

Contents

<i>Preface</i>	v
<i>Symbols</i>	xi
1. Mathematical Induction	1.1-1.33
1.0 Introduction	1.1
1.1 The Greatest Common Divisor	1.1
1.2 Least Common Multiple	1.10
1.3 Prime Numbers	1.14
1.4 Theory of Congruence	1.17
1.5 Mathematical Induction Principle	1.18
1.6 The Well-Ordering Principle	1.26
<i>Exercise</i>	1.32
2. Combinatorics	2.1-2.33
2.0 Introduction	2.1
2.1 Sets	2.1
2.2 Inclusion and Exclusion	2.8
2.3 Binomial Theorem	2.18
2.4 Multinomial Theorem	2.21
2.5 Allied Topics	2.24
<i>Exercise</i>	2.31
3. Logic	3.1-3.39
3.0 Introduction	3.1
3.1 Propositions	3.1
3.2 Connectives	3.2
3.3 Truth Tables	3.6
3.4 Tautology and Contradiction	3.9
3.5 Logical Equivalences	3.10
3.6 Quantifier	3.13
3.7 Predicate Logic	3.19
3.8 Inference	3.19
3.9 Functionally Complete Sets	3.28
3.10 Duality	3.29
<i>Exercise</i>	3.37

4. Functions	4.1-4.40
4.0 Introduction	4.1
4.1 Composition of Functions	4.1
4.2 Relations	4.7
4.3 Characteristic Functions	4.17
4.4 Permutations	4.20
4.5 Ackermann's Function	4.25
4.6 Primitive Recursive Functions	4.27
4.7 Mc Carshy's 91 Function	4.39
4.8 Equivalence Relations	4.39
5. Algebraic Systems	5.1-5.50
5.1 Introduction	5.1
5.2 Semigroups, Monoids	5.1
5.3 Groups	5.4
5.4 Subgroups	5.28
5.5 Cyclic Groups	5.29
5.6 Isomorphism	5.31
5.7 Normal Subgroups	5.40
5.8 Rings and Fields	5.45
<i>Exercise</i>	5.49
6. Group Codes	6.1-6.14
6.0 Introduction	6.1
6.1 Coding Theory	6.1
6.2 The Hamming Distance	6.13
<i>Exercise</i>	6.14
7. Boolean Algebras	7.1-7.47
7.0 Introduction	7.1
7.1 Posets	7.1
7.2 Hasse Diagrams	7.2
7.3 Lattices	7.4
7.4 Karnaugh Maps	7.16
7.5 Boolean Algebras	7.24
<i>Exercises</i>	7.43
8. Recurrence Relations	8.1-8.31
8.0 Introduction	8.1
8.1 Recurrence Relations	8.1
8.2 Rules for Writing C.F.	8.1

8.3	Rules for Finding Particular Solution	8.2
8.4	Generating Functions	8.2
8.5	Some Examples	8.4
8.6	Theorems	8.25
	<i>Exercises</i>	8.30
9.	Graphs and Trees	9.1-9.75
9.1	Introduction	9.1
9.2	Graphs	9.1
9.3	Sub Graphs	9.3
9.4	Isomorphism	9.4
9.5	Some Special Classes of Graphs	9.4
9.6	Connectedness	9.5
9.7	Euler Graphs	9.8
9.8	Hamiltonian Graphs	9.9
9.9	Trees	9.9
9.10	Matrices	9.11
9.11	Planar Graphs	9.13
9.12	Colouring	9.16
9.13	Graphs K_5 , K_{33}	9.17
9.14	Directed Graphs	9.19
9.15	Shortest Path Problem	9.24
9.16	Dijkstra's Algorithm for Shortest Path	9.30
9.17	Algorithm for Minimum Spanningtrees (Kruskal's Algorithm)	9.31
9.18	Spanning Trees	9.37
9.19	Networks	9.40
9.20	Solved Problems	9.40
9.21	Recapitulation	9.72
10.	Computation	10.1-10.63
10.0	Introduction	10.1
10.1	Formal Languages	10.1
10.2	Phrase-Structure Grammar	10.2
10.3	Context-Free Grammar	10.4
10.4	Automaton	10.7
10.5	Pushdown Automation	10.10
10.6	Regular Sets	10.12
10.7	Solved Problems	10.16
10.8	Finite State Automaton	10.20

x Contents

10.9	Left Recursion Removal	10.32
10.10	Construction of PDA	10.36
10.11	The Turing Machine (TM)	10.53
	<i>Exercise</i>	<i>10.59</i>

<i>References</i>	<i>R.1-R.2</i>
-------------------	----------------

<i>Index</i>	<i>I.1-I.5</i>
--------------	----------------