**IC FABRICATION TECHNOLGY**

 **(ECE)**

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

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

**UNIT-I**

**Fundamentals of IC fabrication process:** Preparation of EGS. Crystal growing. Wafer preparation. Epitaxy. Oxidation. Photolithography. Diffusion. Metallization. CMOS fabrication-p-well process, n-well process, twin-tub process. BiCMOS fabrication. IC design techniques-Hierarchical design and design abstraction.

**UNIT-II**

**Devices and Layout:** Sheet resistance. Area capacitance. Delay unit τ. MOS Transistors - Structure of the transistor, Simple transistor model, Transistor parasitics, Wires and vias, Tub ties and latchup, Wire parasitics, Advanced characteristics. Design rules- Fabrication errors, Scalable design rules, SCMOS design rules, Layout design and tools- Layouts for circuits, Stick diagrams, Hierarchical stick diagrams.

**UNIT-III**

**Gates, Network, and sequential Machines:** Static complementary gates- Gate structures, Basic gate layouts, delay, Power consumption, Speed- power product, parasitics, Wires and delay. Network layout design- Single row layout, Standard cell layout. Network delay- Fan-out, Path delay, Transistor sizing. Sequential machines- Latches and Flip-flops.

 **UNIT-IV**

**Subsystems and Floor Planning:** Subsystems- Pipelining, Data paths, 4-bit arithmetic processor as example of subsystem design. Floor planning methods – Block placement and channel distribution, Global routing, power distribution, Clock distribution. Off-chip connections- Packages, I/O Architecture, Pad design.

**UNIT-V**

**Testing and Testability :** System partitioning. Design for testability. Fault models. ATPG.

Testing combinational logic. Testing sequential logic. Scan design techniques. BIST.

**Text Books:**

1. S.M.Sze, VLSI Technology``, Mc Graw-Hill Int. Edn.
2. Wayne Wolf, ``Modern VLSI design`` PearsonEducation Asia.

**Reference Books**

1. Douglas A.Pucknell and Kamran Eshraghian, ``Basic VLSI design``, Prentice-Hall of India Pvt. Ltd.
2. Introduction to VLSI Circuits and Systems – John. P. Uyemura. John wiley, 2003.

Digital Integrated Circuits – John M.Rabaey, PHI,