**13EC4103-VLSI DESIGN**

(ECE)

**Lectures/Week:4Hrs. Sessional Marks:40**

**Univ. Exam. Duration:3Hrs Univ Exam.Marks:60**

**UNIT-I**

**Introduction:** IC fabrication - Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation.

**Components fabrication**-MOS, CMOS &BiCMOS.

**Basic Electrical Properties of MOS circuits:** Pass transistor, MOS Inverter, Various pull ups.

**UNIT-II**

**Basic Circuit Concepts:** Sheet Resistance Rs Area Capacitance calculations, Inverter Delays, Driving large capacitive Loads, Wiring Capacitances.

**VLSI Circuit Design Processes:** VLSI Design Flow, Stick Diagrams, Design Rules and Layout, Contacts and Transistors Layout Digrams for NMOS and CMOS Inverters, Scaling of MOS circuits, Limitation of Scaling.

**UNIT-III**

**Gate level Design:** Logic gates and other complex gates, switch logic, Alternate gate circuits.

**Physical Design:** Floor- Planning, Placement, routing, Power delay estimation, Clock and Power routing

**UNIT-IV**

**Subsystem Design:** Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Counters, High density Memory Elements.

VLSI Design styles: Full-custom, Standard Cells, Gate-arrays, FPGAs and CPLDs.

**UNIT-V**

**VHDL Synthesis:** VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools.

Test and Testability: Fault-modeling and simulation, test generation, design for testability, Built-in self-test.

**TEXT BOOKS:**

1. Essentials of VLSI circuits and Systems – Kamran Eshraghian, Eshraghian Douglas and A Pucknell, PHI, 2005 Edition.
2. D. Roy Chowdhury. Linear Integrated circuits, New Age International Edition(2003)
3. ASIC Design Flow by Smith.

**References:**

1.Pronciples of CMOS VLSI Design- Weste and Eshraghian, Pearson Education, 1999.

2.Modern VLSI Design-Wayne Wolf, Pearson Education, 3rdEdition 1997.

3.Introduction to VLSI Circuits and Systems – John. P. Uyemura. John wiley, 2003.

Digital Integrated Circuits – John M.Rabaey, PHI.