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

L	T	Practical component				C
		LPW	PW	W	S	
3	-	-	-	-	-	3

Course Code	**6EC166ME22**
Course Title	**IC Fabrication Technology**

Course Learning Outcomes (CLOs):

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

1. Comprehend use of materials and parameters involved in the wafer preparation.
2. Illustrate and list the processes involved in fabrication of VLSI circuits.
3. Visualize the complete VLSI fabrication flow from wafer preparation to packaging.

Syllabus: **Teaching Hours:45**

UNIT I: Crystal Growth and Wafer Preparation **05**
Introduction, electronic grade silicon, material properties, crystal growth, silicon shaping, clean room

UNIT II: Epitaxy **05**
Introduction, wafer-phase epitaxy, molecular beam epitaxy, silicon on insulator, epitaxial evaluation

UNIT III: Oxidation **10**
Thin oxides, peroxidation cleaning, dry and wet oxidation, high pressure oxidation, oxidation of polysilicon, oxidation induced defects

UNIT IV: Lithography **05**
Lithography techniques: optical lithography, electron beam lithography, ion beam lithography, comparisons of lithography techniques

UNIT V: Doping, Diffusion and Ion Implantation **10**
Doping technology, Deposition of films using chemical vapour deposition (CVD), Low pressure chemical vapour deposition LPCVD and Sputtering Techniques, ion implantation techniques

UNIT VI: Device and Circuit Fabrication **05**
Isolation, self-alignment, metallization, NMOS IC technology, CMOS IC technology, Advancement in IC fabrication technology including 3D IC

UNIT VII: Packaging **05**
Package types, packaging design consideration, package fabrication technology, advanced packaging

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. S. M. Sze, VLSI Technology, Second Edition, McGraw-Hill
2. S. K. Gandhi, VLSI Fabrication Principles, Second Edition, John Wiley & Sons
3. James Plummer, M. Deal and P.Griffin, Silicon VLSI Technology, Prentice Hall Electronics and VLSI series.