DISCRETE MATHEMATICAL STRUCTURES

III Semester: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACSB04	Core	3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

Students will try to Learn:

I. The fundamental knowledge of statement notations and logical connectives which are used to convert English sentences into logical expressions.
II. The effective use of combinatory principles for calculating probabilities and solving counting problems
III. The characteristics of generating functions for finding the solution of linear homogeneous recurrence relations.
IV. The effective use of graph theory in subsequent fields of study such as computer networks, and algorithms for solving real world engineering problems.

COURSE OUTCOMES:

After Successful completion of this course, students will be able to:

CO 1 Explain mathematical definitions and its notations to Reformulate statements from common language to formal logic.
CO 2 Relate the laws of logic to find the disjunctive normal form and conjunctive normal form of compound proposition.
CO 3 Demonstrate the concept of argument validation using direct proof, proof by contradiction and mathematical induction
CO 4 Apply operations on discrete mathematical structures like sets, functions, lattices to show the relation among them.
CO 5 Apply reflexive, symmetric and transitive properties on partial order set to represent diagraph as Hasse diagram.
CO 6 Identify the types of functions and properties to find operations like composition, recursive and inverse.
CO 7 Compare rings, integral domains, and field structures with binary operations defined on them
CO 8 Make use of addition rule and substitution rule to solve the problems of combinatorics.
CO 9 Solve problems involving recurrence relations and generating functions to obtain particular solution
CO 10 Recall and relate the methods of iteration, substitution and characteristic roots to solve homogenous and non-homogenous recurrence relations
CO 11 Find the optimal Hamiltonian circuit for a graph using nearest neighbor algorithm and sorted edges algorithm
CO 12 Make use of Kruskal's and prim's algorithms to form a spanning tree and to find minimum cost spanning tree.

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MODULE-I	MATHEMATICALLOGICANDPREDICATES
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.	
MODULE-II	**RELATIONS,FUNCTIONSANDLATTICES**
Relations:Propertiesofbinaryrelations,equivalence,compatibilityandpartial orderingrelations, lattices,Hassediagram; Functions:Inversefunction,compositionof functions,recursivefunctions;Lattices:Latticesaspartiallyorderedsets;Definitionand examples,properties oflattices,sublattices, somespeciallattices.	
MODULE-III	**ALGEBRAIC STRUCTURESANDCOMBINATORICS**
Algebraicstructures:Algebraicsystems,examplesandgeneralproperties,semigroupsandmonoids,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 in clusionexclusion principle.	
MODULE-IV	**RECURRENCERELATIONS**
Recurrence relation: Generating functions, function of sequences calculating coefficientofgeneratingfunction,recurrencerelations,solvingrecurrencerelationbysubstitution and generating functions, characteristics roots solution of homogeneous recurrencerelation.	
MODULE-V	**GRAPHSANDTREES**
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	

Text Books:

1. J. P. Tremblay, R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, India, 1st Edition, 1997.
2. Joe L. Mott, Abraham Kandel, Theodore P. Baker, "Discrete Mathematics for Computer Scientists and Mathematics", Prentice Hall of India Learning Private Limited, New Delhi, India, 2nd Edition, 2010.

Reference Books:

1. C. L. Liu, D. P. Mohapatra, ―Elements of Discrete Mathematics‖, Tata Mcgraw-Hill, India, 3rd Edition,2008.
2. Ralph P. Grimaldi, B. V. Ramana, ―Discrete and Combinatorial Mathematics - An Applied Introduction‖, Pearson Education, India, 5th Edition,2011.

Web References:

1. http://www.web.stanford.edu/class/cs103x
2. http://www.saylor.org/course/cs202/.
3. http://www.cse.iitd.ernet.in/~bagchi/courses/discrete-book