

Contents

Algebraic Theory

Chapter I: Cohomology of Profinite Groups	3
§1. Profinite Spaces and Profinite Groups	3
§2. Definition of the Cohomology Groups	10
§3. The Exact Cohomology Sequence	24
§4. The Cup-Product	35
§5. Change of the Group G	43
§6. Basic Properties	58
§7. Cohomological Triviality	72
Chapter II: Some Homological Algebra	77
§1. Spectral Sequences	77
§2. Derived Functors	96
§3. Continuous Cochain Cohomology	106
Chapter III: Duality Properties of Profinite Groups	113
§1. Duality for Class Formations	113
§2. An Alternative Description of the Reciprocity Homomorphism	131
§3. Cohomological Dimension	138
§4. Dualizing Modules	145
§5. Profinite Groups of $cd G \leq 1$	152
§6. Profinite Groups of $scd G = 2$	156
§7. Poincaré Groups	164
§8. Filtrations	174
§9. Generators and Relations	179
Chapter IV: Free Products of Profinite Groups	201
§1. Free Products	201
§2. Subgroups of Free Products	208
§3. Generalized Free Products	212
Chapter V: Iwasawa Modules	221
§1. Modules up to Pseudo-Isomorphism	222
§2. Complete Group Rings	227
§3. Iwasawa Modules	242

§4.	Homotopy of Modules	254
§5.	Homotopy Invariants of Iwasawa Modules	266
§6.	Differential Modules and Presentations	274

Arithmetic Theory

Chapter VI: Galois Cohomology	289
§1. Cohomology of the Additive Group of Fields	289
§2. Hilbert's Satz 90	292
§3. The Brauer Group	298
§4. The Milnor K -Groups	304
§5. Dimension of Fields	309
Chapter VII: Cohomology of Local Fields	319
§1. Cohomology of the Multiplicative Group	319
§2. The Local Duality Theorem	324
§3. The Local Euler-Poincaré Characteristic	337
§4. Galois Module Structure of the Multiplicative Group	347
§5. Explicit Determination of Local Galois Groups	351
Chapter VIII: Cohomology of Global Fields	365
§1. Cohomology of the Idèle Class Group	365
§2. The Connected Component of C_k	381
§3. Restricted Ramification	390
§4. The Global Duality Theorem	405
§5. Local Cohomology of Global Galois Modules	410
§6. Local-Global Duality and the Global Euler-Poincaré Characteristic	416
§7. Generator and Relation Rank of $G_S(p)$	441
Chapter IX: The Absolute Galois Group of a Global Field	449
§1. The Hasse Principle	450
§2. The Theorem of Grunwald-Wang	459
§3. Local Galois Groups in a Global Group	462
§4. Embedding Problems	465
§5. Solvable Groups as Galois Groups	476
Chapter X: Restricted Ramification	509
§1. The Function Field Case	511
§2. First Observations on the Number Field Case	527

§3. Leopoldt's Conjecture	533
§4. Cohomology of Large Number Fields	550
§5. Riemann's Existence Theorem	555
§6. The Theorem of Kuz'min	560
§7. Free Product Decomposition of $G_S(p)$	569
§8. Class Field Towers	578
§9. The Profinite Group G_S	587
Chapter XI: Iwasawa Theory of Number Fields	597
§1. The Maximal Abelian Unramified p -Extension of k_∞	598
§2. Iwasawa Theory for p -adic Local Fields	607
§3. The Maximal Abelian p -Extension of k_∞ Unramified Outside S	611
§4. Iwasawa Theory for Totally Real Fields and CM-Fields	627
§5. Positively Ramified Extensions	639
§6. The Main Conjecture	647
Chapter XII: Anabelian Geometry	661
§1. Subgroups of G_k	661
§2. The Neukirch-Uchida Theorem	667
§3. Anabelian Conjectures	675
Literature	681
Index	694