

Contents

Preface	v
1 Introduction	1
Notation	6
2 The Classic Petri Net	7
2.1 Definitions	7
2.2 State Space	13
2.3 PN-Computability	17
2.4 Basic Properties	20
2.5 Bibliographical Notes	26
2.6 Exercises	28
3 Time Petri Nets	31
3.1 Basic Notions	31
3.2 State space	37
3.3 TPN-Computability	38
3.4 State Space Reduction	45
3.5 RG for Finite TPN	72
3.6 RG for Infinite TPN	78

3.7	Qualitative Properties	89
3.7.1	Reachability	89
3.7.2	Liveness	94
3.7.3	T-invariants	117
3.8	Quantitative Evaluation	118
3.8.1	Unbounded TPN	122
3.8.2	Bounded TPN	128
3.9	Bibliographical Notes	133
3.10	Exercises	135
4	Timed Petri Nets	139
4.1	Definitions	140
4.2	Timed PN and Counter Machines	146
4.3	Transformation of a Timed PN into a Time PN	148
4.4	State Equations	151
4.5	Variations of Timed PN	165
4.5.1	Timed PN with Priorities	165
4.5.2	Timed PN with Variable Durations	168
4.6	Bibliographical Notes	170
4.7	Exercises	171
5	Petri Nets with Time Windows	173
5.1	Definitions	174
5.2	Reachability	178
5.3	tw-Petri Nets and Counter Machines	186
5.4	Liveness	188
5.5	Bibliographical Notes	188
5.6	Exercises	190

A	191
A.1 Appendix on Time Petri Nets	191
Bibliography	199
Index	207