

# Table of Contents

## Introduction

- Digital systems and computer design
- Number systems and binary representation
- Hexadecimal representation
- Binary arithmetic
- Signed numbers
- Digital codes
- Floating-point representation

## Part I — Logic Design

### Chapter 2 — Combinational Systems

- Combinational logic
- Truth tables
- Boolean algebra
- Logic functions
- AND, OR, and NOT gates
- NAND and NOR gates
- XOR gates
- Logic simplification
- Implementation of combinational circuits

### Chapter 3 — The Karnaugh Map

- Introduction to Karnaugh maps
- Two-variable and three-variable Karnaugh maps
- Four-variable Karnaugh maps
- Logic-function minimization
- Don't-care conditions
- Multiple-output functions
- Simplification of logic circuits

### Chapter 4 — Designing Combinational Systems

- The combinational-system design process
- Adders
- Subtractors
- Comparators
- Arithmetic circuits
- Multiplexers and demultiplexers
- Encoders and decoders

- Practical combinational-system design

## **Chapter 5 — Analysis of Sequential Systems**

- Sequential logic systems
- Memory elements
- Latches
- Flip-flops
- Registers
- Counters
- State diagrams
- State tables
- Analysis of sequential circuits

## **Chapter 6 — The Design of Sequential Systems**

- Sequential-system design procedure
- State diagrams
- State tables
- State reduction
- Flip-flop selection
- Excitation equations
- Design of synchronous sequential circuits

## **Chapter 7 — Solving Larger Sequential Problems**

- Complex sequential systems
- Finite-state machines
- Registers and counters
- Modular design
- Large-scale sequential-system design
- Practical applications

# **Part II — Computer Design**

## **Chapter 8 — Computer Organization**

- Basic computer organization
- Central processing unit
- Memory
- Input/output systems
- Registers
- Buses
- Datapaths
- Control units

## **Chapter 9 — Computer Design Fundamentals**

- Computer architecture
- Instruction sets
- Instruction formats
- Registers
- Memory organization
- Addressing
- Datapath design
- Control-unit design

## **Chapter 10 — The Design of a Central Processing Unit**

- CPU organization
- Arithmetic and Logic Unit (ALU)
- Processor registers
- Datapath
- Control unit
- Instruction cycle
- Instruction execution
- Design of a simple processor

## **Chapter 11 — Beyond the Central Processing Unit**

- Memory systems
- Input/output systems
- Interfaces
- Communication between computer components
- System organization
- Extensions of computer architecture