



## TABLE OF CONTENTS

### Chapter I

MEIJER'S G-FUNCTION . . . . .	1
1.1. Definition of the G-Function . . . . .	1
1.2. Elementary Properties of the G-Function. . . . .	6
1.3. Differential Properties and Recurrence Relations . . . . .	8
1.4. Asymptotic Expansions for $G_{p,q}^{m,n}(z)$ in Special Cases . . . . .	10
1.5. Differential Equation Satisfied by $G_{p,q}^{m,n}(z)$ . . . . .	13
1.6. Analytic Continuation of $G_{p,q}^{m,n}(z)$ . . . . .	16
1.7. Some Expansion Formulas of G-Functions and Their Particular Cases.	17
1.8. Some Asymptotic Expansions of $G_{p,q}^{m,n}(z)$ , $p < q$ . . . . .	30
Exercises. . . . .	37

### Chapter II

PARTICULAR CASES OF MEIJER'S G-FUNCTION . . . . .	41
2.1. Introduction . . . . .	41
2.2. Gamma Function and Related Functions . . . . .	41
2.3. Hypergeometric Functions . . . . .	42
2.4. Bessel Functions and Associated Functions. . . . .	47
2.5. Orthogonal Polynomials . . . . .	51
2.6. Elementary Special Functions Expressed in Terms of Meijer's G-Function . . . . .	53
2.7. The G-Function Expressed in Terms of Elementary Special Functions.	61

### Chapter III

INTEGRALS OF G-FUNCTIONS. . . . .	69
3.1. Integrals Involving Hypergeometric Functions and Related Functions	69
3.2. Mellin Transform of the G-Function . . . . .	79
3.3. Integral Transforms of the G-Function. . . . .	83

3.4. Integrals Involving Products of Gauss' Hypergeometric Function and the G-Function . . . . .	88
3.5. Integrals of G-Function with Argument Containing the Factor $x^k \left\{ \frac{1}{x^2} + (1+x)^{\frac{1}{2}} \right\}^{2p}$ . . . . .	93
3.6. An Integral Involving G-Function and Jacobi Polynomials. . . . .	95
Exercises. . . . .	97

Chapter IV

FINITE AND INFINITE SERIES OF G-FUNCTIONS . . . . .	108
4.1. Summation Formulas for Hypergeometric Functions with Specialized Arguments. . . . .	109
4.2. Summation Formulas for the G-Function. . . . .	117
4.3. G-Function Series Whose Sums are Constants . . . . .	124
4.4. Expansions of G-Function by Laplace Transform Techniques . . . . .	132
4.5. Expansions of a G-Function in Series of Products of G-Functions. .	135
4.6. Expansion of a G-Function in Series of Jacobi Polynomials. . . . .	138
4.7. Expansion Formulas of G-Functions in Series of Bessel Functions. .	140
Exercises. . . . .	142

Chapter V

COMPUTABLE REPRESENTATIONS OF A G-FUNCTION IN THE LOGARITHMIC CASE. . .	157
5.1. Independent Gamma Variates . . . . .	157
5.2. Independent Beta Variates. . . . .	158
5.3. Some Preliminary Results . . . . .	160
5.4. Computable Representation of a Hypergeometric Function in the Logarithmic Case . . . . .	164
5.5. Computable Representation of $G_{0,p}^{p,0}(.)$ in the Logarithmic Case . . .	157
5.6. Computable Representation of $G_{p,p}^{p,0}(.)$ in the Logarithmic Case . . .	171
5.7. Computable Representation of $G_{p,q}^{m,n}(.)$ in the Logarithmic Case . . .	176
5.8. Computable Representation of an H-Function in the Logarithmic Case	180
Exercises. . . . .	186

Chapter VI

APPLICATION OF G-FUNCTION IN STATISTICS . . . . .	189
6.1. Exact Distributions of Multivariate Test Criteria. . . . .	189
6.2. The Exact Non-Null Distributions of Multivariate Test Criteria . .	207
6.3. Characterizations of Probability Laws. . . . .	215
6.4. Prior and Posterior Distributions. . . . .	220
6.5. Generalized Probability Distributions. . . . .	222
Exercises. . . . .	224

Chapter VII

OTHER APPLICATIONS OF THE G-FUNCTION. . . . .	231
7.1. Production of Heat in a Cylinder . . . . .	231
7.2. Dual Integral Equations. . . . .	238
7.3. Hard Limiting of Several Sinusoidal Signals. . . . .	248
Exercises. . . . .	256
 Bibliography. . . . .	261
APPENDIX: Orders of the Special Functions for Large and Small Values of the Argument . . . . .	306
Index of Symbols. . . . .	310
Author Index. . . . .	312
Subject Index . . . . .	314