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

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Course Code	**6EC165ME22**
Course Title	**Advanced Topics in VLSI Design**

Course Learning Outcomes (CLOs):

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:45**

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 Nenotube 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, Selected Research papers from reputed journals and proceedings