

Contents

Chapter 1	Theta Functions and Their Transformation Formulae	1
Chapter 2	Eisenstein Series	13
2.1	Eisenstein Series with Half Integral Weight	13
2.2	Eisenstein Series with Integral Weight	37
Chapter 3	The Modular Group and Its Subgroups	45
Chapter 4	Modular Forms with Integral Weight or Half-integral Weight	65
4.1	Dimension Formula for Modular Forms with Integral Weight	65
4.2	Dimension Formula for Modular Forms with Half-Integral Weight	81
	References	88
Chapter 5	Operators on the Space of Modular Forms	89
5.1	Hecke Rings	89
5.2	A Representation of the Hecke Ring on the Space of Modular Forms	113
5.3	Zeta Functions of Modular Forms, Functional Equation, Weil Theorem	120
5.4	Hecke Operators on the Space of Modular Forms with Half-Integral Weight	134
	References	152
Chapter 6	New Forms and Old Forms	153
6.1	New Forms with Integral Weight	153
6.2	New Forms with Half Integral Weight	178
6.3	Dimension Formulae for the Spaces of New Forms	200
Chapter 7	Construction of Eisenstein Series	205
7.1	Construction of Eisenstein Series with Weight $\geq 5/2$	205
7.2	Construction of Eisenstein Series with Weight $1/2$	221
7.3	Construction of Eisenstein Series with Weight $3/2$	232
7.4	Construction of Cohen-Eisenstein Series	246
7.5	Construction of Eisenstein Series with Integral Weight	255
	References	263
Chapter 8	Weil Representation and Shimura Lifting	265
8.1	Weil Representation	265
8.2	Shimura Lifting for Cusp Forms	280

8.3	Shimura Lifting of Eisenstein Spaces	299
8.4	A Congruence Relation between Some Modular Forms	309
	References	318
Chapter 9	Trace Formula	321
9.1	Eichler-Selberg Trace Formula on $SL_2(\mathbb{Z})$	321
9.2	Eichler-Selberg Trace Formula on Fuchsian Groups	335
9.3	Trace Formula on the Space $S_{k+1/2}(N, \chi)$	348
	References	362
Chapter 10	Integers Represented by Positive Definite Quadratic Forms	363
10.1	Theta Function of a Positive Definite Quadratic Form and Its Values at Cusp Points	363
10.2	The Minimal Integer Represented by a Positive Definite Quadratic Form	376
10.3	The Eligible Numbers of a Positive Definite Ternary Quadratic Form	90
	References	428
Index		431