Semiconductor Device Modeling & Circuit Simulation

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UNIT-I

Compound Semiconductor, Lattice Structure, Carrier Drift, Direct & Indirect Semiconductors, Scattering, Recombination, Mean Life Time, Continuity Equation

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UNIT-II

PN Junction Characteristics, Current Component in Diode, Equivalent Circuit of Diode, BJT Characteristics, Second Order Effects in BJT : Thermal Run Away, Base Width Modulation, Kirk Effect, Band Gap Narrowing & Small Signal Analysis

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UNIT-III

Ebers–Moll Model, Hybrid Pi Model, Figure of Merit, Approximation & complete equivalent model of BJT, Charge Control Model, Gummel Poon Model, SPICE model of BJT & Simulation of BJT

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UNIT-IV

N- Channel & P-Channel MOS characteristic and feature, Enhancement and depletion mode, :Second order effect of MOS : Body Effect, Channel length modulation, Sub threshold conditions, DIBL, Hot carrier effect, Mobility degradation, Velocity saturation, CMOS latch up, MOS parasitic capacitances and resistance

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UNIT-V

Circuit models for MOSFET : Small Signal Model, BISM Model, SPICE Model, Simulation & Layout design DC, AC & Transient analysis of linear and non linear circuits, Logic & Timing Simulation

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Text Books:

1. Ben G. Streetman & Sanjay Banerjee, "Solid State Electronic Devices", Sixth Edition , Prentice Hall of India Private Limited, India.
2. Jacob Millman & Christos C. Halkias,, "Integrated Electronics", Second Edition , Tata McGraw Hill Publication, India.

3. Kannan Kanno, "Semiconductor Devices and Physics", Prentice Hall of India Private Limited, India.

4. Jan M. Rabaey, Anantha Chandrakasan and Borivoje Nikolic, "Digital Integrated Circuits", Second Edition, Prentice Hall of India Private Limited, India.

5. M.Rashid, "Introduction to PSpice",