reference Books:

1. B.V.Limaye, Functional Analysis, New Age International Publications, New Delhi.
2. V Krishnamurti, Introduction to linear algebra
3. Matrix Analysis R-Bhatiya Springer Verlag
4. K.Hoffman and R. Kunze, Linear Algebra, Prentice-Hall (India).
5. G.H Golub and C.F.Van Loan, Matrix Computations, North Oxford Academic.
6. G. Bachman and L. Narici, Functional Analysis, Academic Press.
7. E. Kreyszig, introductory functional analysis with application John Wiley.