CONTENT

			Page
1.	The I	Formulation of Problems	1
	1.1	Goals of the book	1
	1.2	General outline	2
	1.3	The structure of problems	3
	1.4	The origin of scientific problems	4
	1.5	The solution of a real problem	8
2.	The Structure of Algorithms		
	2.1	Algorithmic processes	17
	2.2	Direct algorithms	20
	2.3	Primitive and symbolic solutions	29
	2.4	The flowchart language	32
	2.5	Iteration	36
	2.6	Indirect algorithms	47
	2.7	Infinite algorithms	48
3.	_	uages for Algorithms	63
	3.1	The hierarchy of languages	65
	3.2 3.3	Characters Words	70 72
	3.3 3.4	Variables	75
	3.4	Procedures	77
	3.6	Algorithm verbs	81
	3.7	Algorithm control verbs	82
	3.8	External communication	95
	3.9	Internal communication	103
	3.10		107
4.	Computer Organization		
	4.1	Problem : How to exploit speed	117
	4.2	First solution : The simple computers	119
	4.3	Second solution: Higher-level languages	128
	4.4	Third solution: Systems programming	129
	4.5	Fourth solution: Natural programming languages and programming in natural Language	143
	4.6	Fifth solution : Direct-access and conversational operation, versatile consoles,	143
		elaborate systems, and time sharing	144
	4.7	Sixth solution : ??	150
5.	The Construction of Familiar Algorithms		
	5.1	Introduction	151
	5.2	The algorithms of arithmetic	152
	5.3	The algorithms of algebra	153
	5.4	Algorithms with transcendental functions	167
	5.5	Algorithms for searching and classifying	171
	5.6	The algorithms of geometry	183
	5.7	Algorithms of analysis	189
6.	The Representation of Information		
	6.1	Introduction	195
	6.2	Small pieces of information	197
	6.3	The representation of bodies of information	202
	6.4	The representation of relationships	211
	6.5	The representation of expressions	228

7.	The C	Classification of Solution Methods	249
	7.1	Introduction	249
	7.2	Direct symbolic methods	252
	7.3	Enumeration methods	261
	7.4	Scientific trial and error methods	272
	7.5	Simulation of elementary processes	285
8.	The N	309	
	8.1	Introduction	309
	8.2	Uncertainty in the mathematical model	310
	8.3	Uncertainty in algorithm construction	312
	8.4	Errors in computation	314
	8.5	Safeguards against errors and uncertainty	325
Appe		CS: Programs, Compilers, and Systems	331
		1 Algorithms and computer programs	331
		2 Program organization	331
		3 Programming languages and compilers	332
		4 Operating systems and control statements	334
		5 Program debugging and diagnostics	335
		6 Debugging algorithms	336
	PCS-	7 Binary decks	337
Appe		: Algol	339
	A-1	Historical background	340
	A-2	A simple algol program	340
	A-3		344
	A-4	Arithmetic	346
	A-5	Declarations	347
	A-6		351
	A-7	For Statement and for-list	354
	A-8	Procedures	357
	A-9	Input and output procedures	362
		Control cards	371
	A-11	Final remarks Algol Guide and Index	372 373
Appe	ndix F	: Fortran	379
Part I		Introduction	380
1 411 1	F-2	Characters, integer variables, and constants	384
	F-3	Reading and writing integers and messages	386
	F-4	Program control	393
Part I		Variables	397
1 411 1	F-6	Procedures	406
	F-7	Control verbs	420
	F-8	Other features and nonstandard features	428
	F-9	Final remarks	445
	-	Fortran Guide and Index	447
Refer	ences		454
Index		457	