

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

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**FOR B.SC (COMPUTER SCIENCE), B.C.A, M.C.A
AND ALL COMPUTER SCIENCE COURSES**

PUSHPALATHA RAMESH



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Dedicated to my Husband

M.Ramesh

and my lovely Daughters

R.Vainavi

R.Vibhavi

for their love, support and guidance.

PREFACE

The Subject Mathematical Foundation of Computer Science is gaining importance in the curriculum of Engineering, especially Computer Science and Information Technology subjects. This book is the outcome of my teaching experience. This text contains six chapters.

Chapter I Matrices which contains its types, Basic Operations in Matrix, Determinants, Properties of Determinants, Inverse of a Matrix, Rank of Matrix, Characteristics Roots (or) Eigen Values and Eigen Vectors and Cayley - Hamilton Theorem.

Chapter II Set Theory includes, Definition, Basic Set Operations and Laws of Set Theory, Relations, Types of Relations, Representation of Relations in Matrix Form, Composition of Relations, Functions, Types of Functions and Principle of Mathematical Induction.

Chapter III Boolean Algebra contains Definition, Karnaugh Map, Sum of Product and Product of Sum.

Chapter IV Mathematical Logic covers Introduction, Connectives, Derived Connectives, Conditional Propositions, Conditional Statement, Bi-Conditional Statement, Order of Precedence for Logical Connectives, Converse, Inverse and Contra Positive Propositions, Tautologies and Contradictions, Equivalence of Formulae, Tautological Implications, Normal Forms, Principal Disjunctive Normal Form (PDNF), Principal Conjunctive Normal Form (PCNF), Indirect Method

of Proof, Predicate Calculus, Bound and Free Variables and Inference Theory for Predicate Calculus.

Chapter V Graph Theory includes Graphs, Diagraph, Types of Graph, Definitions of Paths, Reachability and Connectedness, Matrix Representation of Graphs, Shortest Path in a Weighted Graph Algorithm, Shortest Path in a Graph without Weights, Traveling Salesman Problem, Binary Trees, Traversals of Binary Trees and Expression Trees.

Chapter VI Grammars And Language covers PSG (Phrase Structure Grammar), Types of Grammars, Productions, Derivation Tree, Left Most and Right Most Derivations, Finite State Automata (FSA), Deterministic Finite Automata (DFA), Non-Deterministic Finite-State Automata, Procedure for Converting NFA to DFA.

This edition is developed as per the syllabus of the M.C.A. It suits the needs of the B.Sc (Computer Science), B.C.A., M.C.A. and M.Sc curriculum of various universities.

Suggestions for improvements of the book shall be gratefully acknowledged.

Pushpalatha Ramesh

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