

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

L	T	P	C
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Course Code	3EC12D105
Course Title	Advanced Topics in VLSI Design

Course Outcomes (COs):

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

1. Comprehend the recent VLSI technology trends.
2. Analyse the scaling limit of CMOS Design and issues related to high density designs.
3. Analyse the possible solutions of scaling limits of CMOS and research trends in VLSI technology and design.

Syllabus:

Teaching Hours:

UNIT I: State-of-Art in CMOS Technology	05
Evolution, Dual Gate CMOS Technology, HKMG CMOS Technology, Gate-All-Around and Vertical MOS	
UNIT II: Limitations of CMOS Technology	10
Conventional VLSI design flow and its difficulties in dealing with deep submicron CMOS design	
UNIT III: Advances in VLSI: Beyond CMOS	10
Overview of Beyond CMOS options, Tunnel Junction Devices, Indium Antimonide Transistors, Carbon Nanotube FETs, Graphene nanoribbon, Spintronic, Photonics	
UNIT IV: Advances: More Moore and More-Than Moore	10
Nanosystems, RF Systems, Biochips, Advances in Memory Technology	
UNIT V: High Performance VLSI Design	05
Signal integrity, types of noise in gigabit CMOS circuits, power plane noise and decoupling capacitor calculation, signal coupling and its impact on circuit performance	
UNIT VI: Recent Topics	05
Recent topics from SIA Roadmap	

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. International Technological Road Map for Semiconductors
2. Selected Research papers from reputed journals and proceedings

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