Contents

Abstr	act		ii	
Ackno	wledgr	nents	\mathbf{v}	
Notation			vi ii	
Chapt	er 1.	Introduction	1	
1.1.	Algebr	raic curves	1	
1.2.	Precedent applications of algebraic curves			
	1.2.1.	Algebraic-geometric codes	6	
	1.2.2.	Elliptic curve cryptography	7	
	1.2.3.	Factorization of large numbers	9	
	1.2.4.	Sequences for stream ciphers	11	
1.3.	A new	application to balanced arrays	12	
1.4.	A new	application to balanced n-ary designs	14	
1.5.	Practical usages of balanced n-ary designs and balanced			
	arrays		16	
	1.5.1.	Block designs	16	
	1.5.2.	Balanced fractional factorial designs	17	
	1.5.3.	Weighing designs	19	
Chapter 2. Algebraic Curves		21		
2.1.	Projec	ctive curves and affine curves	21	
2.2.	Curves over finite fields		24	
2.3.	Ration	Rational functions		
2.4.	Diviso	Divisors		
2.5.	Vector space $L(D)$		30	

Contents	vii	
2.6. Riemann-Roch Theorem	31	
Chapter 3. Balanced Arrays	33	
3.1. Introduction	33	
3.2. Symmetric sets of curves	35	
3.3. A construction on an elliptic curve	39	
Chapter 4. Balanced n-ary Designs	43	
4.1. Introduction	43	
4.2. Algebraic curves and balanced n-ary designs	47	
Chapter 5. Concluding Remarks	53	
Bibliography	55	