

FUNDAMENTALS OF DIGITAL ELECTRONICS THROUGH HDL

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PREFACE

The book has been designed as a self study material for the students of engineering colleges. The goal of this book is to provide simple explanations about the fundamental concepts of Digital Logics and Circuits. This book has been written for the undergraduate students of electrical, electronics and computer science engineering as well as software engineers interested in system design and hardware engineers. The following is a brief description of the subject that is covered in each chapter.

Chapter 1 presents the various binary systems suitable for representing the information in digital form. This digital form of information is useful for processing the signals using digital systems. It explains the binary number system, how to convert from one number systems to another number systems and vice-versa. Also it explained binary arithmetic operations.

Chapter 2 presents the basic postulates of Boolean algebra and shows the graphical representation of Boolean expressions using logic diagrams. Simplification of Boolean expressions, introduction to logic gates such NOT, NAND, NOR, AND, OR logics. The map method to simplify the digital circuits constructed using logic gates.

Chapter 3 introduces the procedure for the analysis and design of combinational circuits. This unit includes various adders, code converters, digital circuits such as encoder, decoder, multiplexer, demultiplexer. In addition to the programmable read only memory (PROM) circuit, internal construction of PLA and PAL is explained. These three PLD components are extensively used in the design and implementation of complex digital circuits.

Chapter 4 outlines the formal procedures for the analysis and design of clocked sequential circuits. The gate structure of several types of flip flops is presented. Few examples are presented with emphasis on sequential circuits that use D type flip flops. Also it explains Flip flop conversions. It also presents the various sequential components such as registers, shift registers and counters and also presents the Finite state machine (FSM) method of digital design. The FSM chart is a flow chart suitable for describing both sequential and parallel operations with digital hardware. Melay and Moore machines are explained with examples.

Chapter 5 the aim of this chapter is to introduce the VHDL language to the reader at the beginner's level. No prior knowledge of the language is required. Its provide a quick tutorial to demonstrate the primary modeling features and describes the basic elements of the language. The emphasis of this chapter is on presenting set of simple and commonly used features so that the reader can start writing models in VHDL. This chapter does not cover the entire language but concentrates on the most useful aspects.

Chapter 6 the purpose of this chapter is to introduce the Verilog HDL to the

reader by explaining its basics of the Verilog language. The various modeling styles supported by Verilog HDL are described in details. It's provides a quick overview of the language, by demonstrating the three main modeling styles.

Chapter 7 The aim of this chapter is to introduce the some VHDL and Verilog basic programs. It's provides how to write programming using three modeling styles and also it's explains writing test benches to verify the functionality.

Appendix-A gives short answers

Appendix-B gives fill in the blanks

Appendix-C provides interview based questions and answers.

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&
My lovingly Wife and Sweet Son
A. Reethika & Varshith

✍ Murali A

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