Contents

Preface	xi
Acknowledgements	xiv
 Computer Number Systems, Codes, and Digital Devices Computer Number Systems and Codes 1.1 Arithmetic Operations on Binary, HEX, and BCD Numbers 1.7 Basic Digital Devices 1.12 Review Questions and Problems 1.19 	1.1-1.20
2. Computers, Microcomputers, and Microprocessors —An Introduction	2.1-2.21
Types of Computers2.1How Computers and Microcomputers are Used—An Example2.2Overview of Microcomputer Structure and Operation2.6Execution of a Three-instruction Program2.7Microprocessor Evolution and Types2.9The 8086 Microprocessor Family—Overview2.118086 Internal Architecture2.12Introduction to Programming the 80862.16Review Questions and Problems2.20	
3. 8086 Family Assembly Language Programming—Introduction Program Development Steps 3.1 Constructing the Machine Codes for 8086 Instructions 3.12 Writing Programs for Use with an Assembler 3.19 Assembly Language Program Development Tools 3.26 Review Questions and Problems 3.29	3.1-3.32
 4. Implementing Standard Program Structures in 8086 Assembly Language Simple Sequence Programs 4.1 Jumps, Flags, and Conditional Jumps 4.8 If-Then, If-Then-Else, and Multiple If-Then-Else Programs 4.15 While-Do Programs 4.20 Repeat-Until Programs 4.22 Instruction Timing and Delay Loops 4.31 Review Questions and Problems 4.33 	4.1-4.36

vi	ii Contents	
5.	Strings, Procedures, and Macros The 8086 String Instructions 5.1 Writing and Using Procedures 5.6 Writing and Using Assembler Macros 5.37 <i>Review Questions and Problems</i> 5.39	5.1-5.40
6.	8086 Instruction Descriptions and Assembler Directives Instruction Descriptions6.1Assembler Directives6.30Assume6.31DB—Define Byte6.31DD—Define Doubleword6.31DQ—Define Quadword6.31DT—Define Ten Bytes6.31DW—Define Word6.32END—End Program6.32ENDP—End Procedure6.32EVD—End Procedure6.32EVEN—Align on Even Memory Address6.32EXTRN6.33GLOBAL—Declare Symbols as Public or Extrn6.33GROUP—Group-related Segments6.33INCLUDE—Include Source Code From File6.33LABEL6.34OFFSET6.34ORG—Originate6.35PROC—Procedure6.35Segment6.35Segment6.35Sport6.35Short6.35Type6.36	6.1-6.36
7.	8086 System Connections Timing, and Troubleshooting A Basic 8086 Microcomputer System 7.1 Using a Logic Analyzer to Observe Microprocessor Bus Signals 7.7 An Example Minimum-mode System, The SDK-86 7.12 Troubleshooting a Simple 8086-based Microcomputer 7.42 <i>Review Questions and Problems</i> 7.47	7.1-4.48
8.	8086 Interrupts and Interrupt Applications 8086 Interrupts and Interrupt Responses 8.1 Hardware Interrupt Applications 8.12 8254 Software-Programmable Timer/Counter 8.17	8.1-8.44

	Contents	ix
	8259A Priority Interrupt Controller8.30Software Interrupt Applications8.39Review Questions and Problems8.41	
9.	Digital Interfacing Programmable Parallel Ports and Handshake Input/Output 9.1 Interfacing a Microprocessor to Keyboards 9.17 Interfacing to Alphanumeric Displays 9.25 8279 Circuit Connections and Operation Overview 9.28 Interfacing to 18-segment and Dot-matrix Led Displays 9.35 Interfacing a Microcomputer to Nonmultiplexed Lcd Displays 9.36 Interfacing Microcomputer Ports to High-power Devices 9.37 Optical Motor Shaft Encoders 9.44 <i>Review Questions and Problems</i> 9.47	9.1-9.50
10.	Analog Interfacing and Industrial ControlReview of Operational-amplifier Characteristics and Circuits 10.2Sensors and Transducers 10.7D/A Converter Operation, Interfacing, and Applications 10.13A/D Converter Specifications, Types, and Interfacing 10.17A Microcomputer-based Scale 10.21A Microcomputer-based Industrial Process-control System 10.31An 8086-based Process-control System 10.35Developing the Prototype of a Microcomputer-based Instrument 10.46Robotics and Embedded Control 10.47Digital Signal Processing and Digital Filters 10.52Review Questions and Problems 10.59	10.1-10.60
11.	Dma, Drams, Cache Memories, Coprocessors, and Eda Tools Introduction <i>11.2</i> The 8086 Maximum Mode <i>11.4</i> Direct Memory Access (DMA) Data Transfer <i>11.5</i> Interfacing and Refreshing Dynamic RAMs <i>11.10</i> A Coprocessor—The 8087 Math Coprocessor <i>11.23</i> Computer-based Design and Development Tools <i>11.39</i> <i>Review Questions and Problems 11.48</i>	11.1-11.49
12.	C, a High-level Language for System Programming Introduction—A Simple C Program Example 12.2 Program Development Tools for C 12.3 Programming in C 12.7 <i>Review Questions and Problems</i> 12.50	12.1-12.52
13.	Microcomputer System Peripherals System-level Keyboard Interfacing 13.1 Microcomputer Displays 13.5 Computer Mice and Trackballs 13.31	13.1-13.59

	Computer Vision 13.33 Magnetic-disk Data-storage Systems 13.34 Optical Disk Data Storage 13.49 Printer Mechanisms and Interfacing 13.50 Speech Synthesis and Recognition with a Computer 13.53 Digital Video Interactive 13.55 Review Questions and Problems 13.57	
14.	Data Communication and Networks	14.1-14.52
	Introduction to Asynchronous Serial Data Communication 14.1 Serial-data Transmission Methods and Standards 14.8 20- and 60-ma Current Loops 14.9 Asynchronous Communication Software on the IBM PC 14.23 Synchronous Serial-data Communication and Protocols 14.35 Local Area Networks 14.40 The GPIB, HPIB, IEEE488 Bus 14.48 <i>Review Questions and Problems</i> 14.50	
15.	The 80286, 80386 and 80486 Microprocessors	15.1-15.45
	Multiuser/Multitasking Operating System Concepts 15.2	
	The Intel 80286 Microprocessor 15.11 The Intel 80386 32-bit Microprocessor 15.16	
	The Intel 80486 Microprocessor 15.41	
	Review Questions and Problems 15.44	
16.	An Introduction to the Pentium Processors	16.1-16.19
	The Pentinum Processor 16.2	
	Epilogue 16.18 Review Oursetiens and Problems 16.10	
	Review Questions and Froblems 10.19	
	Appendix A	A.1–A.13
	Appendix B	B.1–B.16
	Appendix C	С.1–С.2
	Bibliography	Bib.1–Bib.3
	Index	I.1–I.25

х