

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	ECC303	VLSI Design	3	0	0	9

Course Objective
The objective of the course is to present an introduction to Digital VLSI Circuits. It emphasizes on understanding of the basic knowledge in the subject and steps wise design aspect of VLSI design in Silicon.
Learning Outcomes
<p>Upon successful completion of this course, students will:</p> <ul style="list-style-type: none"> • have a broad understanding of concepts on MOSFET device, and speed and power related aspects in IC. • have an understanding on IC fabrication and layout. • be able to design various individual circuits needed for Subsystem Design. • be able to Design Subsystem.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	MOSFET characteristics and models, MOSFET capacitances, sheet resistance, scaling theory, Short Channel Effects, Layer & wiring capacitance, delay.	8	This will help student to understand the principle of MOSFET, various effects, and aspects related to speed, power, and area.
2	Isolation techniques, Semiconductor process techniques: growth, diffusion, oxidation, photolithography, metallization, etching; Fabrication of : nMOS, CMOS, BiCMOS, resistors and capacitors for ICs; Latch-up; Layout design rules.	8	This unit will help student in understanding the steps to fabricate active, and passive components.
4	CMOS Inverter: Voltage transfer characteristics and determination of critical voltages, calculation of noise margins, Switching characteristics and Power Dissipation.	7	The understanding of this unit will immensely help student to understand units following this unit.
5	Design of CMOS Gates: NAND, NOR; Complex logic circuits; CMOS Transmission gates; Dynamic logic circuits; Domino CMOS logic.	8	This will help student to design effective combination logic circuits considering speed, power, and area requirement.
6	Sequential CMOS logic circuits: SR Latch Circuit, Clocked SR/JK Latch, Clocking schemes.	5	In this unit student will know about the design of sequential logic circuits.
7	Subsystem Design: Design of ALU (adder and multiplier), Area and power considerations, Semiconductor memories: Design of ROM and RAM.	6	This unit will help student to design Subsystems require for different Systems.

Text Books:

1. Sung-Mo Kang and Yusuf Lablebici, CMOS Digital Integrated Circuits, Analysis and Design, TMH, Fourth Edition.
2. Douglas A. Pucknell and Kamran Eshraghian, Basic VLSI Design, PHI, Third Edition.

Reference Books:

1. Neil H. E. Weste and David Money Harris, CMOS VLSI Design: A Circuits and Systems Perspective, Pearson 4th Edition..
2. John P. Uyemura, Introduction to VLSI Circuits and Systems, Wiley India, Latest Edition.