C. U. SHAH UNIVERSITY
Wadhwan City

FACULTY OF: - Technology & Engineering
DEPARTMENT OF: -Electrical Engineering
BRANCH: Electrical & Electronics Engineering
SEMESTER: - VIII
CODE: - 4TE08VLS1
NAME – VLSI Technologies

Teaching & Evaluation Scheme

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
							Theory				Practical (Marks)			
		Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE08VLS1	VLSI Technology	4	0	2	6	5	30	1.5	70	3	--	20	30	150

Objectives:

- The course is designed to give the student an understanding of the different design steps required to carry out a complete digital VLSI (Very-Large-Scale Integration) design in silicon.

Prerequisites:-
- Basic understanding of Digital Circuits
- Basic understanding of Logic Design

Course Outlines

Sr. No.	Course Contents	Hours
1	**Introduction:** Overview of VLSI design methodology, VLSI design flow, Design hierarchy, Concept of regularity, Modularity, and Locality, VLSI design style, Design quality.	06
2	**Fabrication of MOSFET:** Introduction, Fabrication Process flow: Basic steps, C-MOS n-Well Process, Layout Design rules, full custom mask layout design.	08
3	**MOS Transistor:** The Metal Oxide Semiconductor (MOS) structure, The MOS System under external bias, Structure and Operation of MOS transistor, MOSFET Current Voltage characteristics, MOSFET scaling and small-geometry effects,	08

	MOSFET capacitances	
4	**MOS Inverters:** Introduction, Resistive load Inverter, Inverter with n-type MOSFET load(Enhancement and Depletion type MOSFET load), CMOS Inverter, Delay-time definitions, Calculation of Delay times	08
5	**Combinational MOS Logic Circuits:** Introduction, MOS logic circuits with Depletion nMOS Loads, CMOS logic circuits, Complex logic circuits, CMOS Transmission Gates (TGs)	08
6	**Dynamic Logic Circuits:** Introduction, Basic Principles of pass transistor circuits, Voltage Bootstrapping, Synchronous Dynamic Circuit Techniques, CMOS Dynamic Circuit Techniques, High-performance Dynamic CMOS circuits	06
7	**Design for testability:** Introduction, Fault types and models, Controllability and observability, Ad Hoc Testable design techniques, Scan –based techniques, Built-in Self Test (BIST) techniques, current monitoring IDDQ test	06
8	**Introduction to Programmable Logic Devices:** FPGA and CPLD	06

Learning Outcomes

- Students will be able to understand the basic fundamental concepts of VLSI and its synthesis.

Books Recommended

1. "CMOS Digital Integrated circuits – Analysis and Design" by Sung-Mo Kang, Yusuf Leblebici Tata McGraw-Hill Education, 2003.
2. "VHDL Primer", by Jayaram Bhasker,Prentice Hall PTR, 1999.
3. "VHDL", by Douglas L. Perry, McGraw-Hill, 1991.