NIRMA UNIVERSITY
SCHOOL OF TECHNOLOGY, INSTITUTE OF TECHNOLOGY
M.Tech. in Electronics & Communication Engineering (VLSI Design)
M.Tech. Semester - II
Department Elective III

L	T	Practical component				C
		LPW	PW	W	S	
2	-	2	-	-	-	3

Course Code	**6EC172ME22**
Course Title	**Reconfigurable Computing**

Course Learning Outcomes (CLOs):

At the end of the course, students will be able to -

1. Comprehend the concept of reconfigurable computing, architectures and types of reconfigurations.
2. Apply the concepts of reconfiguration on the systems design for given specification /design.
3. Evaluate the digital systems designed using reconfigurable architectures for their performance.
4. Implement embedded systems on reconfigurable hardware for given specifications.

Syllabus: **Teaching Hours:30**

Unit I: Introduction **03**

Computing requirements, Area, Technology Scaling, Instructions, Custom Computing Machine,

Unit II: Comparison of Computing Machines **06**

Fine-grained & Coarse-grained structures, Comparison of different architectures viz. PDSPs, RALU, VLIW, Vector Processors, Memories.

Unit III: Arrays for Fast Computations **06**

CPLDs, FPGAs, Multi context, Multi FPGA, Partial Reconfigurable Devices.

Unit IV: High Level Synthesis **09**

Datapath, Constructive Routing, Retiming, Bit stream Generation, JBits, Fast Mapping, System C, HandleC

Unit V: Evaluating and Optimizing Problems for FPGA Implementations **06**

Instance-specific design, Constant Propagation & Partial Evaluation, Precision Analysis & Floating Point, Distributed Arithmetic, CORDIC Algorithm, Task allocation: FPGA vs. CPU partitioning,

Self-Study:

The self-study contents will be declared at the commencement of Semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

Suggested Readings:

1. Scott Hauck, Andre Dehon, Reconfigurable Computing, Morgan Kauffman
2. Christophe Bobda, Introduction to Reconfigurable Computing, Springer
3. Maya Gokhale, Paul Ghaham, Reconfigurable Computing, Springer
4. IEEE Journal papers on Reconfigurable Architectures, High Performance Computing Architecture (HPCA) Society papers