

**3EC05: CMOS DIGITAL INTEGRATED CIRCUITS LABORATORY**  
**CREDITS – 1 (LTP: 0,0,2)**

**Course Objective:**

The course intends to provide an understanding of the building blocks for microprocessor/microcontroller or digital VLSI circuit based on the MOS circuit. The main focus in this course is on the transistor circuit level design and realization for digital operation and the issues involved in CMOS design.

**Teaching and Assessment Scheme :**

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	CE	ESE	CE	100	
0	0	2	1	00	00	40		60

**List of Experiments :**

Sr. No	Name of Practical
1.	Introduction to layout design software - Microwind
2.	To Study MOSIS (MOS Implementation System) layout Design Rules.
3.	To Study and implement n-MOS / pMOS transistor and its V-I characteristic using Microwind.
4.	To Study and implement CMOS Inverter using Microwind.
5.	To Study and implement NAND, AND gate using Microwind.
6.	To Study and implement NOR, OR gate using Microwind.
7.	To Study and implement XNOR, XOR gate using Microwind.
8.	Introduction to DSCH Software and Verilog.
9.	To Study and implement 2:1 MUX CMOS layout using DSCH and Verilog .
10.	To Study and implement Half-Adder CMOS layout using DSCH and Verilog .
11.	To Study and implement CMOS Ring Oscillator CMOS layout using DSCH and Verilog .
12.	To Study and implement Full Adder CMOS layout using DSCH and Verilog.
13.	To Study and implement Two bit Comparator CMOS layout using DSCH and Verilog.
14.	To Study and implement Edge Triggered D-Flip Flop CMOS layout using DSCH and Verilog.
15.	Mini Project – Presentation.

**List of References :**

1. Etienne Sicard, *Microwind & Dsch User's Manual Lite Version*, 2009
2. Kang, Sung-Mo, and Yusuf Leblebici , “*CMOS digital integrated circuits*”, Tata McGraw-Hill Education, 2003.
3. R.J Backer, H. W. Li, D. E. Boyce "*CMOS design, layout and simulation*", IEEE Press, 1998

**Course Outcomes (COs) :**

At the end of this course students will be able to ...

1. Understand the fabrication process of IC technology and VLSI design flow.
2. Analyze the electrical and physical properties of MOSFET.
3. Have an understanding of the static and switching characteristics of MOSFET based circuit.
4. Analyze, understand the design of Combinational, Sequential and dynamic Logic circuits.
5. Develop the understanding of CMOS latch-up, clocking strategy, and testing principles.
6. Develop the CMOS based digital circuits to solve the real-life problem.