

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

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>Course Code</b>	<b>3EC12D102</b>
<b>Course Title</b>	<b>Advanced Topics in VLSI Testing and Verification</b>

**Course Outcomes (COs):**

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

1. Analyze the need of specialized verification and testing for FPGA, ASIC, IP Cores and SoC.
2. Implement various memory testing methods.
3. Address power, area and time constrains in case of testing.
4. Choose the effective methods for analog and mixed mode testing.

**Syllabus:**

**Teaching Hours:**

<b>UNIT I: Timing Analysis</b>	<b>04</b>
Importance, Issues and Challenges, Static and Dynamic Timing Analysis, Set-up and Hold Violation and Remedies	
<b>UNIT II: Logic and Fault Simulation</b>	<b>04</b>
Introduction, Simulation Methods, Logic Simulation, Fault Simulation, Serial and Parallel fault simulation	
<b>UNIT III: Diagnosis</b>	<b>06</b>
Combinational Logic Diagnosis, Scan Chain Diagnosis, Logic BIST Diagnosis, System Level Diagnosis, BIST with Diagnostic Support	
<b>UNIT IV: IP Core Testing</b>	<b>05</b>
Core Based Testing And Test Wrapper, SoC and Embedded System Testing	
<b>UNIT V: Low Power Testing</b>	<b>06</b>
Power Related Reliability Issues, High Speed Low Power Testing Issues	
<b>UNIT VI: Test Compression</b>	<b>05</b>
Introduction, Test Stimulus Compression, Test Response Compaction, Industry Practices	
<b>UNIT VII: Analog and Mixed Signal Testing</b>	<b>05</b>
Introduction, Analog Defect Mechanism and Fault Models, Analog Circuit Testing, DC Parametric Testing, Mixed-Signal Testing, IEEE1149.4 Standard	
<b>UNIT VIII: Memory Testing and Built-In-Self-Test</b>	<b>05</b>
RAM Function fault Models, RAM Test Algorithms, Fault Simulation, Built-In-Self-Test for Memory, Memory Diagnosis and Built-In-Self-Repair, Memory Testing for Nanometer Age	
<b>UNIT IX: Test Technology Trends</b>	<b>05</b>
I/O Testing, FPGA Testing, MEMS Testing RF Testing, Delay Testing,	

**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.

**Suggested Readings:**

1. Malvin A Breuer, Diagnosis and Reliable Design of Digital System, Computer Science Press
2. Laung-Terng Wang et al., VLSI Test Principals and Architecture:, Morgan Kaufman
3. Stanlay L. Hurst, VLSI Testing : Digital and Mixed Analogue/Digital Techniques, Institution of Engineering and Technology
4. Michael L. Bushnell and Vishwani D. Agrawal Essential of Electronic Testing for Digital, Memory and Mixed Signal VLSI Circuits, Kluwer Academic Publishers
5. Ashok K Sharma, Semiconductor Memories : Technology, Testing and Reliability, John

L = Lecture, T = Tutorial, P = Practical, C = Credit