

TABLE OF CONTENTS

Foreword	vii	
Symbols, Notations and Formulas	ix	
Introduction	1	
Chapter 1		
THE GAMMA AND BETA FUNCTIONS		
1.1	Definitions of the Gamma Function	5
1.2	Definition of Beta Function	8
1.3	Graph of the Gamma Function	10
1.4	Graph of Beta Function	11
1.5	Properties of the Gamma Function	12
1.6	The Gamma Function Programs and Tables	18
1.7	The Gamma Function Third Program	24
1.8	Graphs of $\Gamma(p)$ and $1/\Gamma(p)$	25
1.9	Properties of Beta Function	28
1.10	Exponential Functions	31
1.11	Beta Function in Terms of the Gamma Function	37
1.12	Trigonometric Integral Evaluations	42
1.13	Duplication Formula for the Gamma Function	46
1.14	Generalization of Beta Function in R^n -Space	48
1.15	Laplace Transform and the Gamma Function	52
1.16	Incomplete Gamma Functions	55
1.17	Incomplete Beta Function	56
1.18	Digamma Function and the Function $\beta(x)$	56

Chapter 2		
APPLICATIONS OF THE GAMMA AND BETA FUNCTIONS		
2.1	Introduction	61
2.2	Definite Integrals	62
2.3	Improper Integrals	84
2.4	Line and Double Integrals	145
2.5	Surface Integrals	158
2.6	Multiple Integrals	162
2.7	Laplace Transform and the Gamma Function	197
2.8	Applications of the Digamma Function and the Function $\beta(x)$	206
Chapter 3		
COMPLETE ELLIPTIC INTEGRALS $K(k)$ AND $E(k)$		
3.1	Definition of Elliptic Integrals	219
3.2	Properties of Complete Elliptic Integrals	220
3.3	Complete Elliptic Integrals Outside the Range	221
3.4	Computer Programs to Tabulate $K(k)$	222
3.5	Computer Programs to Tabulate $E(k)$	230
3.6	A High-Accuracy Program	236
Chapter 4		
APPLICATIONS OF ELLIPTIC INTEGRALS		
4.1	Introduction	239
4.2	Applications of Elliptic Integrals	240
4.3	Elliptic Integrals and the Gamma Function	283

APPENDIXES

Appendix A1.		
A1.1	The Absolute Convergent Test for Improper Integrals of the First Kind	293
A1.2	The Absolute Convergent Test for Improper Integrals of the Second Kind	294
Appendix A2.	Transformations of Multiple Integrals	
A2.1	Jacobian in 3-Dimensional	295
A2.2	Jacobian in n -Dimensional Space	296
A2.3	Particular Case	296
A2.4	Case of Functions of Functions	297
A2.5	Jacobian of Implicit Functions	298
A2.6	Particular Case of Implicit Functions	299
Appendix A3.	Jacobian for Polar and Spherical Coordinates	
A3.1	Polar Coordinates in Plane	299
A3.2	Spherical Coordinates in 3-Dimensional Space	300
A3.3	Spherical Coordinates in the R^n -Space	301
A3.4	Element of a Sphere Surface in R^n -Space	302
Appendix A4.	Jacobian of a General Transformation	303
Appendix A5.	Jacobians of Other General Transformations	
A5.1	Jacobian of the General Transformation	304
A5.2	Jacobian of the Transformation	304
A5.3	Jacobian of the Transformation	305
Appendix A6.	Reference Formulas	306
Bibliography		315