

## Microprocessor And Interfacing Technical Publications

The microprocessor is the latest development in the field of computer technology. With rapid advances in semiconductor technology it became possible to fabricate the whole CPU (Central Processing Unit) of a digital computer on a single IC using LSI and VLSI technology. A CPU built into a single LSI and VLSI IC is called a microprocessor. It has numerous applications. The aim of this book is to introduce the subject of microprocessor. It describes microprocessor peripheral and interfacing circuits and devices. It deals with assembly language programming of Intel 8086/8088 microprocessor and also includes a number of assembly language programs. It describes how to interface various peripheral devices with a microprocessor and gives electronic circuits and programs. The book is suitable for an advanced course on the subject at B. Tech. and M.Tech. level. Since the subject is of interdisciplinary nature it is also suitable for microprocessor courses at B.Sc./ M.Sc. level. The book covers the syllabus of AMIE, MCA, IETE and diploma courses.

This text is intended for microprocessor courses at the undergraduate level in technology, engineering, and computer science. Now in its third edition, it provides a comprehensive treatment of the microprocessor, covering both hardware and software based on the Z80 microprocessor family. This edition preserves the focus of the earlier editions and includes the following changes: Chapters have been revised to include the most recent technological changes in 32- and 64-bit microprocessors and 8-bit microcontrollers. Several illustrative programs have been added throughout the text. Complete data sheets for the LM 135 temperature sensor and LCD panel, and a complete list of Z80 instructions with machine

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cycles, T-states, and flags are included in the Appendixes. Appendix G, which contains answers to selected questions, has been added.

The book gives total functioning of microprocessor and interfacing peripherals and applications. The programs in assembly language also given in this book. It is very useful to electronics base and degree students in A. P.

Semiconductors and Rectifiers Classification of solids based on energy band theory - Intrinsic Semiconductors - Extrinsic semiconductors - P type and N type - PN junction - Zener effect - Zener diode characteristics - Half wave and full wave rectifiers - Voltage regulation. Transistors and Amplifiers Bipolar junction transistor - CB, CE, CC configuration and characteristics - Biasing circuits - Class A, B and C amplifiers - Field effect transistor - Configuration and characteristic of FET amplifier - SCR, Diac, Triac, UJT - Characteristics and simple applications - Switching transistors - Concept of feedback - Negative feedback - Application in temperature and motor speed control. Digital Electronics Binary number system - AND, OR, NOT, NAND, NOR circuits - Boolean algebra - Exclusive OR gate - Flip flops - Half and full adders - Registers - Counters - A/D and D/A conversion. 8085 Microprocessor Block diagram of microcomputer - Architecture of 8085 - Pin configuration - Instruction set - Addressing modes - Simple programs using arithmetic and logical operations. Interfacing and Applications of Microprocessor Basic interfacing concepts - Interfacing of Input and Output devices - Applications of microprocessor Temperature control, Stepper motor control, Traffic light control.

Microprocessors and Interfacing is a textbook for undergraduate engineering students who study a course on various microprocessors, its interfacing, programming and applications.

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This Book Presents A Thorough Treatment Of Microprocessor Hardware And Software. The Various Concepts Have Been Explained In A Systematic And Integrated Manner So As To Develop A Clear And Comprehensive Understanding Of Microprocessor Technology. Beginning With The Fundamentals Of Digital Electronics, The Book Explains The Development And Evolution Of Various Microprocessor Generations. It Then Presents A Detailed Account Of Microprocessor Architecture, Followed By 8085 Instructions, Timing And Control And Programming. Memory Devices Are Then Thoroughly Explained, Followed By Data Transfer Schemes. The Books Then Discusses Various Contemporary Support Chips And Their Applications. Salient Features: \* Numbering System, Review Of Decimal System, Binary Format, Data Organization, Shift And Rotates, Ascii Character Set Etc. Have Been Included In Chapter 1. \* Detailed Discussion On Software Time Delay Has Been Incorporated In Chapter 6. \* Memory Hierachy, Static And Dynamic Ram Cell Have Been Updated, Pin Outs Of Different Eproms Have Been Included In Chapter 7. \* Electrical Characteristics Of Pit (8253/8254) And Programming Procedure For 8254 Have Been Included In Chapter 9. \* Updating Of Data Bus Buffer, Irr And Isr, Command Word, Initialization Of Control Word, Table Summary For Initialization And Operation Of Control Word, Interfacing Etc. Have Been Done In Chapter 12. A Large Number Of Solved Examples Are Included Throughout The Text To Illustrate The Concepts And Techniques. Review And Objective Questions Are Also Included For Self Test. The Book Would Serve As An Excellent Text For Degree And Diploma Students Of Computer Science And Engineering And Electronics.

The book provides comprehensive coverage of the hardware and software

aspects of the 8085 microprocessor. It also introduces advanced processors from Intel family, SUN SPARC microprocessor and ARM Processor. The book teaches you the 8085 architecture, instruction set, machine cycles and timing diagrams, Assembly Language Programming (ALP), Interrupts, interfacing 8085 with support chips, memory and peripheral ICs - 8255 and 8259. The book explains the features, architecture, memory addressing, operating modes, addressing modes of Intel 8086, 80286, 80386 microprocessors, segmentation, paging and protection mechanism provided by 80386 microprocessor and the features of 80486 and Pentium Processors. It also explains the architecture of SUN SPARC microprocessor and ARM Processor.

Introduction to Microcontrollers is a comprehensive, introductory text/reference for electrical and computer engineers and students with little experience with a high-level programming language. It systematically teaches the programming of a microcontroller in assembly language, as well as C and C++. This books also covers the principles of good programming practice through top-down design and the use of data structures. It is suitable as an introductory text for a first course on microcomputers that demonstrates what a small computer can do. Shows how a computer executes instructions; Shows how a high-level programming language converts to assembler language; Shows how a microcontroller is

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interfaced to the outside world; Hundreds of examples, experiments, "brain-teasers" and motivators; More than 20 exercises at the end of each chapter

The book is written for an undergraduate course on the 8085 and 8086 microprocessors and 8051 microcontroller. It provides comprehensive coverage of the hardware and software aspects of 8085 and 8086 microprocessors and 8051 microcontroller. The book uses plain and lucid language to explain each topic. A large number of programming examples is the feature of this book. The book provides the logical method of describing the various complicated concepts and stepwise techniques for easy understanding, making the subject more interesting. The book is divided into three parts. The first part focuses on the 8085 microprocessor. It teaches you the 8085 architecture, pin description, bus organization, instruction set, addressing modes, instruction formats, Assembly Language Programming (ALP), instruction timing diagrams, interrupts and interfacing 8085 with support chips, memory and peripheral ICs - 8251, 8253, 8255, 8259 and 8279. It also explains the interfacing of 8085 with data converters - ADC and DAC- and introduces a temperature control system design. The second part focuses on the 8086 microprocessor. It teaches you the 8086 architecture, register organization, memory segmentation, interrupts, addressing modes, operating modes - minimum and maximum modes, interfacing 8086 with

support chips, minimum and maximum mode 8086 systems and timings. The third part focuses on the 8051 microcontroller. It teaches you the 8051 architecture, pin description, instruction set, programming 8051 and interfacing 8051 with external memory. It explains timers/counters, serial port, interrupts of 8051 and their programming. It also describes the interfacing 8051 with keyboards, LCDs and LEDs and explains the control of servomotor, stepper motors and washing machine using 8051.

An overview of 8085, Architecture of 8086, Microprocessor, Special functions of general purpose registers, 8086 flag register and function of 8086 flags. Addressing modes of 8086, Instruction set of 8086, Assembler directives simple programs, Procedures, and Macros. Assembly language programs involving logical, Branch and Call instructions, Sorting, Evaluation of arithmetic expressions, String manipulation. Pin diagram of 8086-Minimum mode and maximum mode of operation, Timing diagram, Memory interfacing to 8086 (Static RAM and EPROM), Need for DMA, DMA data transfer method, Interfacing with 8237/8257.8255 PPI-Variou modes of operation and interfacing to 8086, Interfacing keyboard, Displays, Stepper motor and actuators, D/A and A/D converter interfacing. Interrupt structure of 8086, Vector interrupt table, Interrupt service routines, Introduction to DOS and BIOS interrupts, 8259 PIC architecture

and interfacing cascading of interrupt controller and its importance. Serial data transfer schemes, Asynchronous and synchronous data transfer schemes, 8251 USART architecture and interfacing, TTL to RS 232C and RS232C to TTL conversion, Sample program of serial data transfer, Introduction to High-speed serial communications standards, USB.8051 Microcontroller architecture, Register set of 8051, Modes of timer operation, Serial port operation, Interrupt structure of 8051, Memory and I/O interfacing 8051.

Designed for a one-semester course in Finite Element Method, this compact and well-organized text presents FEM as a tool to find approximate solutions to differential equations. This provides the student a better perspective on the technique and its wide range of applications. This approach reflects the current trend as the present-day applications range from structures to biomechanics to electromagnetics, unlike in conventional texts that view FEM primarily as an extension of matrix methods of structural analysis. After an introduction and a review of mathematical preliminaries, the book gives a detailed discussion on FEM as a technique for solving differential equations and variational formulation of FEM. This is followed by a lucid presentation of one-dimensional and two-dimensional finite elements and finite element formulation for dynamics. The book concludes with some case studies that focus on industrial problems and

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Appendices that include mini-project topics based on near-real-life problems. Postgraduate/Senior undergraduate students of civil, mechanical and aeronautical engineering will find this text extremely useful; it will also appeal to the practising engineers and the teaching community.

8086/8088 CPU : Architecture programming model segmentation, Addressing modes, Instruction sets, Assembly language programming BIOS and DOS interrupts. BIOS and DOS Interrupts : Introduction to DOS, Assembly language programming in MSDOS using BIOS and DOS Interrupts, Programming technique, Time delay loop, Produce and macros. 8086 Configuration : Basic 8086 configuration, Maximum and minimum modes, System bus timing, Interrupt priority management, Programmable interrupt controller (PIC) 8259A 8089(IOP). Main Memory Design : 8086 CPU Read/Write timing SRAM and ROM interfacing requirement, Address decoding technique full partial block PROM, Troubleshooting the memory module. DMA : Basic DMA operation, 8237 DMA controller. Multiprocessor Configuration : Queue status and block facility 8086 based multiprocessor system, Co-processor configuration, Closely coupled configuration, Overview of loosely coupled configuration, 8087 NDP, 8087 data types and processor architecture, 8087 programming.

Analog Interfacing to Embedded Microprocessors addresses the technologies and methods

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used in interfacing analog devices to microprocessors, providing in-depth coverage of practical control applications, op amp examples, and much more. A companion to the author's popular Embedded Microprocessor Systems: Real World Design, this new embedded systems book focuses on measurement and control of analog quantities in embedded systems that are required to interface to the real world. At a time when modern electronic systems are increasingly digital, a comprehensive source on interfacing the real world to microprocessors should prove invaluable to embedded systems engineers, students, technicians, and hobbyists. Anyone involved in connecting the analog environment to their digital machines, or troubleshooting such connections will find this book especially useful. Stuart Ball is also the author of Debugging Embedded Microprocessor Systems, both published by Newnes. Additionally, Stuart has written articles for periodicals such as Circuit Cellar INK, Byte, and Modern Electronics. \* Provides hard-to-find information on interfacing analog devices and technologies to the purely digital world of embedded microprocessors \* Gives the reader the insight and perspective of a real embedded systems design engineer, including tips that only a hands-on professional would know \* Covers important considerations for both hardware and software systems when linking analog and digital devices

The book is written for an undergraduate course on the 8085 microprocessor and 8051 microcontroller. It provides comprehensive coverage of the hardware and software aspects of 8085 microprocessor and 8051 microcontroller. The book is divided into two parts. The first part focuses on 8085 microprocessor. It teaches you the 8085 architecture, instruction set, Assembly Language Programming (ALP), interfacing 8085 with support chips, memory and peripheral ICs - 8251, 8253, 8255, 8259, 8237 and 8279. It also explains the interfacing of

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8085 with data converters - ADC and DAC - and introduces a temperature control system and data acquisition system design. The second part focuses on 8051 microcontroller. It teaches you the 8051 architecture, instruction set, programming 8051 with ALP and C and interfacing 8051 with external memory. It also explains timers/counters, serial port and interrupts of 8051 and their programming in ALP and C. It also covers the interfacing 8051 with data converters - ADC and DAC, keyboards, LCDs, LEDs, stepper motors, servo motors and introduces the washing machine control system design.

This up-to-date and contemporary book is designed as a first level undergraduate text on microprocessors for the students of engineering (computer science, electrical, electronics, telecommunication, instrumentation), computer applications and information technology. It gives a clear exposition of the architecture, programming and interfacing and applications of 8085 microprocessor. Besides, it provides a brief introduction to 8086 and 8088 Intel microprocessors. The book focusses on : microprocessors starting from 4004 to 80586. instruction set of 8085 microprocessor giving the clear picture of the operations at the machine level. the various steps of the assembly language program development cycle. the hardware architecture of microcomputer built with the 8085 microprocessor. the role of the hardware interfaces: memory, input/output and interrupt, in relation to overall microcomputer system operation. peripheral chips such as 8255, 8253, 8259, 8257 and 8279 to interface with 8085 microprocessor and to program it for different applications.

8086 80286 80386 80486

This book is designed as a first-level introduction to Microprocessor 8085, covering its architecture, programming, and interfacing aspects. Microprocessor 8085 is the basic

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processor from which machine language programming can be learnt. The text offers a comprehensive treatment of microprocessor's hardware and software. Distinguishing features : All the instructions of 8085 processor are explained with the help of examples and diagrams. Instructions have been classified into groups and their mnemonic hex codes have been derived. Memory maps of different memory sizes have been illustrated with examples. Timing diagrams of various instructions have been illustrated with examples. A large number of laboratory-tested programming examples and exercises are provided in each chapter. At the end of each chapter, numerous questions and problems have been given. Problems from previous years' question papers have been separately given in each chapter. More than 200 examples and problems have been covered in the entire text. This book is designed for undergraduate courses in B.Sc. (Hons) Physics and B.Sc. (Hons) Electronics. It will also be useful for the students pursuing B.Tech. degree/diploma in electrical and electronics engineering.

In the last few years, a large number of books on microprocessors have appeared on the market. Most of them originated in the context of the 4-bit and the 8-bit microprocessors and their comparatively simple structure. However, the techno-logical development from 8-bit to 16-bit microprocessors led to processor components with a substantially more complex structure and with an expanded functionality and also to an increase in the system architecture's complexity. This book takes this advancement into account. It examines 16-bit microprocessor systems and describes their structure, their behavior and their programming. The principles of computer organization are treated at the component level. This is done by means of a detailed examination of the characteristic functionality of microprocessors. Furthermore

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the interactions between hardware and software, that are typical of microprocessor technology, are introduced. Interfacing techniques are one of the focal points of these considerations. This publication is organized as a textbook and is intended as a self-teaching course on 16-bit microprocessors for students of computer science and communications, design engineers and users in a wide variety of technical and scientific fields. Basic knowledge of boolean algebra is assumed. The choice of material is based on the 16-bit microprocessors that are currently available on the market; on the other hand, the presentation is not bound to anyone of these microprocessors.

The book is written for an undergraduate course on the 8051 and MSP430 microcontrollers. It provides comprehensive coverage of the hardware and software aspects of 8051 and MSP430 microcontrollers. The book is divided into two parts. The first part focuses on 8051 microcontroller. It teaches you the 8051 architecture, instruction set, programming 8051 and interfacing 8051 with external memory. It explains timers/counters, serial port, interrupts of 8051 and their programming. It also describes the interfacing 8051 with data converters - ADC and DAC, keyboards, LCDs, LEDs, stepper motors and DC motor interfacing. The second part focuses on MSP430 microcontroller. It teaches you the low power features, architecture, instruction set, programming, digital I/O and on-chip peripherals of MSP430. It describes how to use code composer studio for assembly and C programming. It also describes the interfacing MSP430 with

external memory, LCDs, LED modules, wired and wireless sensor networks.

Intel 8085 Architecture - Instruction format addressing modes - Basic timing diagram - input/output - Interrupt system - 8085 based system design (Introduction only)

6 - Bit Processors (Intel 8086 And Motorola 68000)

Intel 8086: Architecture - addressing modes and Instruction format taking MOV destination, SRC instruction as example - interfacing of RAM to 8086 - odd and even addressed banks - storing/retrieval of 16 bit data at an odd address

Motorola 68000 to be studied in comparison with 8086 - differences in, i. register array arrangement, ii. Memory Interfacing, iii. MOV instruction now is MOV source, destination iv. special signals like valid Memory Address and, v. only memory mapped I/O possible.

Microcontrollers Intel 8-bit and 16-bit microcontrollers - 8031 and 8096 suggested - compared to microprocessors the extra features available: i. On chip D/A and A/D facilities, ii. Watchdog timer, iii. Capability for bit-wise manipulation - real time clock - automatic process control / instrumentation applications case studies - cross assemblers.

Interfacing Basics On controlling/monitoring continuous varying (analog) non-electrical signal using microprocessor/microcontrollers need for interfacing ICs - DIP switch - thumb wheel switch as input devices - single LED, seven segment LED as output devices - interfacing these using both memory mapped I/O and peripheral

mapped I/O - D/A, A/D ICs and their signals - sample and hold IC and its usage. Interfacing ICs 8255 - Programmable peripheral Interface along with 8085 - Both Mode 0 and Mode 1, detailed study. 8254 - Programmable Interval Timer along with Intel 8086 - Both Mode 0 and Mode 3 to be studied. Need for the following ICs: (a) 8251 - USART; (b) 8257 - Direct Memory Access Controller; (c) 8259 - Programmable Interrupt Controller; (d) 8279 - Keyboard / Display Interface.

The book is written for an undergraduate course on the 8085 microprocessor. It provides comprehensive coverage of the hardware and software aspects of the 8085 microprocessor, and it introduces advanced processors from Intel family. The book teaches you the 8085 architecture, instruction set, machine cycles and timing diagrams, Assembly Language Programming (ALP), interrupts, interfacing 8085 with support chips, memory, and peripheral ICs - 8251, 8253, 8255, 8259, and 8237. It also explains the interfacing of 8085 with keyboard, display, data converters - ADC and DAC and introduces a temperature control system, stepper motor control system, and data acquisition system design. The book also explains the architecture, programming model, memory segmentation, addressing modes, pin description of Intel 8086 microprocessor, and features of Intel 80186, 80286, 80386, and 80486 processors.

8085 Microprocessor Basic 8085 Microprocessor architecture and its functional blocks, 8085 Microprocessor IC pinouts and signals, address, data and control buses, clock signals, instruction cycles, machine cycles and timing states, instruction timing diagram. Programming of 8085 Microprocessor Basic instruction set of 8085, addressing modes, writing assembly language programs, looping counting and indexing operations, stacks and subroutines, conditional call and return instructions, debugging programs. 8085 Interfacing and Interrupts Bus interfacing concepts, timing for the execution of input and output (I/O) instructions, I/O address decoding, memory and I/O interfacing memory mapped I/O interfacing of matrix input keyboard and output display. Serial I/O lines of 8085 and the implementation asynchronous serial data communication using SID and SOD lines, interrupt structure of 8085, RST (restart) instructions, vectored interrupt, interrupt process and timing diagram of interrupt instruction execution, 8259A interrupt controller, principles block I/O data transfer (direct memory access) techniques. Programmable Interface and Peripheral Devices Programming and applications of 8455/8156 programmable I/O ports and timer, 8255A programmable peripheral interface, 8253/8254 programmable interval timer, 8257 direct memory access controller, 8279 programmable keyboard / display interface. 8086 and 8088 Microprocessors Architecture and

organization of 8086/8088 microprocessor family, bus interface unit, 8086/8088 hardware pin signals, timing diagram of 8086 family microprocessors, simplified read/write bus cycles, 8086 minimum and maximum modes of operation, 8086/8088 memory addressing, address decoding, memory system design of 8086 family, timing considerations for memory interfacing, input/output port addressing and decoding, introduction to 8087 floating point coprocessor and its connection to host 8086. 8086 Assembly Language Programming Addressing modes, 8086 instruction formats and instruction set, data transfer, arithmetic, bit manipulation, string, program execution transfer and processor control instructions, machine codes for 8086 instructions, assembly language syntax, assembler directives, initialization instructions, simple sequential and looping programs in assembly language, debugging assembly language programs. Advanced Assembly Level Programming Conditional jumps and IF-THEN-ELSE, WHILE-DO REPEAT-UNTIL, delay loop programs, implementing procedure calls, passing parameters using pointers and stack, reentrant and recursive procedures, calling FAR procedures, assembler MACRO instructions, software interrupts and interrupt service routines, software interrupt applications, such as in basic input output system of IBM-PC computer, high level C-language calls to assembly language programs with an illustrative example.

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Presents the techniques of interfacing microprocessors and digital systems to external devices. Addresses analog subsystems and software development as important considerations in interfacing, and uniquely treats the interface between digital electronic devices at all levels of scale. Covers interfacing inside and outside VLSI devices, as well as to peripherals of personal computers. Detailed design examples and numerous figures illustrate important concepts throughout the book. Specific topics covered include IBM PC and Intel 80386 microprocessor interfacing, interfacing automation protocol (MAP), local area networks (LAN), and software interfacing methods using the C language and PC/M86.

### Microprocessor and Interfacing Techniques Microprocessor and Interfacing Technical Publications

8085 Microprocessor architecture, instruction set, timing, diagram, Assembly language programming, stack, subroutines, interrupts, wait & hold state concept. Memory addressing; decoding, Memory design and interfacing techniques, Microprocessor input output, I/O mapping and memory mapping of devices 8085, Interrupts, Interrupt handling, PIC 8259. Supporting peripheral chips - 8255 (I/O), 8254 (Timer counter), 8237 (DMA controller), 8279 (Keyboard display controller). 8 bit microcontroller - MCS51 family architecture, instruction set, assembly language programming using special features of 8051. Typical application of microprocessor and microcontroller in system demonstrating advantage over discrete circuits.

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Flowchart, Program listing of typical case. Use of ADC and DAC. Software and hardware debugging methods using tools like logic analyser, simulator, emulator etc. Serial I/O; 8085 SID, SOD, Synchronous Asynchronous serial I/O, 8251 USART interfacing and programming, RS232 C and RS 485 Interface standards.

The book is written as per the syllabus of the subject Microprocessors and Interfacing Techniques for S. E. (Computer Engineering), Semester-II of University of Pune. It focuses on the three main parts in the study of microprocessors – the architecture, the programming and the system design. The 8086 microprocessor is described in detail along with glimpses of 8088, 80186 and 80188 microprocessors. The various peripheral controllers for 8086/88 are also discussed. Other topics that are related to the syllabus but not explicitly mentioned are included in the appendices. Key Features — Programs are given and the related theory is discussed within the same section, thereby maintaining a smooth flow and also eliminating the need for a separate section on the practical experiments for the subject of Microprocessors and Interfacing Laboratory — Both DOS-based programs as well as kit programs are given — Algorithms and flowcharts are given before DOS-based programs for easy understanding of the program logic

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