

# AME19 VLSI DESIGN

## UNIT-1 INTRODUCTION TO MOS TRANSISTOR

- 1.1 MOS Transistor, CMOS logic, Inverter, Pass Transistor, Transmission gate,
- 1.2 Layout Design Rules, Gate Layouts, Stick Diagrams, Long-Channel I-V Characteristics,
- 1.3 C-V Characteristics, Non-ideal I-V Effects, DC Transfer characteristics,
- 1.4 RC Delay Model, Elmore Delay, Linear Delay Model, Logical effort,
- 1.5 Parasitic Delay, Delay in Logic Gate, Scaling.

## UNIT-2 COMBINATIONAL MOS LOGIC CIRCUITS

- 2.1 Circuit Families: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic,
- 2.2 Dynamic Circuits, Pass Transistor Logic,
- 2.3 Transmission Gates, Domino, Dual Rail Domino, CPL, DCVSPG, DPL,
- 2.4 Circuit Pitfalls. Power: Dynamic Power, Static Power, Low Power Architecture.

## UNIT-3 SEQUENTIAL CIRCUIT DESIGN

- 3.1 Static latches and Registers, Dynamic latches and Registers, Pulse Registers,
- 3.2 Sense Amplifier Based Register, Pipelining, Schmitt Trigger,
- 3.3 Monostability Sequential Circuits, Astability Sequential Circuits.
- 3.4 Timing Issues: Timing Classification of Digital System, Synchronous Design.

## UNIT-4 DESIGN OF ARITHMETIC BUILDING BLOCKS AND SUBSYSTEM

- 4.1 Arithmetic Building Blocks: Data Paths, Adders, Multipliers, Shifters, ALUs, and power and speed tradeoffs, Case Study.
- 4.2 Design as a tradeoff. Designing Memory and Array structures:
- 4.3 Memory Architectures and Building Blocks, Memory Core, Memory Peripheral Circuitry.

## UNIT-5 IMPLEMENTATION STRATEGIES AND TESTING

- 5.1 FPGA Building Block Architectures, FPGA Interconnect Routing Procedures.
- 5.2 Design for Testability: Ad Hoc Testing, Scan Design, BIST, IDDQ Testing,
- 5.3 Design for Manufacturability, Boundary Scan.

### Reference Books:

1. M.J. Smith, "Application Specific Integrated Circuits", Addison Wesley, 1997
2. Sung-Mo kang, Yusuf leblebici, Chulwoo Kim "CMOS Digital Integrated Circuits: Analysis & Design", 4th edition McGraw Hill Education, 2013
3. Wayne Wolf, "Modern VLSI Design: System On Chip", Pearson Education, 2007