

213301
Discrete Structures

Credit Points	Teaching Hrs/Week	Tutorial Hrs/Week
04	4	0

Objective	<ul style="list-style-type: none"> ▪ To learn formal logic, proofs, sets, relations and functions ▪ To use formal logic proofs and logical reasoning to solve problems ▪ To relate the ideas of mathematical induction to recursion and recursively defined structures ▪ To learn graphs, trees and related algorithms ▪ To apply these concepts to various areas of computer science
Prerequisites	<ul style="list-style-type: none"> ▪ Knowledge of Elementary Mathematics

Unit	Topic Name	Details	Hrs
I	Logic and Proofs	Propositions, Conditional Propositions, Logical Connectivity, Propositional calculus, Universal and Existential Quantifiers, Proofs, Proof Techniques, Mathematical Induction Set Theory - Set, Combination of sets, Finite and Infinite sets, Un-countably infinite sets, Principle of inclusion and exclusion.	08
II	Combinatorics and Discrete Probability	Permutations and Combinations: rule of sum and product, Permutations, Combinations, Algorithms for generation of Permutations and Combinations. Discrete Probability, Conditional Probability, Information and Mutual Information, Binomial Coefficients and Combinatorial Identities.	08
III	Relations, Functions and Recurrence Relations	Relations: Definitions, Properties of Binary Relations, Equivalence Relations and partitions, Partial ordering relations and lattices, Chains and Anti chains. Functions: Definitions, domain, Range, One-to-One and OnTo, Inverse and Composition, Pigeonhole Principle, Discrete Numeric functions and Generating functions, Job scheduling Problem. Recurrence Relations: Recurrence Relation, Linear Recurrence Relations With constant Coefficients, Homogeneous Solutions, Total solutions, solutions by the method of generating functions	10
IV	Graphs and Trees	Graphs: Basic terminology, multi graphs and weighted graphs, paths and circuits, shortest path in weighted graph, Hamiltonian and Eulerian paths and circuits,	10

		factors of a graph, planer graph and Traveling salesman problem. Trees:Trees, rooted trees, path length in rooted trees, prefix codes, binary search trees, spanning trees and cut set, minimal spanning trees, Kruskal's and prime's algorithms for minimal spanning tree, The Max flow – Min cut theorem (transport network).	
V	Groups and Rings	Algebraic Systems, Groups, Semi Groups, Monoid, Subgroups, Permutation Groups, Codes and Group codes, Isomorphism and Automorphisms, Homomorphism and Normal Subgroups, Ring, Integral Domain, Field, Ring Homomorphism, Polynomial Rings and Cyclic Codes.	08

Text Books	<ol style="list-style-type: none"> 1. C. LIU, "Elements of Discrete Mathematics", 2nd Edition, Tata McGraw-Hill, 2002, ISBN 0-07-043476-X. 2. R. Johnsonbaugh, "Discrete Mathematics", 5th Edition, Pearson Education, 2001 ISBN 81 – 7808 – 279 - 9 (Recommended for Unit I and Unit II)
Reference Books	<ol style="list-style-type: none"> 1. N. Biggs, "Discrete Mathematics", 2nd Edition, Oxford, 2002 ISBN 0 –19 – 850717 - 8 2. E. Goodaire, M. Parmenter, "Discrete Mathematics with Graph Theory", 2nd edition, Pearson Education, 2003 ISBN 81 – 7808 – 827 – 4 (Recommended for Recurrence relations). 3. N. Deo, "Graph theory with application to Engineering and Computer Science", Prentice Hall of India, 1990, 0 – 87692 – 145 – 4 (Recommended for Graph) 4. B. Kolman, R. Busby and S. Ross, "Discrete Mathematical Structures", 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9 5. J. Tremblay, R. Manohar, "Discrete Mathematical Structures with application to Computer Science", Tata McGraw-Hill, 2002 ISBN 0-07-463113-6 (Recommended for propositional Calculus) 6. F. Harary, "Graph Theory", Narosa Publishing House, 1988 ISBN 81 – 85015 – 55 – 4
Related Websites	<ol style="list-style-type: none"> 1. www.cs.odu.edu/~toida/nerzic/level-a/web_course.html 2. www.users.csc.tntech.edu/~srini/DM/intro/intro.html 3. www.math.about.com/od/discretemath/Discrete_Math.htm 4. www.dgp.toronto.edu/~wael/teaching/324-03s/tutorials/324tutorial10b.pdf 5. http://math.about.com/od/discretemath/Discrete_Math.htm

Examination Scheme	Continuous Assessment – 40 marks	Tests, Assignments.
	Final Theory Paper – 60 marks	Written