

CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING

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ADVANCED VLSI DESIGN: SEMI- CUSTOM TO FULL-CUSTOM

ELIGIBILITY: B.Tech in Electronics & Communication Engineering, Electrical & Electronics Engineering, CSE/IT or equivalent

Duration: 26 Weeks

COURSE CONTENTS

MODULE 1 : ADVANCED DIGITAL DESIGN

Introduction to basic digital fundamental, Combinatorial Logic Design, Sequential Logic Design: Counter Design, Advanced Design Issues: metastability, noise margins, skew, timing considerations, Finite state Machine, Shift Registers, Memories, Case study of digital design circuits

MODULE 2 : VHDL

VLSI Design flow, Introduction to EDA Tools, Introduction to VHDL, Various Modeling styles Syntax and Semantics of VHDL, Design Suits- Entities, architecture declaration, VHDL Modeling of Combinational circuits, Variable and signal types, arrays and attributes, Operators, attributes and signal assignments, Sequential assignment statements, if, case, loops, wait statement, assertion statement, Delay Model – Inertial delay Model, Transport delay model; VHDL Modeling of Sequential circuits, Concurrent assignment statements- when else, with select, Configurations, Packages. Functions, Procedures, generics, FSM based Modeling of Digital Circuits, Writing Test Benches

MODULE 3: VERILOG HDL

Data Types, Data objects, Introduction to Verilog HDL, Various Modeling styles, Syntax, Task and Functions, Specify Block and Timing Checks, Verification and Writing Test Benches

MODULE 4: FULL CUSTOM DESIGN

Introduction to: Full-Custom, Semi-Custom Design, introduction to ASIC design methodology, ASIC design flow, Basic elements of FPGA, Planning, Placement, routing algorithms, FPGA Implementation

MODULE 5: SPICE SIMULATION

Analog circuits : Introduction to Analog VLSI Design, CMOS Technology, Device Sizing, Timing Parameters & Parasitic Extraction, CMOS Design Rules, Basic Analog Building Blocks- Inverter, NAND, NOR gates, CMOS Differential Amplifier Design, CMOS Common Source/Drain Amplifier Design, CMOS Current Mirror Design, Introduction to System on Chip (SoC)

MODULE 6: PYTHON FOR LOGIC DESIGN

Introduction to Python, Python based design of basic logic gates

PROJECT WORK