

# Contents

<b>Preface to the First Edition</b>	<b>xi</b>
<b>Preface to the Second Edition</b>	<b>xiii</b>
<b>Conventions</b>	<b>xv</b>
<b>PART I</b>	
<b>Chapter 1. ELEMENTARY RESULTS</b>	
1. General Rings	1
2. Noetherian Rings and Artinian Rings	13
<b>Chapter 2. FLATNESS</b>	
3. Flatness	17
4. Faithful Flatness	25
5. Going-up Theorem and Going-down Theorem	31
6. Constructible Sets	38
<b>Chapter 3. ASSOCIATED PRIMES</b>	
7. $\text{Ass}(M)$	49
8. Primary Decomposition	52
9. Homomorphisms and $\text{Ass}$	57
<b>Chapter 4. GRADED RINGS</b>	
10. Graded Rings and Modules	61
11. Artin-Rees Theorem	67
<b>Chapter 5. DIMENSION</b>	
12. Dimension	71
13. Homomorphisms and Dimension	78
14. Finitely Generated Extensions	83
<b>Chapter 6. DEPTH</b>	
15. $M$ -regular Sequences	95
16. Cohen-Macaulay Rings	106
<b>Chapter 7. NORMAL RINGS AND REGULAR RINGS</b>	
17. Classical Theory	115
18. Homological Theory	127
19. Unique Factorization	141

<b>Chapter 8. FLATNESS II</b>	
20. Local Criteria of Flatness	145
21. Fibres of Flat Morphisms	152
22. Theorem of Generic Flatness	156
<b>Chapter 9. COMPLETION</b>	
23. Completion	161
24. Zariski Rings	172
<b>PART II</b>	
<b>Chapter 10. DERIVATION</b>	
25. Extension of a Ring by a Module	177
26. Derivations and Differentials	180
27. Separability	190
<b>Chapter 11. FORMAL SMOOTHNESS</b>	
28. Formal Smoothness I	197
29. Jacobian Criteria	213
30. Formal Smoothness II	222
<b>Chapter 12. NAGATA RINGS</b>	
31. Nagata Rings	231
<b>Chapter 13. EXCELLENT RINGS</b>	
32. Closedness of Singular Locus	245
33. Formal Libres and G-Rings	249
34. Excellent Rings	258
<b>APPENDIX</b>	
35. Eakin's Theorem	261
36. A Flatness Theorem	263
37. Coefficient Rings	265
38. $p$ -Basis	269
39. Cartier's Equality and Geometric Regularity	278
40. Jacobian Criteria and Excellent Rings	281
41. Krull Rings and Marot's Theorem	293
42. Kunz' Theorems	299
43. Complement	306
<b>Index</b>	311
<b>Index of Symbols</b>	313