

CONTENTS

FOREWORD	4
GENERAL CONVENTIONS	6
<u>CHAPTER I</u>	
<u>FORMAL VARIETIES</u>	8
1. The categories $\underline{\underline{nil}}(K)$ and $\underline{\underline{nil}}(K, n)$	8
2. Functors in pointed sets	9
3. Models and their morphisms	10
4. Formal varieties	13
5. Formal modules	14
6. The functor \mathfrak{z} (tangent)	17
7. The composition lemma	19
8. The isomorphism theorem	22
9. The fibration $J_q \rightarrow J_{q-1}$	23
10. The functor \mathfrak{C} (curves)	25
11. Changes of rings	28
<u>CHAPTER II</u>	
<u>FORMAL GROUPS AND BUDS</u>	31
1. Groups in categories	31
2. Group laws and formal groups	33
3. The $\underline{\underline{Q}}$ theorem, the lift theorem, and the general existence of ghosts	37
4. Buds and extensions	39
5. Obstructions	40
6. The 1-dimensional symmetric 2-cocycle lemma	44
7. Curvilinear group laws and buds	47
8. End of the proofs of the theorems	51
9. A digression concerning non-commutative groups	54
<u>CHAPTER III</u>	
<u>THE GENERAL EQUIVALENCE OF CATEGORIES</u>	57
1. Definition of W^+ and \hat{W}^+ from $\mathfrak{C}(\underline{\underline{G}}_m)$	57
2. The formal group homomorphism $\underline{\underline{w}} : \hat{W}^+ \rightarrow D_+^{\underline{\underline{P}}}$	61
3. The F_n operators	64

4.	The representation theorem: $\mathfrak{C}(G) \simeq \text{Hom}(\hat{W}^+, G)$	68
5.	Introducing the ring of operators $\text{Cart}(K)$	70
6.	Curves in formal groups and representations of operators	72
7.	Continuity, uniform modules, reduced modules	75
8.	How \mathfrak{C} is fully faithful on formal groups	79
9.	Some corollaries of the representation theorem	81
10.	The existence theorem: preliminaries with a uniform module	83
11.	The existence theorem: end of the proof	86

CHAPTER IV

THE SPECIAL EQUIVALENCES OF CATEGORIES 92

1.	The functor Cart and the commuting relations	92
2.	An axiomatic description of the functor Cart_S	94
3.	Properties and existence of Cart_S are derived from the matrix representation κ'	96
4.	The ring $W_S(K)$ and its integers	101
5.	Uniform and reduced $\text{Cart}_S(K)$ -modules	105
6.	The functorial ring homomorphism $\kappa_{T,S}$	107
7.	The category of S -typical groups	110
8.	The reduction theorem	114
9.	An example: between Artin-Hasse and multiplication	116

CHAPTER V

THE STRUCTURE THEOREM AND ITS CONSEQUENCES 118

1.	Free uniform $\text{Cart}_S(K)$ -modules and types.	118
2.	Slopes and types	121
3.	The structure theorem	124
4.	A second proof of the existence theorem	129
5.	Presentations, structural constants, morphisms.	133
6.	Tensor products	136
7.	Definition and general properties of reduced derivatives	141
8.	S -typical groups over S -torsion-free rings	144
9.	Some examples	149
10.	The parametrization of curvilinear group laws	152
11.	A digression concerning derivatives	159

CHAPTER VION FORMAL GROUPS IN CHARACTERISTIC p

163

1.	Notations for the local case	163
2.	The special features of characteristic p	167
3.	Fields and perfect fields	170
4.	Finite dimension and isogeny	174
5.	Unipotent formal groups	179
6.	Spectral decomposition of semi-linear automorphisms of finite \tilde{E} -modules	183
7.	Formal groups of finite height	189
8.	Isoclinical formal groups over an algebraically closed field	196

CHAPTER VIIEXTENDING AND LIFTING SOME FORMAL GROUPS

199

1.	Extensions with additive kernels of formal groups of finite height	199
2.	The universal extension with additive kernel in characteristic p	204
3.	The reduction modulo p of p -typical groups	209
4.	On some ring homomorphisms $A \rightarrow W(A)$	212
5.	A p -adic lemma	215
6.	Reduction from $W(k)$ to k (a perfect field of characteristic p)	218
7.	Lifts from k over $W(k)$	223
8.	The universal extension with additive kernel in characteristic 0	228

QUOTED REFERENCES	231
-------------------	-----

INDEX	232
-------	-----