

Course Name : Electronics Engineering Group
Course Code : ET/EJ/EN/EX/DE/ED/EI
Semester : Sixth for ET/EJ/EN/EX/DE and Seventh for ED/EI
Subject Title : VLSI Design (Elective- I)
Subject Code : 9174

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
03	--	02	03	80	20	--	25@	--	125

Rationale:

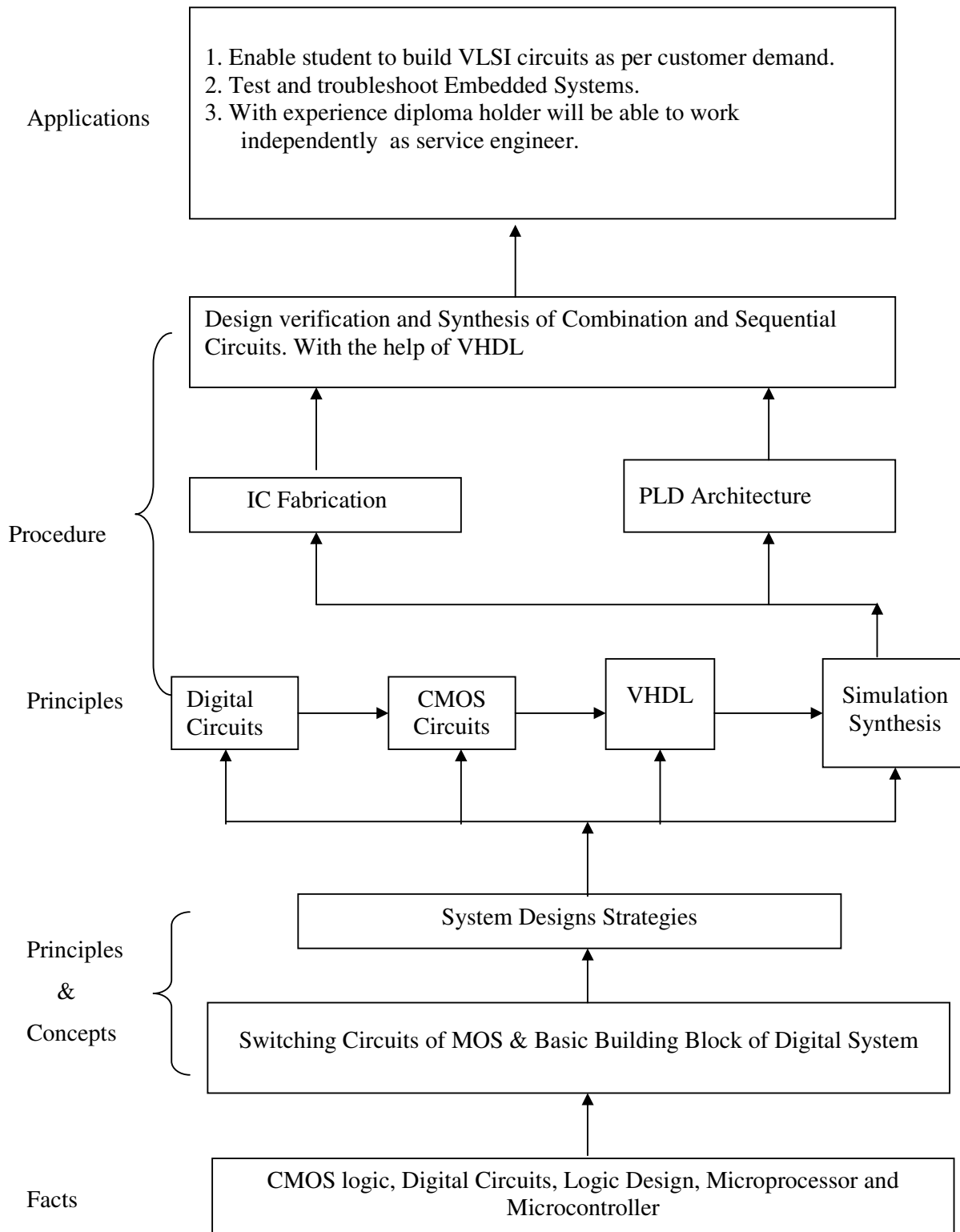
The influence of integrated-circuit technology in the past few years on our society has been pervasive, in area ranging from consumer products to business management to manufacturing control. The driving force behind this pervasiveness is that the functional capability of modern integrated circuitry has increased in scope and complexity exponentially with time over the past 20 years. The designers of modern integrated circuitry have continually endeavored to provide more computational speed with less dissipated electrical power and less circuit board area, while maintaining a low failure rate and an aggressive cost. The complexity and speed is finding ready application for VLSI systems in digital processing. Although silicon MOS-based circuitry will meet most requirements in such systems .The student can acquire knowledge in the design skill of combinational and sequential circuit with the help of VHDL and CMOS Logic circuit processing operation, student can use this knowledge as technician, supervisor and programmer in different sections of industry

Objectives:

The students will be able to:

1. Understand fundamental issues of VLSI technology and to appreciate the limitations imposed by the processing technology on the VLSI circuit designer.
2. Understand system design strategies and their implementation via automated techniques and high level design language.
3. Understand the principles of design verification and testing.
4. Appreciate how the preceding objectives are drawn together in CMOS subsystems design.

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	Very Large Scale Integration (VLSI) Technology 1.1 CMOS Logic ,Basic Gates using NMOS and PMOS Switch, Parameter measurements. 1.2 VLSI and its use in electronics	06	08
02	VLSI Design Concepts 2.1 MOS circuit characterization and performance Estimation. 2.2 CMOS Technology- P Well process , N Well process, Twin tube process 2.3 Circuit elements - Resistors and capacitors	10	16
03	Finite state machines (FSM) 3.1 Moore and Mealey machines: Implementation of circuits using Moore and Mealey machines.	06	08
04	Architecture of ASIC and PLD 4.1 CPLD -Xilinx and Atmel series architecture, Details of internal block diagram 4.2 Introduction to FPGA like Xilinx (FPGA), SPARTAN 3 series and Atmel	06	12
05	Hardware Description Language (HDL) 5.1 Features of Verilog-Entity, Architecture, Configuration, Package, Bus, Driver, Attributes Process 5.2 Behavioral Modeling, Sequential Processing, Data Types, Configurations.	07	12
06	Simulation, Testing and Synthesis using VHDL 6.1 Simulation Issues 6.2 Testing Issues 6.3 Synthesis Issues	07	12
07	Hardware Modeling examples (operation & block Testing) 7.1 Different styles of modeling 7.2 Modeling simple elements 7.3 Modeling conditional operators 7.4 Modeling combinational logic 7.5 Modeling regular structure 7.6 Modeling synchronous logic	06	12
Total		48	80

Practical:

Skills to be developed:

Intellectual Skills:

1. Program Design, Verification, Testing and Synthesis skills

Motor Skills:

1. FPGA Selection, system level Diagnosis,

List of Practical:

1. Design ,verify, test, Synthesize basic gates using VHDL (Any Two)
2. Design ,verify, test, Synthesize synchronous counter using FPGA
3. Design ,verify, test, Synthesize Scrolling of data on seven segment display using FPGA

4. Interface ADC-DAC using FPGA
5. Generation of Ramp using DAC using FPGA
6. Temperature sensing using ADC-DAC using FPGA
7. Stepper motor controller using FPGA
8. 8:1 multiplexer using FPGA
9. 2:4 Decoder using FPGA
10. 8:3 Encoder using FPGA

List of Practice Oriented Projects (Any One):

11. 4 bit ALU using FPGA
12. LCD controller using FPGA
13. Lift controller using FPGA

List Of Equipments:

Hardware using FPGA's of the Spartan-II & Vertex series from Xilinx or Atmel series

Learning Resources:

1. Books:

Sr. No.	Author	Title	Publication
01	Douglas A. Pucknell, Kamran Eshraghian	Basic VLSI Design	Prentice Hall of India
02	Douglas Perry	VHDL	McGraw Hill
03	Xilinx	Xilinx Manual	www.xilinx.com
04	John f. Wakerly	Digital Design	Prentice Hall of India

- 2. Websites:** <http://www.xilinx.com>
<http://www.atmel.com>

- 3. Magazines:** 1. VLSI Society of India, Texas Instruments (India) Pvt. Ltd, C V Raman Nagar, Bangalore 560093
 2. E E Times : www.vlsi-india.net
 3. I. E. E.E.: VLSI Designers Interface