

CONTENTS

	Page
Chapter 1 PROPOSITIONS AND TRUTH TABLES	1
Statements. Compound statements. Conjunction, $p \wedge q$. Disjunction, $p \vee q$. Negation, $\sim p$. Propositions and truth tables.	
<hr/>	
Chapter 2 ALGEBRA OF PROPOSITIONS	10
Tautologies and contradictions. Logical equivalence. Algebra of propositions.	
<hr/>	
Chapter 3 CONDITIONAL STATEMENTS	18
Conditional, $p \rightarrow q$. Biconditional, $p \leftrightarrow q$. Conditional statements and variations.	
<hr/>	
Chapter 4 ARGUMENTS, LOGICAL IMPLICATION	26
Arguments. Arguments and statements. Logical implication.	
<hr/>	
Chapter 5 SET THEORY	35
Sets and elements. Finite and infinite sets. Subsets. Universal and null sets. Set operations. Arguments and Venn diagrams.	
<hr/>	
Chapter 6 PRODUCT SETS	50
Ordered pairs. Product sets. Product sets in general. Truth sets of propositions.	
<hr/>	
Chapter 7 RELATIONS	58
Relations. Relations as sets of ordered pairs. Inverse relation. Equivalence relations. Partitions. Equivalence relations and partitions.	
<hr/>	
Chapter 8 FUNCTIONS	66
Definition of a function. Graph of a function. Composition function. One-one and onto functions. Inverse and identity functions.	
<hr/>	
Chapter 9 VECTORS	81
Column vectors. Vector addition. Scalar multiplication. Row vectors. Multi- plication of a row vector and a column vector.	
<hr/>	
Chapter 10 MATRICES	90
Matrices. Matrix addition. Scalar multiplication. Matrix multiplication. Square matrices. Algebra of square matrices. Transpose.	

CONTENTS

		Page
Chapter 11	LINEAR EQUATIONS	104
	Linear equation in two unknowns. Two linear equations in two unknowns. General linear equation. General system of linear equations. Homogeneous systems of linear equations.	
<hr/>		
Chapter 12	DETERMINANTS OF ORDER TWO AND THREE	127
	Introduction. Determinants of order one. Determinants of order two. Linear equations in two unknowns and determinants. Determinants of order three. Linear equations in three unknowns and determinants. Invertible matrices. Invertible matrices and determinants.	
<hr/>		
Chapter 13	THE BINOMIAL COEFFICIENTS AND THEOREM	141
	Factorial notation. Binomial coefficients. Binomial theorem. Pascal's triangle. Multinomial coefficients.	
<hr/>		
Chapter 14	PERMUTATIONS, ORDERED SAMPLES	152
	Fundamental principle of counting. Permutations. Permutations with repetitions. Ordered samples.	
<hr/>		
Chapter 15	COMBINATIONS, ORDERED PARTITIONS	161
	Combinations. Partitions and cross-partitions. Ordered partitions.	
<hr/>		
Chapter 16	TREE DIAGRAMS	176
	Tree diagrams.	
<hr/>		
Chapter 17	PROBABILITY	184
	Introduction. Sample space and events. Finite probability spaces. Equiprobable spaces. Theorems on finite probability spaces. Classical birthday problem.	
<hr/>		
Chapter 18	CONDITIONAL PROBABILITY. INDEPENDENCE	199
	Conditional probability. Multiplication theorem for conditional probability. Finite stochastic processes and tree diagrams. Independence.	
<hr/>		
Chapter 19	INDEPENDENT TRIALS, RANDOM VARIABLES	216
	Independent or repeated trials. Repeated trials with two outcomes. Random variables. Probability space and distribution of a random variable. Expected value. Gambling games.	
<hr/>		
Chapter 20	MARKOV CHAINS	233
	Probability vectors. Stochastic and regular stochastic matrices. Fixed points of square matrices. Fixed points and regular stochastic matrices. Markov chains. Higher transition probabilities. Stationary distribution of regular Markov chains. Absorbing states.	
<hr/>		
Chapter 21	INEQUALITIES	257
	The real line. Positive numbers. Order. (Finite) Intervals. Infinite intervals. Linear inequalities in one unknown. Absolute value.	

CONTENTS

	Page
Chapter 22 POINTS, LINES AND HYPERPLANES	266
Cartesian plane. Distance between points. Inclination and slope of a line. Lines and linear equations. Point-slope form. Slope-intercept form. Parallel lines. Distance between a point and a line. Euclidean m -space. Bounded sets. Hyperplanes. Parallel hyperplanes. Distance between a point and a hyperplane.	
<hr/>	
Chapter 23 CONVEX SETS AND LINEAR INEQUALITIES	281
Line segments and convex sets. Linear inequalities. Polyhedral convex sets and extreme points. Polygonal convex sets and convex polygons. Linear functions on polyhedral convex sets.	
<hr/>	
Chapter 24 LINEAR PROGRAMMING	300
Linear programming problems. Dual problems. Matrix notation. Introduction to the simplex method. Initial simplex tableau. Pivot entry of a simplex tableau. Calculating the new simplex tableau. Interpreting the terminal tableau. Algorithm of the simplex method.	
<hr/>	
Chapter 25 THEORY OF GAMES	321
Introduction to matrix games. Strategies. Optimum strategies and the value of a game. Strictly determined games. 2×2 matrix games. Recessive rows and columns. Solution of a matrix game by the simplex method. $2 \times m$ and $m \times 2$ matrix games. Summary.	
<hr/>	
INDEX	337