

Contents

1	Matchings and Perfect Matchings	1
1.1	Definitions and terminologies	3
1.2	Matchings in bipartite graphs and augmenting path	6
1.3	Matchings in non-bipartite graphs	11
1.4	Sufficient conditions for 1-factors	15
1.5	Gallai-Edmonds Structure Theorem.....	24
1.6	Number of 1-factors	32
2	Degree Constraint Factors	39
2.1	Characterizations of factors	39
2.2	Factors in bipartite graphs	48
2.3	Factors with special properties	51
2.4	L -factor	62
3	Factors and Graphic Parameters	77
3.1	Toughness and k -factors	77
3.2	Toughness and $[a, b]$ -factors	88
3.3	Binding number and factors	95
3.4	Connectivity and factors	102
3.5	Other parameters and existence of factors	114
4	Component Factors and Connected Factors	123
4.1	Star factor	124
4.2	Path and cycle factors	132
4.3	El-Zahar's Conjecture and other component factors	141
4.4	Connected $[a, b]$ -factors	144
4.5	Connected (g, f) -factors	150
4.6	Generalized trees	154

5	Elementary Graphs and Decomposition Theory	165
5.1	Elementary graphs and 1-extendable graphs	166
5.2	Ear decomposition	174
5.3	Minimal graphs and more decompositions	184
5.4	Bricks and optimal ear decomposition	194
6	k-Extendable Graphs and n-Factor-Critical Graphs	209
6.1	Characterizations and basic properties	210
6.2	Equivalence and recursive relationships	220
6.3	Matching extension and graphic parameters	224
6.3.1	Matching extension and forbidden subgraphs	224
6.3.2	Matching extension and toughness	228
6.3.3	Matching extension in planar graphs and surfaces	231
6.3.4	Matching extension, degree sum and closure operations	234
6.3.5	Matching extension and product of graphs	239
6.3.6	Matching extension and other parameters	241
6.4	Extendability of symmetric graphs	243
7	Extremal k-Extendable Graphs and Generalizations	251
7.1	Maximal and minimal k -extendable graphs	251
7.2	Generalization of matching extension	262
7.3	Variations of graph extension	274
8	Fractional Factors of Graphs	283
8.1	Fractional matchings	283
8.2	Fractional (g, f) -factors	293
8.3	Parameters and fractional factors of graphs	302
8.4	Maximum and minimum fractional (g, f) -factors	311
8.5	Connected fractional factors	319
	Index	325
	References	329