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طراحی سیستمهای مجتمع خیلی فشرده دیجیتال

Digital VLSI System Design

تعداد واحد: ۳ (نظری)

پیشنیاز: ندارد

هدف: آشنایی کامل با طراحی مدارهای دیجیتال در سطح ترانزیستور و RTL. آشنایی با طراحی و تکنولوژی ها و معماریهای ساخت مدارهای ترکیبی و ترتیبی دیجیتال

شرح درس:

1. Hardware Description Language

- o Design and Modeling using Verilog
- o Design Structure
- o Language Fundamentals
- o Modeling Combinational Logic Circuits
- o Modeling Synchronous Logic Circuits
- o Modeling Finite State Machines
- o Testbench, Simulation and Verification
- o Verilog Styles for Synthesis

2. VLSI technology and ASIC design

• Implementation Strategies for Digital ICs

- o CAD Tool Flow for ASICs
- o Full-Custom Circuit Design
- o Custom ASICs
- o Cell-based Design Methodology
- o Array-based Implementation Approaches
- o Regular Array Architectures in ASICs (PLA, SRAM, DRAM, multi-port RAMs, CAMs)
- o IP Blocks

• Digital ASIC Design

- o Issues in Digital Integrated Circuit Design
- o Quality Metrics of Digital Designs
- o Digital IC Components
- o Design of Combinational Logic Gates in CMOS
- o Design of Sequential Logic Circuits
- o Packaging and Interconnects
- o I/O Pads and Buffers
- o Timing Issues in Digital ICs
- o Design for Testing
- o Data-path Functional Units

3. IC Design Flow

• Digital IC Design Flow

- o Introduction to IC Design Flow
- o Digital system Modeling
- o Fundamentals of Digital Design Methods
- o Synthesis Step with Design Compiler
- o Placement and Routing Step with SOC Encounter
- o Introduction to Calibre Interactive

مراجع:

1. Digital Integrated Circuits, 2nd Edition Rabaey et. al., 2002
2. CMOS VLSI Design A Circuits and Systems Perspective (3rd Edition), Neil Weste and David Harris
3. Analysis and Design of Digital Integrated Circuits, by David Hodges and Horace Jackson, 2003.
4. Cmos Digital Integrated Circuits, by David Hodges, Horace Jackson, Resve Saleh, 3rd Edition.
5. M.J. Smith, ``Application-Specific Integrated Circuits'', Addison Wesley, ISBN 0-201-50022-1.
6. Thomas and Moorby, ``The Verilog Hardware Description Language'', 3rd edition, Kluwer Academic. ISBN 0-7923-9723-1.
7. H. Bhatnagar, ``Advanced ASIC Chip Synthesis Using Synopsys Design Compiler, Physical Compiler, and PrimeTime'', ISBN 0-7923-7644-7.