

# Contents

<b>Chapter I. Valuations</b>	<b>3</b>
1.1. Some Basic Definitions	3
1.2. Complete Fields	7
1.3. Finite Extensions of Complete Fields	12
<b>Chapter II. Local Fields</b>	<b>18</b>
2.1. General Properties	18
2.2. The Multiplicative Group $k^\times$	22
2.3. Finite Extensions	25
2.4. The Different and the Discriminant	29
2.5. Finite Galois Extensions	32
<b>Chapter III. Infinite Extensions of Local Fields</b>	<b>35</b>
3.1. Algebraic Extensions and Their Completions	35
3.2. Unramified Extensions and Totally Ramified Extensions	36
3.3. The Norm Groups	40
3.4. Formal Power Series	43
3.5. Power Series over $\mathfrak{o}_{\bar{K}}$	45
<b>Chapter IV. Formal Groups <math>F_f(X, Y)</math></b>	<b>50</b>
4.1. Formal Groups in General	50
4.2. Formal Groups $F_f(X, Y)$	53
4.3. The $\mathfrak{o}$ -Modules $W_f^n$	57
4.4. Extensions $\bar{L}^n/\bar{K}$	61
<b>Chapter V. Abelian Extensions Defined by Formal Groups</b>	<b>65</b>
5.1. Abelian Extensions $L^n$ and $k_\pi^{m,n}$	65
5.2. The Norm Operator of Coleman	69
5.3. Abelian Extensions $L$ and $k_\pi$	75
<b>Chapter VI. Fundamental Theorems</b>	<b>80</b>
6.1. The Homomorphism $\rho_k$	80
6.2. Proof of $L_k = k_{ab}$	84
6.3. The Norm Residue Map	88

<b>Chapter VII. Finite Abelian Extensions</b>	<b>98</b>
7.1. Norm Groups of Finite Abelian Extensions	98
7.2. Ramification Groups in the Upper Numbering	101
7.3. The Special Case $k_{\pi}^{m,n}/k$	107
7.4. Some Applications	110
<b>Chapter VIII. Explicit Formulas</b>	<b>116</b>
8.1. $\pi$ -Sequences	116
8.2. The Pairing $(\alpha, \beta)_f$	120
8.3. The Pairing $[\alpha, \beta]_{\omega}$	123
8.4. The Main Theorem	127
8.5. The Special Case for $k = \mathbf{Q}_p$	133
<b>Appendix</b>	<b>137</b>
A.1. Galois Cohomology Groups	137
A.2. The Brauer Group of a Local Field	141
A.3. The Method of Hazewinkel	146
<b>Bibliography</b>	<b>151</b>
<b>Table of Notations</b>	<b>153</b>
<b>Index</b>	<b>155</b>