ANURAG UNIVERSITY

Pre-Ph.D	L	T/P/D	C
	3	0/0/-	3

Application Specific Integrated Circuit Design

Course Objectives

- To Focus on the Semi-Custom IC Design and introduce the Principles of Design Logic Cells, I/O Cells and Interconnect Architecture, with Equal Importance given to FPGA and ASIC styles.
- To deal with the entire FPGA and ASIC Design Flow from the Circuit and Layout Design Point of View

UNIT- I

INTRODUCTION TO ASICS, CMOS LOGIC AND ASIC LIBRARY DESIGN:

Types of Asics - Design Flow - CMOS Transistors - Combinational Logic Cell – Sequential Logic Cell - Data Path Logic Cell - Transistors as Resistors - Transistor Parasitic Capacitance- Logical Effort.

UNIT- II

PROGRAMMABLE ASICS, PROGRAMMABLE ASIC LOGIC CELLS AND PROGRAMMABLE ASIC I/O CELLS:

Anti Fuse - Static Ram - EPROM and EEPROM Technology - ACTEL ACT- Xilinx LCA – ALTERA FLEX - ALTERA MAX DC & AC Inputs and Outputs - Clock & Power Inputs - Xilinx I/O Blocks.

UNIT- III

PROGRAMMABLE ASIC ARCHITECTURE

Architecture and Configuration of ARTIX / Cyclone and KINTEX Ultra Scale / STRATIX FPGA –Micro-Blaze / NIOS Based Embedded Systems – Signal Probing Techniques.

UNIT- IV

LOGIC SYNTHESIS, PLACEMENT AND ROUTING

Logic Synthesis - Floor Planning Goals and Objectives, Measurement of Delay in Floor Planning, Floor Planning Tools, I/O and Power Planning, Clock Planning, Placement Algorithms. Routing: Global Routing, Detailed Routing, Special Routing.

UNIT- V

SYSTEM-ON-CHIP DESIGN

SoC Design Flow, Platform-Based and IP Based SoC Designs, Basic Concepts of Bus-Based Communication Architectures, High Performance Filters using Delta-Sigma Modulators. Case Studies: Digital Camera, SDRAM, High Speed Data standards.

Text Books:

1. J.S.Smith, "Application Specific Integrated Circuits", Pearson, 2003.
2. Steve Kilts, “Advanced FPGA Design,” Wiley Inter-Science,2006

Reference Books:

1. Roger Woods, John Mcallister, Dr. Ying Yi, Gaye Lightbod, “FPGA-Based Implementation of Signal Processing Systems”, Wiley, 2008.
2. H.Gerez, “Algorithms for VLSI Design Automation”, John Wiley,1999.
3. Hoi-Jun Yoo, KangminLeeandJun Kyong Kim,” Low-Power NoC for High-Performance SoC Design”, CRC Press,2008.
4. S. Pasricha and N. Dutt,” OnChipCommunication Architectures System on Chip Interconnect, Elsveir”,2008.