

EC046 VERY LARGE SCALE INTEGRATED CIRCUIT DESIGN

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|-----------|---|----------|
| 1. | MOS TECHNOLOGY AND CIRCUITS | 9 |
| | MOS Technology and VLSI, Process parameters and considerations for BJT, MOS and CMOS, Electrical properties of MOS circuits and Device modelling. | |
| 2. | MOS CIRCUIT DESIGN PROCESS | 9 |
| | MOS layers, Stick diagram, Layout diagram, Propagation delays, Examples of combinational logic design, Scaling MOS circuits. | |
| 3. | DIGITAL CIRCUITS AND SYSTEMS | 9 |
| | Programmable Logic Array (PLA) and finite state machines, Design of ALU's Memories and Registers. | |
| 4. | ANALOG VLSI AND HIGH SPEED VLSI | 9 |
| | Introduction to analog VLSI, Models for analog switches, active resistors, current sources / sinks, current references, BJT and CMOS operational amplifiers for simulation. Layout of typical circuits like common source amplifier, current source and differential amplifier, Sub-micron technology and GaAs VLSI technology. | |
| 5. | HARDWARE DESCRIPTION LANGUAGES | 9 |
| | VHDL Background and basic concepts, Structural specification of hardware and Design organisation and parameterization. | |

Total : 45

Text Books

1. Douglas A. Pucknell and Kamran Eshrafhian, "Basic VLSI Design systems and circuits", Prentice Hall of India Pvt., Ltd.
2. Randall L. Geiger and P.E. Allen, "VLSI design techniques for analog and digital circuits", McGraw-Hill Int., Co., 1990.
3. Peter J. Ashenden, "The Designer's guide to VDL", Harcourt Asia Pvt., Ltd., 1995.

References

1. Amar Murkherjee, "Introduction to NMOS and CMOS VLSI system design", Prentice Hall, 1986.
2. Fabious.E., "Introduction to VLSI design", McGraw-Hill, 1990.
3. Navabi.Z., "VHDL analysis and modeling of digital systems", McGraw-Hill, 1983.
4. Mohammed Ismail and Terri Fiez, "Analog VLSI, Signal and Information Processing", McGraw-Hill, 1994.
5. Neil H.E. Weste, Kamran Eshrafhian, "Principles of CMOS VLSI Design", Addison Wesley, 1998.

Analog & Mixed Signal ASIC Design Tools

Custom Front End Tools

Design Entry

1. Virtuoso Schematic Composer
2. Virtuoso Schematic Composer VHDL interface
3. Virtuoso Schematics Composer Verilog interface
4. Cadence Analog Design Environment

Circuit Simulation

5. Virtuoso Schematic Composer HSPICE interface
6. Cadence Electronic Design for Manufacturability Option
7. Cadence SPICE
8. Spectre Analog Circuit Simulator
9. Spectre RF Simulation Option.
10. Cadence Analog HSPICE interface option
11. AMS Designer.
12. AMD Environment.

Custom Back End

Layout

13. Virtuoso XL Layout Editor

Digital ASIC Design Bundle

Digital Front End

Functional Simulation

14. Cadence NC-Verilog Simulator
15. Cadence NC- VHDL Simulator
16. Verification Cockpit
17. Cadence NC- SIM Simulator

RTL Synthesis

18. Ambit Building Extreme (BGX100)

Digital Back End

Physical & Place and Route

19. Nano Encounter
20. Celtic Crosstalk Analyzer for cell-based Designs

Tools Common to Digital and Mixed Signal Design

Physical Design for manufacturing

21. Assura DRC
22. Assura LVS
23. Assura RCX
24. Pacific Static Noise Analyzer For Custom Digital ICs
25. VoltageStrom (Gate and Transistor)

Interfaces

26. Cadence Design Framework Integrators Toolkit
27. Virtuoso EDIF 200 Reader
28. Virtuoso EDIF 300 Connectivity Reader / Writer
29. Virtuoso EDIF 300 Schematic Reader / Writer
30. Allegra PCB Design HDL 610
31. Allegra PCB SI 610

Altera Tools

Quartus II Design Software for PCs, Version 3.0

GNU Tools & Excalibur Component Software, Version 3.0

MAX+PLUS II Design Software for PCs, Version 10.2

Model Technology ModelSim – Altera Version 5.7c Simulation tool

(including precompiled libraries for use only with the Quartus II software version 3.0)