

Microelectronics Technology (GEC-103)

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Unit 1

Introduction: Basic structure of BJT, NMOS, CMOS, BiCMOS Devices

Crystal Growth & Silicon wafer preparation: Introduction, Structure of Semiconductor, Electron- Grade Silicon, CZ Crystal Growth, Silicon Shaping, Processing considerations

Epitaxy: Introduction, Vapour-Phase Epitaxy, Molecular beam Epitaxy, Silicon on Insulator, Epitaxial Evaluation **8**

Unit 2

Oxidation: Introduction, Growth Mechanism and Kinetics, Thin oxidation, Oxidation Technique and System, Oxidation Properties, Redistribution of Dopants at interface, Oxidation of Polysilicon, Oxidation Induced Defects.

Dielectrics and Polysilicon Film Deposition: Introduction, Deposition Process, Polysilicon, Silicon Dioxide, Silicon Nitride, Plasma Assisted Deposition. **9**

Unit 3

Lithography: Introduction, Optical Lithography, Electron Lithography, X-ray Lithography, Ion Lithography

Etching: Wet and Dry Chemical Etching, Reactive Plasma Etching

Diffusion: Introduction, Model of diffusion, in solid, Diffusivities of B, P, As and Sb, Measurement Techniques **8**

Unit 4

Ion Implantation: Introduction, Range Theory (Ion Stopping, Range Distribution, Damages, Channeling), Annealing, Shallow Junction, High Energy Implantation.

Metallization: Chemical Vapour Deposition (CVD), Physical Vapour Deposition (PVD), Evaporation technique, sputtering technique. **8**

Unit 5

Fabrication steps of IC: Bipolar IC, MOS IC, BiCMOS IC, Fault Detection and Characterization Technique **7**

Text Books

1. SZE S M (SE) "VLSI Technology", Mc Graw Hill International
2. Gandhi S, "VLSI fabrication principles", Wiley Publication

Reference Books

1. Campbell S A, "The Science and Engineering of Microelectronics fabrication" Oxford University press
2. Geiger Randall L, Allen Phillip E, Stader Noel R, "VLSI Design Technique for Analog and Digital Circuits", Mc Graw Hill International