K L University
Department of Electronics & Computer Engineering
M.Tech (Embedded Systems)

Course No. : **15-EM5103**
Course Title : **VLSI Technology & Design**
Course Structure : **3-0-2**
Credits : **4**

SYLLABUS:

UNIT – I:
Review of Microelectronics and Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology.
Basic Electrical Properties of MOS, CMOS &BiCMOS Circuits: Ids-Vds relationships, Threshold Voltage Vt, Gm, Gds and ωo, Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Zpu/Zpd, MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT – II:
Layout Design and Tools: Transistor structures, Wires and Bias, Scalable Design rules, Layout Design and Tools.
Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT – III:
Combinational Circuit Design: Delay Estimation, Logical Effort and Transistor Sizing , Power Dissipation, Circuit Families, Circuit Pitfalls, Low-power Logic Design, Comparison of Circuit Families, Silicon-on-Insulator Circuit Design

UNIT –IV:
Sequential Circuit Design: Introduction, Sequencing Static Circuits, Circuit Design of Latches and Flip-flops: Conventional CMOS Latches and Flip-Flops, Pulsed Latches, Resettable Latches and Flip-Flops, Enabled Latches and Flip-flops. Static Sequencing Element Methodology: Choice of Elements, Low-power Sequential Design. Synchronizers: A simple synchronizer, arbiter.

UNIT – V:
Floor Planning and System Design: Floor planning methods, Global interconnect, Floor Plan design, off-chip connections, Register Transfer Design, Pipelining

Text Books:
1. Essentials of VLSI Circuits and Systems, K. Eshraghian. D, A.Pucknell, 2005, PHI.
2. Modern VLSI Design - Wayne Wolf, fourth edition, Pearson Education.
3. CMOS VLSI Design A Circuits and systems perspective Third Edition Neil H.E.Weste

References:
1. Introduction to VLSI systems – A Logic, Circuit and System Perspective- Ming Bo, Liu, CRC Press, 1st Edition 2011.
2. Principals of CMOS VLSI Design – N.H.E Weste, K.Eshraghian, 2nd ed., Adisson Wesley.

Project Based Lab: The students will do five basic experiments to gain the knowledge and hands on experience using VHDL and FPGB boards and the Develop an application using this knowledge.