

Contents

<i>Preface</i>	<i>page</i> vii
<i>Preface to the English edition</i>	ix
<i>Introduction</i>	xi
1 Combinatorial configurations	1
1.1 Notions of set theory and algebra	1
1.2 Mappings and composition laws	5
1.3 Combinatorial configurations	15
1.4 Latin squares	19
1.5 (v, k, λ) -configurations	25
1.6 Finite projective planes	36
1.7 Block designs	42
1.8 Sperner's theorem and completely separating families of sets	47
2 Transversals and permanents	49
2.1 Transversals	49
2.2 Decomposition of non-negative matrices	58
2.3 Decomposition of probabilistic automata	68
2.4 Permanents	73
2.5 Calculation of permanents	82
2.6 The inclusion–exclusion method	87
2.7 Inequalities for permanents	93
3 Generating functions	102
3.1 Generating functions	103
3.2 The basic numbers, polynomials and relations	110
3.3 Non-regenerative substitutions, inversions and ascents in permutations	125
3.4 Gaussian coefficients and polynomials	133
3.5 The Dirichlet generating functions	141

vi	<i>Contents</i>	
3.6	Asymptotic behavior of Stirling numbers	146
3.7	The saddle point method and asymptotic behavior of Stirling numbers	158
4	Graphs and mappings	165
4.1	The generating functions for graphs	165
4.2	Trees and forests	172
4.3	Cycle classes	187
4.4	Generating functions of cycles of substitutions	190
4.5	Mappings with constraints	197
5	The general combinatorial scheme	209
5.1	Definition of the general combinatorial scheme	211
5.2	Commutative asymmetric n -basis	228
5.3	The asymptotics of the number of m -samples	235
5.4	Non-commutative asymmetric n -basis	240
5.5	Commutative symmetric n -basis	246
5.6	The Hardy–Ramanujan formula	252
5.7	Non-commutative symmetric n -basis	257
5.8	Asymptotics of the Bell numbers	262
5.9	Coverings of sets by subsets	264
6	Pólya's theorem and its applications	272
6.1	Burnside's lemma	273
6.2	Pólya's theorem	278
6.3	Trees and chemical trees	283
6.4	Classes of functions and automata	286
	<i>Bibliography</i>	295
	<i>Index</i>	303