IC111 Linear Algebra

Credit: 2.5-0.5-0-3

Prerequisite: Consent of the faculty member

Students intended for: B.Tech.

Elective or Core: Core Semester: Even/Odd

Course objective: The principal aim of the course is to make students understand the central ideas of linear algebra: matrix theory, vector spaces, linear transformations, orthogonality, eigenvalues, eigenvectors and canonical forms. Applications of linear algebra to geometry and ordinary differential equations and some general applications used in engineering are covered in the syllabus.

Course content:

- **Matrix Theory:** Rank of Matrix, inverse of a matrix by elementary operations, Solution of linear simultaneous equations and their numerical solutions by gauss Elimination and Gauss Seidel Methods. Eigen values and eigen vectors, Cayley Hamilton Theorem, Diagonalization of Matrices. Orthogonal, Hermitian, Skew Hermitian, Normal and Unitary matrices and their elementary properties, Quadratic Forms. [12Lectures]
- **Vector Spaces:** Vector spaces, Sub Spaces, Linear Dependences and Independences of Vectors, Span, Bases and Dimensions, Direct Sum. [12Lectures]
- **Linear Transformations**: Linear Transformations, Linear Variety, Range Space and Rank, Null Space and Nullity, Homomorphism, Matrix of Linear Transformations, Matrix Representation of a linear transformation, Structure of the solutions of the matrix equation Ax = b, Change of bases. [12Lectures]

Text Books

G.Strang, "*Linear Algebra and its Applications"*, 4th Edition, Thomson, (2006).

K. Hoffman and R. Kunze, "*Linear Algebra"*, Prentice Hall, (2008).

H.Anton, "*Elementary Linear Algebra with Applications"*, 9th Edition, John Wiley (2004).

Reference Books:

E.Kreyszig, "*Advanced Engineering Mathematics*", 9th Edition, John Wiley (2007).

S.Kumaresan, "*Linear Algebra – A Geometric Approach*", Prentice Hall of India (2004).

D. S. Watkins, "Fundamentals of Matrix Computations", 2nd Edition, John Wiley & Sons (2002).