

Course Code: ELO 381

Title of the Course: Swayam-III

Prerequisite/objectives/learning outcomes as provided by course on SWAYAM website.

Number of Credits: 4

Course Code: ELO303

Title of the Course: Digital System Design Using HDL

Number of Credits: 4

<u>Prerequisites for the course:</u>	Should have studied digital electronics at graduate level.	
<u>Objective:</u>	This course develops concepts in Principles of Combination and Sequential logic design, VHDL and Verilog.	
<u>Content:</u>	1. Introduction: About Digital Design, Analog versus Digital, Electronic Aspects of Digital Design, PLD's, ASIC, Digital Design level. Digital Concept and Number System: General Positional number system conversions, Operation, BCD, Gray Code, Character Codes, Codes for Actions, Conditions, and States n-Cubes and Distance, Codes for Detecting and Correcting Errors, Error-Detecting Codes, Error-Correcting and Multiple-Error-Detecting Codes, Hamming Codes, CRC Codes, Two-Dimensional Codes, Checksum Codes, m-out-of-n Codes, Codes for Serial Data Transmission and Storage, Parallel and Serial Data, Serial Line Codes,	07
	2. Combinational Logic Design Principles: Switching Algebra, Combinational-Circuit Analysis, Combinational-Circuit Synthesis, and Timing Hazards.	08
	3. Hardware Description Languages: HDL-Based Digital Design, ABEL Hardware Description Language, The VHDL Hardware Description Language, The Verilog Hardware Description Language,	06
	4. Combinational Logic Design Practices: Documentation Standards, Circuit Timing, Combinational PLDs, Decoders, Encoders, Three-State Devices , Multiplexers, Exclusive-OR Gates and Parity Circuits , Comparators, Adders, Subtractors, and ALUs , Combinational Multipliers .	06
	5. Sequential Logic Design Principles & Practices: Bistable Elements, Latches and Flip-Flops, Clocked Synchronous State-Machine Analysis, Clocked Synchronous State-Machine Design, Designing State Machines Using State Diagrams, State-Machine Synthesis Using Transition Lists, Another State-Machine Design Example, Decomposing State Machines, Feedback Sequential-Circuit Analysis, Feedback Sequential-Circuit Design, ABEL Sequential-Circuit Design Features , Sequential-Circuit Design with VHDL , Sequential-	09

	Circuit Design with Verilog, Sequential-Circuit Documentation Standards , Latches and Flip-Flops ,Sequential PLDs , Counters, Shift Registers, Iterative versus Sequential Circuits , Synchronous Design Methodology , Impediments to Synchronous Design , Synchronizer Failure and Metastability 6. Memory, CPLDS, AND FPGAS Read-Only Memory, Read/Write Memory, Static RAM, Dynamic RAM, Complex Programmable Logic Devices, Field-Programmable Gate Arrays Tutorials: 1. Design flow for the simple microprocessor in HDL 2. Study and compares types of RAMS. 3. Design of GRAY code circuit. 4. Study of ALTERA PLD's 5. Study of XILINX PLD's. 6. Studying WEB Pack Xilinx tool.	12
Total		48
Pedagogy:	lectures/ tutorials/assignments/self-study	
References/Readings	1. Digital Design Principles and Practices, by John F. Wakerly, Prentice Hall's Fourth Edition. 2. Digital Logic Applications & Designs by John M. Yarbough, CWS Publishing Co. Division of Thomson Learning, 3. Giovanni De Micheli, "Synthesis and Optimization of Digital Circuits," Tata McGraw-Hill, 2003. 4. Srinivas Devadas, Abhijit Ghosh, and Kurt Keutzer, "Logic Synthesis," McGraw-Hill, USA, 1994. 5. Neil Weste and K. Eshragian,"Principles of CMOS VLSI Design: A System Perspective,2nd edition, Pearson Education, 2000. 6. Kevin Skahill, "VHDL for Programmable Logic," Pearson Education, 2000. M.N.O. Sadiku, Elements of Electromagnetics 2nd Edition) , Oxford University press, 1995.	
Learning Outcomes	Explains Principles of Combination and Sequential logic design and HDL.	

Course Code: ELO 304

Title of the Course: EDA Tools

Number of Credits: 4

Prerequisites for the course:	Should have studied Digital Communication Systems	
Objective:	This course develops concepts in Programming with different types of EDA Tools	
Content:	Study of JTAG, Modelsim Syntax study. 1. Study of Phases of Quartus compilations.	4