IC Design (MEC-265)

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LECTURE-1

Unit-I

Analog and Digital ICs:

Basic Components of Analog and Digital ICs, its Design challenges, IC chip size and circuit complexity, Fundamentals of Monolithic and Hybrid ICs, VLSI Design Flow, VLSI Design Hierarchy, Design quality, and Design Styles, Packaging Technology and CAD Technology applications

Unit-II

Introduction of IC Technology:

Silicon Wafer Preparation, Epitaxy, Film Deposition, Lithography & Etching, Impurity Doping and Metallization process, Planar Process, Fabrication of a typical circuit

Unit-III

Electrical behavior of MOS transistors and its design challenges:

Short channel effects, Types of scaling and its impact, High-k Technology Inverters: nMOS and CMOS inverters, its design challenges, Switching characteristics, Introduction of Pass transistors and CMOS Transmission Gates, Design of circuits using pass transistor and CMOS TG

Unit-IV

Stick diagram and Layout representation of various ICs:

Micron and λ based design rule for VLSI circuit design, Stick diagram and layout representation of a CMOS inverter, CMOS two-input NOR gate, CMOS two-input NAND gate and complex CMOS logic gates

Books & References:

❑ Kang and Leblebici: "CMOS Digital Integrated Circuits"- TMH Publication, 2003

❑ S.M. Sze: "Semiconductor Devices: Physics & Technology" -Wiley India Publications, 2000.

❑ Weste, Harris and Bannerjee: "CMOS VLSI Design" - Pearson Education Publication, 2011.

❑ Douglas A Pucknell & Kamran Eshragian, "Basic VLSI Design" PHI 3rd Edition (original Edition – 1994)