



CO1	M	M	H	M	H	-	-	-	-	L	-	M	M	-
CO2	M	L	H	M	H	L	L	-	-	L	-	M	M	L
CO3	M	L	H	M	H	L	L	-	L	L	-	M	M	M

g)Examination Scheme for practical dominated course											
Internal evaluation (40M)						Semester end evaluation (60M)					
Laboratory experiment (15M)				Model laboratory test (25M)			Part-A (20M)	Part-B (40M)			
Performance in conducting experiment (5)	Result and analysis (3)	Viva Voc (3)	Record (4)	Performance in conducting experiment (15)	Result and analysis (5)	Viva Voc (5)	Theory questions to evaluate the knowledge and understanding (20)	Performance in conducting experiment (25)	Result and analysis (10)	Viva-Voc (5)	

### h)Course Content

#### Theory

**15 Hours**

Reconfigurable Computing: Reconfigurable Computing Systems, Evolution and Characteristics, Advantages and Issues, Fundamental Concepts and Design Steps, Domain Specific Processors and Application Specific Processors.

Reconfigurable Architectures: Classification of Reconfigurable Architectures, FPGA Technology and Architectures, LUT devices and Mapping, Placement and Partitioning.

Interconnections in Reconfigurable Architectures: Routing and Switching concepts.

Programming Technology: HDL Based Programming and High level Synthesis using C, Partial Reconfiguration.

Intellectual Property Based Design: Soft core, Firm core and Hard Core, Software tools.

**i)List of experiments**

<b>S. No</b>	<b>CO Mapping</b>	<b>Practical Exercises (60 Hours)</b>
1.	CO1	Introduction to Software and Hardware Tools
2.	CO1	Design of VLSI Subsystems using Verilog HDL.
3.	CO1	Implementation of an Arithmetic and Logical Unit on FPGA.
4.	CO1	Design of Finite State Machine using Verilog HDL.
5.	CO2	Implementation and Analysis of VLSI Subsystems in FPGAs.
6.	CO2	Implementation of Filters.
7.	CO2	Interfacing GPIOs and PMODs with FPGA.
8.	CO2	Signal Generation and AD-DA Interfaces.
9.	CO2	Implementation of IP Cores in FPGA.
10.	CO2	Interfacing Sensors and Display Devices with FPGA.
11.	CO3	Study and Implementation of Micro blaze processor.
12.	CO3	Study and Implementation of Zynq Processing system.
13.	CO3	Design and Implementation of an Embedded System in FPGA.

Total 75hrs

**j)Learning Resources**

**Textbooks**

1. S. Hauck ,”Reconfigurable Computing: Theory and practice of FPGA based Computation”, Morgan Kaufmann, 2008.
2. Simon, “Programming FPGA’s : Getting started with Verilog:, McGraw – Hill Education,2016.
3. Wayne Wolf, “FPGA-Based System Design”, Pearson Education, 1e, 2005.
4. S. Palnitkar, ”Verilog HDL”, Pearson Education, 1e, 2003.

**List of Major Equipment/ Instrument/Software with Broad Specifications**

1. Xilinx VIVADO 2017 (Licensed version)

2. Basys 3
3. Nexys Video
4. ZYBO

**List of Software/Learning Websites**

1. <http://www.verilog.com/> **Online**

**resources**

1. Prof. Ken Eguro, University of Washington, Video lecture on Reconfigurable Computing, Sponsored by Microsoft Research
2. <https://www.microsoft.com/en-us/research/video/candidate-talk-reconfigurable-computingarchitectural-and-design-tool-challenges/>