

Subject Code: 1ET4050602	Subject Title: VLSI
Pre-Requisite	Basic Knowledge of Digital Electronics

RATIONALE:

Digital integrated circuits are integral part of electronic equipment/gadgets starting from small toys to complex computer systems including personal digital assistants, mobile phones and Multimedia agents. This course will enable the students to acquire the basic skills to develop codes for VLSI circuits through VHDL programming. This course will also enable them to use FPGA and ASIC chips for design and development of various applications. Thus this course is an advance but very useful course for electronic engineers

COURSE OBJECTIVE:

The course content should be taught and implemented with the aim to develop required skills in the students so that they are able to acquire following competency:

- **Develop codes through VHDL programming for VLSI based electronic systems**

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment
3	-	2	4	60	40	20	30

DETAILS OF COURSE CONTENTS:

Unit	TOPIC	Total Hrs.	WEIGHTAGE
Unit – I. Digital System and MOS Transistor	1.1 VLSI design flow, Y chart, Practical design flow 1.2 Design Hierarchy-Structural Decomposition in the physical (geometrical) domain 1.3 FPGA, Gate Array Design, Standard Cell Based Design, Full Custom Design 1.4 MOS structure 1.5 MOS system under external bias Structure and operation of MOS FET transistor MOSFET current- voltage Characteristics	08	15%
Unit– II MOS Inverters	2.1 MOS Inverter : concept and working 2.2 Resistive load Inverter Inverter with n-type MOSFET Load, Enhancement load NMOS, Depletion Load NMOS Enhancement load and Depletion Load NMOS CMOS Inverter: Circuit operation and description Cascaded CMOS Inverter stages	12	30%

Unit– III MOS Circuits	3.1 Combinational MOS LogicCircuits. 3.2 CMOS logic circuits 3.3 Complex logic circuit Sequential MOS circuit VLSI Technology-Environment& Processes in brief	12	30%
Unit-IV Introduction to VHDL	4.1 Data flow, behavioural, Structural 4.2 Logic operations viz. AND,OR, NOR,NAND,NOT,EXOR, EXNOR etc. 4.3Adder and Subtractor.	10	25%

Suggested List of Practicals :

Identify VHDL entities and coding styles.
Simulate the Basic logic gates using VHDL.
Simulate the Universal logic gates using VHDL
Simulate X-OR and X-NOR logic gates using VHDL
Simulate Half Adder using VHDL
Simulate Full Adder using VHDL
Simulate Half Subtractor using VHDL
Simulate Full Subtractor using VHDL

Suggested List of Books:

S. No.	Title of Book	Author	Publication
1.	CMOS DIGITAL INTEGRATED CIRCUITS	Sung Mo Kang	TMH
2.	Introduction to VLSI Circuits and Systems.	Uyemura J.P.	WILEY INDIA PVT. LTD.
3.	VLSI DESIGN	Das Debaprasad	OXFORD
4.	VLSI DESIGN Theory and Practice	Vij Vikrant, Er. Syal Nidhi	LAXMI PUBLICATIONS PVT. LTD.
5.	Circuit design with VHDL	Pedroni V.A.	PHI
6.	VHDL Modelling of systems	Znawabi	TMH
7.	VHDL Programming by Example	Perry Douglas L.	MGH
8.	VHDL design	Bhaskar J	Pearson
9.	VLSI Technology	Chang C.Y. and Sze S. M.	McGraw Hill