VL5006 RECONFIGURABLE ARCHITECTURES

DETAILED SYLLBUS

OBJECTIVES:

The students should be made to:

- Understand concept of reconfigurable systems
- Learn programmed FPGAs
- Study flexibility on routability

UNIT I INTRODUCTION

Domain-specific processors, Application specific processors, Reconfigurable Computing Systems – Evolution of reconfigurable systems – Characteristics of RCS advantages and issues. Fundamental concepts & Design steps –classification of reconfigurable architecture-fine, coarse grain & hybrid architectures – Examples

UNIT II FPGA TECHNOLOGIES & ARCHITECTURE

Technology trends- Programming technology- SRAM programmed FPGAs, antifuse programmed FPGAs, erasable programmable logic devices. Alternative FPGA architectures: Mux Vs LUT based logic blocks – CLB Vs LAB Vs Slices- Fast carry chains- Embedded RAMs-FPGA Vs ASIC design styles.

UNIT III ROUTING FOR FPGAS

General Strategy for routing in FPGAs- routing for row-based FPGAs – segmented channel routing, definitions- Algorithm for I segment and K segment routing – Routing for symmetrical FPGAs, Flexibility of FPGA Routing Architectures: FPGA architectural flexibility on Routability-Effect of switch block flexibility on routability – Trade-offs in flexibility of S and C blocks

UNIT IV HIGH LEVEL DESIGN

FPGA Design style: Technology independent optimization- technology mapping- Placement. High level synthesis of reconfigurable hardware, high- level languages, Design tools: Simulation (cycle based, event driven based) – Synthesis (logic/HDL vs physically aware) – timing analysis (static vs dynamic)- verification physical design tools.

UNIT V APPLICATION DEVELOPMENT WITH FPGAS

Case Studies of FPGA Applications–System on a Programmable Chip (SoPC) Designs.

REFERENCES:

1. Christophe Bobda, "Introduction to Reconfigurable Computing –Architectures, Algorithms and Applications", Springer, 2010.

2. Clive "Max" Maxfield, "The Design Warrior"s Guide to FPGAs: Devices, Tools And Flows", Newnes, Elsevier, 2006.

3. Jorgen Staunstrup, Wayne Wlf, "Hardware/Software Co- Design: Priciples and practice", Kluwer Academic Pub, 1997.

4. Maya B. Gokhale and Paul S. Graham, "Reconfigurable Computing: Accelerating Computation with Field-Programmable Gate Arrays", Springer, 2005.

5. Russell tessier and Wayne Burleson "Reconfigurable Computing for Digital Signal Processing: A Survey" Journal of VLSI Signal processing 28, p7-27,2001.

6. Stephen M. Trimberger, "field – programmable Gate Array Technology" Springer,2007.

7. Stephen D. broen, Robert J. Francis, Jonathan Rose, Zvonko G. Vranesic," Field programmable Gate Arrays", Kluwer Academic Pubnlishers, 1992.

8. Scott Hauck and Andre Dehon (Eds.), "Reconfigurable Computing –The Theory and Practice of FPGA-Based Computation", Elsevier / Morgan Kaufmann, 2008.