

DISCRETE MATHEMATICAL STRUCTURES

III Semester: CSE / IT								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACSB04	Core	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil			Total Classes: 60	
I. COURSEOVERVIEW:								
<p>The purpose of this course is to provide a clear understanding of the concepts that underlying fundamental concepts and tools in discrete mathematics with emphasis on their applications to computer science. It emphasizes mathematical definitions and proofs as well as applicable methods. The course contents include formal logic notation, proof methods; induction, well- ordering; sets, relations; growth of functions; permutations and combinations, counting principles, recurrence equations, trees and more general graphs</p>								
II. OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> I. Describe the logical and mathematical foundations, and study abstract models of computation. II. Illustrate the limitations of predicate logic. III. Define modern algebra for constructing and writing mathematical proofs. IV. Solve the practical examples of sets, functions, relations and recurrence relations. V. Recognize the patterns that arise in graph problems and use this knowledge for constructing the trees and spanning trees. 								
III. COURSE OUTCOMES(COs):								
COs	Course Outcome							
CO 1	To understand the concepts associated with Mathematical Logic and Predicate calculus							
CO 2	Ability to learn the basic concepts about relations, functions and to draw different diagrams like Lattice, Hassen diagrams.							
CO 3	To understand the concepts of Algebraic Structures And Combinatorics.							
CO 4	To describe various types of recurrence relations and the methods to find out their solutions.							
CO 5	To understand the basic concepts associated with Graphs and Trees.							
IV. SYLLABUS:								
MODULE - I	MATHEMATICAL LOGIC AND PREDICATES						Classes: 10	
<p>Mathematical logic: Statements and notations, connectives, well-formed formulas, truth tables, tautology, equivalence implication; Normal forms: Disjunctive normal forms, conjunctive normal forms, principle disjunctive normal forms, principle conjunctive normal forms; Predicate calculus: Predicative logic, statement functions, variables and quantifiers, free and bound variables, rules of inference, consistency, proof of contradiction, automatic theorem proving.</p>								
MODULE - II	RELATIONS, FUNCTIONS AND LATTICES						Classes: 09	
<p>Relations: Properties of binary relations, equivalence, compatibility and partial ordering relations, lattices, Hasse diagram; Functions: Inverse function, composition of functions, recursive functions; Lattices: Lattices as partially ordered sets; Definition and examples, properties of lattices, sub lattices, some special lattices.</p>								

MODULE - III	ALGEBRAIC STRUCTURES AND COMBINATORICS	Classes: 09
Algebraic structures: Algebraic systems, examples and general properties, semi groups and monoids, groups, sub groups, homomorphism, isomorphism, rings. Combinatory: The fundamental counting principles, permutations, disarrangements, combinations, permutations and combinations with repetitions, the binomial theorem, multinomial theorem, generalized inclusion exclusion principle.		
MODULE - IV	RECURRENCE RELATION	Classes: 09
Recurrence relation: Generating functions, function of sequences calculating coefficient of generating function, recurrence relations, solving recurrence relation by substitution and generating functions, Characteristics roots solution of homogeneous recurrence relation.		
MODULE - V	GRAPHS AND TREES	Classes: 08
Graphs: Basic concepts of graphs, isomorphic graphs, Euler graphs, Hamiltonian graphs, planar graphs, graph coloring, digraphs, directed acyclic graphs, weighted digraphs, region graph, chromatic numbers; Trees: Trees, spanning trees, minimal spanning trees.		
V. Text Books:		
<ol style="list-style-type: none"> 1. J. P. Tremblay, R. Manohar, Discrete Mathematical Structures with Applications to Computer Sciencel, Tata McGraw Hill, India, 1st Edition,1997. 2. Joel. Mott, Abraham Kandel, Theodore Baker, -Discrete Mathematics for Computer Scientists and Mathematiciansl, Prentice Hall of India Learning Private Limited, New Delhi, India, 2nd Edition, 2010. 		
VI. Reference Books:		
<ol style="list-style-type: none"> 1. Kenneth H. Rosen, -Discrete Mathematics and Its Applicationsl, Tata McGraw-Hill, New Delhi, India, 6th Edition,2012. 2. C. L. Liu, D. P. Mohapatra, -Elements of Discrete Mathematicsl, Tata McGraw-Hill, India, 3rd Edition,2008. 3. Ralph P. Grimaldi, B. V. Ramana, -Discrete and Combinatorial Mathematics - An Applied Introductionl, Pearson Education, India, 5th Edition, 2011. 4. D. S. Malik, M. K. Sen, -Discrete Mathematical Structures: Theory and Applications, Thomson Course Technology, India, 1st Edition, 2004. 		
VII. Web References:		
<ol style="list-style-type: none"> 1. http://www.web.stanford.edu/class/cs103x 2. http://www.cs.odu.edu/~cs381/cs381content/web_course.html 3. http://www.cse.iitd.ernet.in/~bagchi/courses/discrete-book 4. http://www.saylor.org/course/cs202/ 5. http://www.nptel.ac.in/courses/106106094/ 6. http://www.tutorialspoint.com/discrete_mathematics. 7. http://www.dmtcs.org/dmtcs-ojs/index.php/dmtcs 		
VIII. E-Text Books:		
<ol style="list-style-type: none"> 1. https://people.eecs.berkeley.edu/~daw/teaching/cs70-s05/ 2. http://home.anadolu.edu.tr/~eakyar/dersler/ayrik/kitap/kitap.pdf 3. http://45.63.83.30/graph-theory-keijo-ruohonen-pdf-tut.pdf 4. http://www.zib.de/groetschel/teaching/WS1314/BondyMurtyGTWA.pdf 		