

## CONTENTS

<b>Special Symbols and Abbreviations . . . . .</b>	xiii
--	------

### **Chapter I: SWITCHING FUNCTIONS**

<i>1. Introduction . . . . .</i>	1
<i>2. The n-Cube <math>Q^n</math> . . . . .</i>	1
<i>3. Switching Functions . . . . .</i>	4
<i>4. Boolean Operations . . . . .</i>	8
<i>5. Set-Theoretic Operations . . . . .</i>	13
<i>6. Boolean Expressions . . . . .</i>	17
<i>7. Cubical Complexes . . . . .</i>	22

### **Chapter II: THRESHOLD FUNCTIONS**

<i>1. Introduction . . . . .</i>	28
<i>2. Linear Separability . . . . .</i>	28
<i>3. Tolerance . . . . .</i>	32
<i>4. Integral Separating Systems . . . . .</i>	37
<i>5. Convex Hulls . . . . .</i>	39
<i>6. Boundary Points . . . . .</i>	42
<i>7. Connectedness . . . . .</i>	48
<i>8. Similarity . . . . .</i>	50
<i>9. Characterizing Parameters . . . . .</i>	52
<i>10. Number of Threshold Functions . . . . .</i>	55

### **Chapter III: MONOTONICITY AND ASUMMABILITY**

<i>1. Introduction . . . . .</i>	58
<i>2. On Cubes in <math>Q^n</math> . . . . .</i>	58
<i>3. Restricted Switching Functions . . . . .</i>	60

4. Complete Monotonicity . . . . .	64
5. k-Monotonicity . . . . .	65
6. Unateness . . . . .	68
7. Property of 2-Monotonic Functions . . . . .	70
8. Numerical Tests . . . . .	72
9. Asummability . . . . .	77

## Chapter IV: CLASSIFICATION

1. Introduction . . . . .	83
2. Classes of Switching Functions . . . . .	83
3. Complementation of Variables . . . . .	86
4. Permutation of Variables . . . . .	91
5. Invariance Theorem . . . . .	94
6. Canonical Switching Functions . . . . .	97
7. Canonical Partial Order in $Q^n$ . . . . .	99
8. Regular Switching Functions . . . . .	103
9. Canonical Separating Systems . . . . .	106

## Chapter V: ARITHMETIC INVARIANTS

1. Introduction . . . . .	111
2. Connectivity Numbers . . . . .	111
3. Numbers of Connecting Edges . . . . .	113
4. Dimension . . . . .	114
5. Higher Dimensional Invariants . . . . .	117
6. Completeness and Existence . . . . .	122
7. Enumeration and Labeling . . . . .	126
8. Computation of Parameters . . . . .	130
9. Dual Switching Functions . . . . .	133
10. Duality Theorems . . . . .	137
11. Extreme Points . . . . .	143
12. Computation of Maximal Points . . . . .	144
13. Computation of Minimal Points . . . . .	149

## Chapter VI: SYNTHESIS OF LINEAR SEPARABILITY

1. Introduction . . . . .	153
2. General Method . . . . .	153
3. The Willis Reduction . . . . .	159

4. Further Reduction . . . . .	167
5. Illustrative Examples . . . . .	172
6. Successive Elimination . . . . .	176
7. An Illustrative Example . . . . .	185
8. Successive Approximation . . . . .	189
9. Analytical Algorithm . . . . .	194
10. Other Synthesis Methods . . . . .	199

**Chapter VII: MINIMAL SEPARATING SYSTEMS**

1. Introduction . . . . .	202
2. Preliminaries . . . . .	203
3. Minimality Criteria . . . . .	208
4. Uniquely Minimal Separating Systems . . . . .	213
5. The Minimization Problem . . . . .	218
6. Dual Simplex Method . . . . .	224
7. Dual Simplex Tableaux . . . . .	234
8. Solution of the Minimization Problem . . . . .	247
9. Minimal Integral Separating Systems . . . . .	254

**Chapter VIII: MINIMAL THRESHOLD NETWORKS**

1. Introduction . . . . .	256
2. Decompositions of Switching Functions . . . . .	257
3. Minimal Linear Decompositions . . . . .	264
4. Simple Decompositions . . . . .	267
5. Reduction Theorem . . . . .	270
6. Total Degree of Repetition . . . . .	276
7. Ashenhurst's Fundamental Theorem . . . . .	280
8. Cases with "Don't-Care" Points . . . . .	285
9. Assignment of Values to *'s . . . . .	289
10. Singular Simple Decompositions . . . . .	295
11. Discussion of Component Functions . . . . .	299
12. Minimization Algorithm . . . . .	302
13. Illustrative Example . . . . .	308

<b>Bibliography . . . . .</b>	315
-------------------------------	-----

<b>Index . . . . .</b>	335
------------------------	-----