

PET5H002 DIGITAL VLSI DESIGN (3-1-0)**Module-I**

1. **Introduction:** Historical Perspective, VLSI Design Methodologies, VLSI Design Flow, Design Hierarchy, Concept of Regularity, Modularity and Locality, VLSI Design Styles, Computer-Aided Design Technology.
2. **Fabrication of MOSFETs:** Introduction, Fabrication Processes Flow – Basic Concepts The CMOS n-Well Process, Layout Design Rules, Stick Diagrams, Full-Customs Mask Layout Design.
3. **MOS Transistor:** The Metal Oxide Semiconductor (MOS) Structure, The MOS System under External Bias, Structure and Operation of MOS Transistor (MOSFET), MOSFET Current-Voltage Characteristics, MOSFET Scaling and Small-Geometry Effects, MOSFET Capacitance.

Module – II

4. **MOS Inverters – Static Characteristics:** Introduction, Resistive-Load Inverters, Inverters with n-Type MOSFET Load, CMOS Inverter.
5. **MOS Inverters – Switching Characteristics and Interconnect Effects:** Introduction, Delay-Time Definitions, Calculation of Delay-Times, Inverter Design with Delay Constraints, Estimation of Interconnect Parasitics, Calculation of Interconnect Delay, Switching Power Dissipation of CMOS Inverters.
6. **Combinational MOS Logic Circuits:** Introduction, MOS Logic Circuits with Depletion NMOS Loads, CMOS Logic Circuits, Complex Logic Circuits, CMOS Transmission Gates (Pass Gates).

Module – III

7. **Sequential MOS Logic Circuits:** Introduction, Behaviour of Bistable Elements, SR Latch Circuits, Clocked Latch and Flip-Flop Circuits, CMOS D-Latch and Edge-Triggered Flip-Flop.
8. **Dynamic Logic Circuits:** Introduction, Basic Principles of Pass Transistor Circuits, Voltage Bootstrapping, Synchronous Dynamic Circuit Techniques, Dynamic CMOS Circuit Techniques, High Performance Dynamic CMOS Circuits.

Module – IV

9. **Design for Testability:** Introduction, Fault Types and Models, Ad Hoc Testable Design Techniques, Scan-Based Techniques, Built-In Self-Test (BIST) Techniques, Current Monitoring I_{DDQ} Test.

Additional Module (Terminal Examination-Internal)

10. **Semiconductor Memories:** Introduction, Dynamic Random Access Memory (DRAM), Static Random Access Memory (SRAM), Non-volatile Memory, Flash Memory.

Text Books

1. *CMOS Digital Integrated Circuits: Analysis and Design*, Sung-Mo Kang and Yusuf Leblebici, Tata McGraw-Hill Publishing Company Limited, 3rdEdn, 2003.
2. *Principles of CMOS VLSI Design – a Systems Perspective*, K. Eshraghian and N.H.E. Weste, Addison Wesley, 2nd Edition, 1993.

Reference Books

1. *Digital Integrated Circuits– A Design Perspective*, Jan M. Rabaey, AnanthaChandrakasan, BorivojeNikolic, PHI, 2nd Edn.
2. *Modern VLSI Design System – on – Chip Design*, Wayne Wolf, PHI, 3rd Edn.
3. *VLSI Design*, Debaprasad Das, Oxford University Press, New Delhi, 2010.
4. *CMOS Logic Circuit Design*, John P. Uyemura, Springer, 2001.
5. *Digital Integrated Circuit Design*, Ken Martin, Oxford University Press, 2000.
6. *VLSI Design Technique for Analog and Digital Circuits*, R LGEIGER, TMH.
7. *Algorithms for VLSI Physical Design Automation*, Naveed SHERWANI, BSP BOOKS PVT Ltd., 3rd Edition.
8. *Introduction to VLSI Systems a logic, Circuits and System*, Ming BOLin, BSP BOOKS PVT LTD.