SREENIVASA INSTITUTE of TECHNOLOGY and MANAGEMENT STUDIES

I MCA - I Semester	**L**	**P**	**C**
	4	**0**	**4**

16MCA111 DISCRETE STRUCTURES AND AUTOMATA THEORY

Course Objectives

- To acquire the knowledge of logical operations and predicate calculus needed for computing skill
- To acquire the basic knowledge of set theory, functions and relations concepts needed for designing and solving problems.
- Apply the acquired knowledge of formal languages to the engineering areas like Compiler Design.
- Apply the acquired knowledge of finite automata theory and design discrete problems to solve by computers.

Syllabus:

UNIT I : Mathematical Logic and Predicates

Propositions, Logical Connectives, Conditionals and Biconditionals, Well formed formulas, tautologies, Logical Equivalences, Theory of Inference for Statement Calculus, Predicate Calculus, Free & Bound variables, Inference Theory of Predicate Calculus.

UNIT II : Relations and Functions

Introduction, Properties of Binary Relations, Closure of Relelations, Warshall's Algorithm, Equivalence Relations and Partitions, Partional Ordering Relations and Lattices, Compatible Relation, Functions – Composition of Functions, Recursive Functions, Hashing Function, Pigeon Hole Principles & Its Applications.

SITAMS, CHITTOOR

UNIT III : Generating Functions and Recurrence Relations

Generating Functions , Combinatorial Problems.

Recurrence Relations – Linear Recurrence Relations with constant coefficients, Homogeneous Solutions, Particular Solutions, Total Solutions, Solution by Method of Generating Functions.

UNIT IV : Graphs , Trees and Cut-Sets

Introduction, Basic terminology, Multigraphs and Weighted Graphs, Digraphs and Relations, Representation of Graphs, Operations on Graphs, Paths and Circuits, Graph traversals-Traversing of a Graph, Depth-First Search , Breadth-First Search.

Shortest Paths in Weighted Graphs, Euleran Paths and Circuits, Hamiltanian Paths and Circuits, The Travelliing Salesperson Problem.

Trees and Cut-Sets – Trees, Rooted Trees, Spanning Trees and Cut-sets, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm.

UNIT V : Introduction to Automata, Automata with output, Regular Expression and Languages.

Alphabets, String , Languages, Finite Automata (FA) , Transition Graph, Simpler Notation for DFA's , The language of a DFA, Non determinism, Minimization of DFA's .

Introduction, Moore Machine, Mealy Machine, Equivalence of Mealy and Moore Machine's.

Regular Expressions, Comparitive Study of Regular Expression, Regular Sets and Finite Automata, Construction of FA for Regular Expression, Construction of Regular Expression from DFA.

SITAMS, CHITTOOR

Course Outcomes:

- Explore the logical operations and predicate calculus needed for computing skill.
- Learn the basics of set theory, functions and relations needed for designing and solving problems.
- Understand the Graph Traversals and Minimal Spanning Tree Algorithms
- Understand the basics of Finite Automata
- Understand about the Regular Expressions

TEXT BOOKS:

1. Elements of Discrete Mathematics- A Computer Oriented Approach, 4/e, 2010, C.L.Liu, D.P. Mohapatra, Tata Mcraw-Hill , New Delhi.

2. Discrete Structures and Automata Theory , 2007, Rakesh Dube, Adesh Pandey, Ritu Gupta, Narosa Publishing House, New Delhi.

REFERENCE BOOKS:

1. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e, 2006, J.L.Mott, A. Kandel, T.P. Baker, Prentice Hall of India Private Limited , New Delhi.

2. Mathematical Foundation of Computer Science (Discrete Structures) , 2006, Dr. D.S. Chandra Sekharaiah, Prism Books Private Limited, Bangalore.

3. Discrete Mathematics and its Applications, 6/e, 2007, Kenneth H. Rosen, Tata McGraw-Hill

4. Publishing Company Limited, New Delhi.

5. Discrete Mathematical Structures, 5/e, 2007, Bernard Kolman, Robert C. Busby, Sharon

6. Cutler Ross, Prentice Hall of India Private Limited, New Delhi.

7. Discrete and Combinatorial Mathematics, 5/e , 2006, Raph P. Grimaldi, B.V. Ramana,

8. Pearson Education , New Delhi.

SITAMS, CHITTOOR