



STANLEY
COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(Approved by AICTE, New Delhi | Affiliated to Osmania University ,Hyderabad)
Address : Chapel Road, Abids ,Hyderabad

BIT 410

CPLD & FPGA ARCHITECTURE

UNIT - I

Review of Logic Design, Implementation with NAND – NOR gates, designing with multiplexers, implementation of logic functions with look-up tables, minimization of combinational functions based on a) Circuit size, gates and literals i.e. space & power b) number of levels of logic i.e. time or circuit depth.

The Quine-McCluskey Algorithm, Multi level logic minimization, covering, factored forms, technology mapping, review of finite state machines, one hot encoding

UNIT - II

Programmable Logic: Introduction, programmable logic devices (PLDs), SPLDs, CPLDs, fundamentals of PLD circuits, PLD symbology, PLD architectures: Programmable Read Only Memories (PROMs), Programmable Array Logic (PAL), ALTERA CPLDs

UNIT - III

FPGAs: Introduction, Programming Technologies: SRAM, Antifuse, EPROM and EEPROM Xilinx FPGAs, Actel, Altera, Concurrent Logic FPGAs. Crosspoint Solutions FPGA, translation to XNF format, Partition, Place and route, Technology mapping for FPGAs: Logic Synthesis, logic Optimization, Lookup Table Technology Mapping, Mapping into Xilinx 3000 CLBs, Multiplexer Technology, Mapping.

UNIT - IV

Logic Block Architecture: Logic Block functionality Versus area-efficiency, Impact of Logic Block Functionality in FPGA performance, Routing for FPGAs: Segmented Channel Routing, Routing for Symmetrical FPGAs, CGE detailed router Algorithm. Flexibility of FPGA routing architectures: Logic Block, Connection Block, Trade offs in Flexibilities of the S and C blocks, A theoretical model for FPGA routing.

UNIT - V

Platform FPGA architectures, Multi-FPGA Systems: Xilinx Virtex II Pro Platform FPGA, Altera Stratix Platform FPGA, Serial I/O, Memories, CPUs and Embedded Multipliers, Multi FPGA systems: Interconnecting Multiple FPGAs, partitioning, Novel architectures.

Suggested Reading:

- 1) Park K. Chan, Samiha Mourad, "Digital Design using Field Programmable Gate Arrays", Pearson, 1994 (Unit-I)
- 2) Ronald J Tocci, Neal S. Widmer, Gregory L. Moss, "Digital Systems: Principles & Applications", 10th Edition, Pearson, 2009 (Unit-II)
- 3) Stephen Brown Zvonko Vranesic – Fundamentals of Digital Logic with VHDL design, McGraw Hill – 2000 (Unit I & II).
- 4) Stephen D. Brown, Robert J Francis, Jonathan Rose, Ivonko G. Vranesic, "Field Programmable Gate Arrays", Springer International Edition, First Indian Print 2007 (Unit III & IV)
- 5) Wayne Wolf, "FPGA-based System Design", Pearson Education, First Impression, 2009 (Unit V)
- 6) Stephen M. Trimmerger, "Field Programmable Gate Array Technology" Springer International Edition", First Indian Reprint 2007.
- 7) Michel John Sebastian Smith "Application-Specific Integrated Circuits", Pearson Education, First Indian reprint 2000.