



Course Code	Course Title	L	T	P	J	C
MAT1004	Discrete Mathematics	3	0	0	0	3
Pre-requisite	NIL	Syllabus Version				
		v. 1.0				
Course Objectives:						
The aim of this course -						
1 To cover certain sets, functions, relations and groups concepts for analyzing problems that arise in engineering and physical sciences.						
2 To imparting to analyze the problems connected with combinatorics and Boolean algebra.						
3 To solve calculus and integral calculus problems.						
Expected Course Outcome						
At the end of the course the student should be able to						
1.Observe the various types of sets, functions and relations.						
2.Understand the concepts of group theory.						
3.Understand the concepts of combinatorics.						
4.Understand the concepts of graph theory and its applications.						
5.Learning logic and Boolean algebra. Using these concepts to solve the problems.						
Module:1	Set, Function and Relation	5 hours				
Introduction to set – Subset – Types of set – Operation of sets – Principle of inclusion and exclusion – Laws of set theory – Functions – One-one and onto functions – Relations – Types of relation – Equivalence relations.						
Module:2	Algebraic Structures	8 hours				
Semigroup – Monoids – Groups – Subgroups – Abelian groups – Lagrange’s theorem – Rings (examples only) – Integral domain – Fields – Definition and examples.						
Module:3	Combinatorics	8 hours				
Introduction to Basic Counting Principles, Formulae behind nPr , nCr - Balls and Pins problems - Pigeon-Hole Principle - Recurrence relations – Generating Functions - Introduction to Proof Techniques - Mathematical Induction						
Module:4	Basic Graph Theory	4 hours				
Graphs and digraphs, complement, isomorphism, connectedness and reachability, adjacency matrix, Eulerian paths and circuits in graphs and digraphs, Hamiltonian paths and circuits in graphs and tournaments						
Module:5	Trees, Planer graph and colouring of a graph	6 hours				
Trees; Planar graphs, Euler’s formula, dual of a planer graph, independence number and clique number, chromatic number, statement of Four-color theorem						
Module:6	Logic	7 hours				
Propositional calculus - propositions and connectives, syntax; Semantics - truth assignments and truth						



tables, validity and satisfiability, tautology; Adequate set of connectives; Equivalence and normal forms; Compactness and resolution; Formal reducibility - natural deduction system and axiom system; Soundness and completeness						
Module:7		Boolean Algebra			5 hours	
Introduction of Boolean algebra, truth table, basic logic gate, basic postulates of Boolean algebra, principle of duality, canonical form, Karnaugh map.						
Module:8		Contemporary Issues			2 hours	
Industry Expert Lecture						
Total Lecture hours:					45 hours	
Text Book(s)						
1.	I. N. Herstein, “Topics in Algebra”, John Wiley and Sons.					
2.	M. Morris Mano, “Digital Logic & Computer Design”, Pearson.					
3.	C. L. Liu, “Elements of Discrete Mathematics;”, second edition, LiuMcGraw Hill, New Delhi.					
4.	J. A. Bondy and U. S. R. Murty, “Graph Theory with Applications “, Macmillan Press, London.					
5.	L. Zhongwan, “Mathematical Logic for Computer Science “, World Scientific, Singapore					
Reference Books						
1.	Gilberft Strang, “Introduction to Linear Algebra”.					
2.	R. A. Brualdi, “Introductory Combinatorics”, , North-Holland, New York.					
3.	N. Deo, “Graph Theory with Applications to Engineering and Computer Science”, Prentice Hall, Englewood Cliffs.					
4.	E. Mendelsohn, “Introduction to Mathematical Logic, (Second Edition)”, Van-Nostrand, London.					
Mode of Evaluation: CAT/Quiz/Digital assignment, Seminar and FAT						
Recommended by Board of Studies				16-02-2019		
Approved by Academic Council				No. 56	Date	24-09-2019