**Adichunchanagiri institute of technology, chikKAmagalurU**

**Department of COMPUTER science & engineering**

**Add on course – 30 Hours**

**ADD on Course Name: Basics of VLSI Design**

**Course Code: 19CS\_AC\_012**

## Module 1: 10 Hours

Introduction: Basic steps of IC fabrication, PMOS, NMOS, CMOS &BiCMOS,and SOI process technologies, MOS transistors - MOS transistor switches – Basic gate using switches, working polartransistor Resistors and Capacitors. Basic Electrical Properties of MOS and BiCMOS Circuits: Working of MOS transistors – threshold voltage; MOS design equations: Ids–Vds relationships, Threshold Voltage, Body effect, Channel length modulation , gm, gds, figure of merit ω0; Pass transistor, NMOS Inverter, CMOS Inverter analysis and design, Various pull ups loads,Bi-CMOS Inverters.

**Module 2: 10 Hours**

Basic Circuit Concepts: Capacitance, resistance estimations- Sheet Resistance Rs, MOS Divice Capacitances, routing a pacitance, Analytic Inverter Delays, Driving large Capacitive Loads, Fan-in and fan-out. VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

**Module 3: 10 Hours**

Gate level Design: Logic gates and other complex gates, Switch logic, Alternate gate circuits. Subsystem Design: Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Counters, VHDL Synthesis: VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation

**TEXT BOOKS:**

1. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, “Essentials of VLSI circuits and systems”, PHI, 2013 Edition.

 2. K.Lal Kishore and V.S.V. Prabhakar, “VLSI Design”, IK Publishers

**REFERENCES:** 1. Weste and Eshraghian, “Principles of CMOS VLSI Design”, Pearson Education, 1999.