

(EC527) DIGITAL IC DESIGN

Objective of the Course : This course gives knowledge of MOS transistor and circuit design using MOS transistor. It imparts the knowledge of combinational, sequential circuit design at RTL and subsystem level designs.

UNIT - I

CMOS Inverter: Introduction to MOS transistor, CMOS Inverter: Introduction, Static behavior, switching Threshold, Noise Margins, Robustness revisited, dynamic behavior: Computing the capacitances, propagation delay, propagation delay from a design perspective power, energy and energy delay.

UNIT - II

Combinational Logic Design: Introduction, Static CMOS design: Complementary CMOS, ratioed logic, pass transistor logic dynamic CMOS Design: Dynamic logic, speed and power dissipation of dynamic logic, signal integrity issues in Dynamic design, cascading dynamic gates.

Sequential Logic Design: Introduction, static latches and registers: The Bistability principle, multiplexer based latches, master-slave edge-Triggered register, low-voltage static latches, Static SR Flip-flop, dynamic latches and registers, dynamic transmission, Gate Edge - triggered registers, CMOS NOR-CMOS True single - phase clocked register (TSPCER).

UNIT - III

Timing Issues in Digital Circuits: Introduction, Timing classification of digital systems, synchronous design, Self-Timed circuit design, synchronizers and arbiters.

UNIT - IV

Digital Integrated System Building Blocks: Introduction, Adders, Multiplexers, shifters, Memories, ROM, RAM, Internal structure, ROM 2 D Structure, SRAM, DRAM.

UNIT - V

VHDL Design: Combinational logic design using VHDL: VHDL modeling for decoder, Encoder, Multiplexer, Comparator, adders & subtractors. **Sequential logic design using VHDL:** VHDL modeling for latches, flip-flops, counters, shift registers, FSM.

TEXT BOOKS:

1. Jan M. Rabaey, Anantha Chandrakaran, "Digital Integrated Circuits:", Borivoje Nikolic.
2. Ken Martin, "Digital Integrated Circuit Designing".
3. Joh, "Digital Design Principles & Practices", F. Wakerly
4. J. Bhasker, "VHDL Premier".