Course Outcome(s)	The students are: equipped with standard concepts and tools in linear algebra that they would find useful in their disciplines; made competent enough to pursue advanced level of Mathematics; enabled to use Linear Algebra techniques when it is required; get an insight into the enormous applicability of linear algebra. The competency developed include: Solving systems of linear equations; Qualitative analysis of systems of linear equations; Develop understanding of vector Spaces, linear independence , determinants, canonical forms , familiarize analysis of Transformations and use of eigen values and decomposition techniques.

Syllabus:

Vector Spaces: subspaces, bases and dimensions, co-ordinates, summary of row equivalence. Linear Transformations: Linear transformation, the algebra of linear transformation, Isomorphisms, representation of transformations by matrices.

Linear Transformations (contd) : Linear functionals, the double dual, the transpose of linear transformations.

Determinants: Commutative Rings, Determinant functions, Permutation and the uniqueness of determinants, Additional properties of determinants. Elementary Canonical Forms: Introduction, characteristic values, annihilating polynomials, invariant subspaces, simultaneous triangulation, simultaneous diagonalisation, direct sum decomposition, invariant direct sums, Jordan, Rational form and diagonalization.

Text books:

1. Kenneth Hoffman and Ray Kunze, Linear Algebra, 2nd Edition, Prentice Hall of India Private Ltd, New Delhi, 1971.

References:

1. Gilbert Strang, Introduction to Linear Algebra, Wellesley-Cambridge Press; 5th Edition, 2016. 2. Klaus Janich, Linear Algebra, Springer Verlag, 1994.
3. Paul R. Halmos, Linear Algebra Problem Book, The Mathematical Association of America, 1995.
4. Kumaresan, Linear Algebra: A Geometric Approach, Prentice Hall, 2000.

Code:MAT5104: Discrete Mathematics Prerequisites: Set theory and logic: Basic concepts, cardinal numbers	L	T	P	Credit
	4	1	0	4

Course Category	Core
Course Type	Theory
Course Objective	Prepare students to develop mathematical foundations to understand and create mathematical arguments, require in learning many
Course Outcome(s)	It develop ability to deal with notions of mapping and via that notion ability to tackle various notions of infinity like countable, uncountable etc. ; ability to unifying theme for various combinatorial problems, and apply combinatorial intuitions in network theory, data structure and various other fields of science.

Syllabus:

Set theoretic operations and functions - Countable and uncountable sets - Mathematical induction - Binary relations - Pigeonhole principle -Discrete numeric functions, Generating functions, recurrence relations.

Lattices as algebraic systems - Principles of duality - Basic properties – Distributive and complemented lattices - Boolean lattices - Boolean algebra - Boolean functions and expressions.

Introduction to Graphs: The concept of a graph, Graphs and graph models, special types of graphs - path, trail, way, cycle, circuit, regular graphs, bipartite graphs, complete graphs, external graphs, intersection graphs. Graph Isomorphism, self-complementary graphs. Representing Graphs: Adjacency matrix, incidence matrix, cycle matrix. Blocks, cut-points, bridges and blocks. Trees - Properties of trees - BFS Algorithm. Eulerian Graphs, Hamiltonian Graphs. Coverings and Matching: Coverings and independence, critical points and lines, matching, maximum matching problems, minimum covering problems. Planar graphs: Plane and planar graphs, outerplanar graphs, Kuratowski's theorem - coloring problems - basic ideas.

Text books:

1. Norman L. Biggs, Discrete Mathematics, Oxford University Press, 2002.
2. Frank Harary, Graph Theory, Narosa Publishing House, 2001.

References:

1. C. L. Liu, Elements of Discrete Mathematics, McGraw-Hill, 2000.
2. Douglas B West, Introduction to Graph Theory, Prentice Hall, 2008.
3. Paul R. Halmos, Naive Set Theory, Dover Publications Inc.; Reprint Edition, 2017.

Code:MAT5105: Topology	L	T	P	Credit