Course code: Course Title	Course Structure			Pre-Requisite
SE317: Discrete Structures	L	T	P	NIL
	3	1	0	

Course Objective: The objective of the course is to give basic knowledge of combinatorial problems, algebraic structures and graph theory.

S. NO	Course Outcomes (CO)
CO1	Understand and remember the symbols and properties of predicators, propositional logic, logic programming, and quantifiers.
CO2	Analyze and apply various theorem-proving techniques, principles of induction, and recurrence relation solutions.
CO3	Apply and understand set theory, combinatorial principles, and relational algebra.
CO4	Analyze and understand the concepts of lattices and boolean algebra and evaluate the operations.
CO5	Understand the concepts of graph theory and evaluate depth first search, breadth first search, in order, pre order, and post order traversal algorithms.

S. NO	Contents	Contact Hours
UNIT 1	**Formal Logic:** Statement, Symbolic Representation and Tautologies, Quantifiers, Predicator and validity, Normal form, Prepositional Logic, Predicate Logic, Logic Programming and Proof of correctors.	4
UNIT 2	**Proof, Relation and Analysis of Algorithm:** Technique for theorem proving: Direct Proof, Proof by Contra position, proof by exhausting cares and proof by contradiction, Principle of mathematical induction, principle of complete induction, recursive definition, solution methods for linear, first-order recurrence relations with constant coefficients, analysis of algorithms involving recurrence rotations-recursive selection sort, binary search, quick sort, solution method for a divide-and-conquer recurrence relation.	8
UNIT 3	**Sets and Combinations:** Sets, Subtracts, powersets, binary and unary operations on a set, set operations/set identities, fundamental country principles, principle of inclusion, exclusion and pigeonhole, permutation and combination, pascal's triangles, binomial theorem, representation of discrete structures.	8
UNIT 4	**Relation/function and matrices:** Rotation, properties of binary rotation, operation on binary rotation, closures, partial ordering, equivalence relation, properties of function, composition of function, inverse, binary and n-ary operations, characteristics for, permutation function, composition of cycles, Boolean matrices, Boolean matrices multiplication.	7
UNIT 5	**Lattices:** Lattices: Definition, sublattices, direct product, homomorphism **Boolean Algebra**: Definition, properties, isomorphic structures (in particulars, structures with binary operations) subs algebra, direct product and homomorphism, Boolean function, Boolean expression, representation & minimization of Boolean function.	7
UNIT 6	**Graph Theory:** Terminology, isomorphic graphs, Euler's formula (Proof) four color problem and the chromatic number of a graph, five color theorem. Trees terminology, directed graphs, Computer representation of graphs, Warshall's algorithms, Decision Trees, Euler path & Hamiltonian circuits, shortest path & minimal spanning trees, Depth-first and breadth first searches, analysis of research algorithm, trees associated with DFS & BFS Connected components,	8

	in order, preorder & post order trees traversal algorithms.	
	TOTAL	**42**

REFERENCES		
S.No.	**Name of Books/Authors/Publishers**	**Year of Publication / Reprint**
1	J. P. Trembly, P. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill.	**1997**
2	Narsingh Deo, "Graph Theory with Application to Engineering and Computer Science", PHI.	**2004**
3	Kenneth H. Rosen, K. Krithivasan, "Discrete Mathematics and Its Applications", McGraw Hill, 8th Edition.	**2021**
4	C. L. Liu, D. P. Mohapatra, "Elements of Discrete Mathematics: A Computer Oriented Approach", McGraw Hill, 4th Edition.	**2017**
5	Bernard Kolman, Robert Busby, and Sharon C. Ross, "Discrete Mathematical Structures", Pearson, 6th Edition.	**2015**