

**CONTENTS**

---

CHAPTER	TITLE	PAGE NO.
I	INTRODUCTION AND BASIC CONCEPTS	1
	(1.1) INTRODUCTION.	1
	(1.2) THE METHOD OF APPROXIMATE INTEGRATION.	3
	(1.3) THE CONCEPT OF DIVIDED DIFFERENCES.	5
	(1.4) FORWARD DIFFERENCES.	7
	(1.5) TRUNCATION AND ROUNDING ERRORS.	8
	(1.6) RELATED DEFINITIONS.	9
	(1.7) LAGRANGE'S INTERPOLATION FORMULA.	13
	(1.8) SPLINE.	15
	(1.9) RELATED THEOREMS.	16
II	NEWTON-COTES INTEGRATION FORMULAE	17
	(2.1) INTRODUCTION.	17
	(2.2) NEWTON-COTES FORMULAE.	18
	(2.3) NEWTON-COTES CLOSED INTEGRATION FORMULAE.	19
	(2.4) NEWTON-COTES OPEN INTEGRATION FORMULAE.	30
	(2.5) COMPOSITE INTEGRATION FORMULAE.	34
	(2.6) REMARKS ON NEWTON-COTES FORMULAE.	37
	(2.7) SPLINE INTERPOLATION.	39
	(2.7.1) DERIVATION OF CUBIC SPLINE EQUATION.	40
	(2.8) SPLINE INTEGRATION.	45
	(2.9) ERROR ANALYSIS.	46

III	GAUSSIAN QUADRATURE	50
	(3.1) INTRODUCTION.	50
	(3.2) SOME SPECIAL ORTHOGONAL POLYNOMIALS.	52
	(3.2.1) LEGENDRE POLYNOMIALS.	52
	(3.2.2) CHEBYSHEV POLYNOMIALS.	53
	(3.2.3) HERMITE POLYNOMIALS.	53
	(3.2.4) LAGUERRE POLYNOMIALS.	54
	(3.3) GAUSS-LEGENDRE QUADRATURE.	55
	(3.4) GAUSS-LAGUERRE QUADRATURE.	60
	(3.5) GAUSS-CHEBYSHEV QUADRATURE AND GAUSS-HERMITE QUADRATURE.	63
	(3.6) OTHER GAUSSIAN QUADRATURE FORMULAE.	65
	(3.7) GAUSSIAN QUADRATURE WITH PREASSIGNED ABSCISSAS.	66
	(3.8) THE ALGEBRAIC APPROACH TO THE GAUSSIAN QUADRATURE.	68
	(3.9) CONVERGENCE OF GAUSSIAN RULES.	72
	(3.10) ERROR ANALYSIS.	76
	(3.11) CRITICAL EVALUATION OF GAUSSIAN QUADRATURE.	85
IV	COMPUTER IMPLEMENTATION OF SOME METHODS.	87
	(4.1) INTRODUCTION.	87
	(4.2) PROGRAM LISTING.	89
	(4.3) OUTPUT OF PROGRAMS.	98
	(4.4) CONCLUSION.	100
	APPENDIX.	101
	REFERENCES.	102

---