

**S.E. (ELECTRONICS) SEMESTER IV**  
**DIGITAL SYSTEMS DESIGN II**

Period per week	Lecture	4	
	Practical	2	
	Tutorial	--	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	Practical	3	50
	Oral Examination	---	25
	Term Work	---	25
	TOTAL	---	200

Detailed Syllabus		Lectures/Week
1.	<b>Hardware Description Languages</b>  Introduction to Hardware Description Language, Core features of VHDL, data types, concurrent and sequential statements, data flow, behavioral, structural architectures, Subprograms, modularity, design reuse concepts	08
2.	<b>Application of HDL in combinational circuits</b>  Implementation of Combinational Circuits in VHDL, Use of Component Instantiation and Structural Architecture Using VHDL and PLDs Combinational circuit design examples – barrel shifter, simple floating – point encoder, cascading comparator.	08
3	<b>Sequential logic design</b>  Synchronous State Machines: Mealy and Moore Machines, Clocked synchronous state machine analysis, Clocked synchronous state machine design, designing state machines using state diagrams, State Reduction techniques, State Assignment Rules, State machine synthesis using transition lists	14
4	<b>Applications of sequential circuits</b>  MSI counters and applications, MSI Shift registers and their	10

	applications Implementation of Counters and Shift registers in VHDL VHDL sequential circuit design features. Implementation of FSM in VHDL	
5.	<b>Memory, CPLDs and FPGAs</b>  Types of memory devices, Read-Only Memory (ROM), Read / write memory, Static RAM, Dynamic RAM, Introduction to Xilinx XC9500 CPLD family and Xilinx XC 4000 FPGA family.	08
6	<b>Introduction to Asynchronous design</b> Fundamental and pulse mode Asynchronous sequential machine, Analysis of Asynchronous Sequential Circuits: Transition Table, Flow Table, Race Conditions Stability Considerations, Analysis of simple circuits like latches is expected	08

#### **Text Books**

1. Douglas L Perry, VHDL Programming by Examples, Fourth Edition, Tata McGraw hill Publications, 2002.
2. Morris Mano, Digital Design , Pearson Education ,Asia,2002
3. John M. Yarbrough, Digital Logic :Applications and Design, Thomson Brooks/Cole , 2004

#### **Reference Books**

1. John F. Wakerley, Digital Design Principles and Practices, third edition updated, Pearson Education, Singapore, 2002.
2. Stephen Brown & Zvonko Vranesic, Fundamentals of Digital Logic with VHDL Design, first edition, McGraw Hill International edition, 2000.

### **SUGGESTED LIST OF EXPERIMENTS**

#### **The experiments must include:**

1. Implementation of combinational circuits in VHDL (min 2 Experiment)
2. Applications using MSI counters / shift registers (min 2 Experiments)
3. Implementation of sequential circuits in VHDL (min 2 Experiments)
4. Implementation of Synchronous Sequential Circuit Design examples in hardware as well as using VHDL (min 2 Experiments)
5. A demonstration (at least) of programming FPGA / CPLD should be done

#### **Term Work**

The term work shall consist of at least eight laboratory experiments covering the whole of syllabus, duly recorded and graded. This will carry a weightage of fifteen marks. A test shall be conducted and will carry a weightage of ten marks.

