

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

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Course Code	3EC12D201
Course Title	IC Fabrication Technology

Course Outcomes (COs):

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:

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.

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