

Unit I

Overview of VLSI, Moore's Law - 1, 10

Electrical conduction in Silicon -

" Characteristics of MOSFET's Threshold voltage - (19) (24)
check

n -FET current voltage eqⁿ - 199

Square law & linear model of a FET - 202, 212

MOS Capacitances - 215 (Gate source & Gate drain)

junction capacitances - 217

FET RC model - 212

Modelling of small Mosfets -

Scaling Theory - 229

MOSFETs as switches -

Pass characteristics - 26

logic gates using CMOS - 28

Bubble pushing - 50

XOR & XNOR - 53

AOI, OAI - 55

Transmission gates - 55

2-1 MUX - 57

XOR, XNOR, OR - 59

UNIT-II Physical structure of CMOS IC

IC layers - 6-7

Layers used to create MOSFET - 77

Top & side view of MOSFET - 77

CMOS layers - 93

Silicon patterning on layers of SiO_2 &

parallel connect FETs - 97, 98

Layouts of NOT gate - 99

IG gate, non-inverting buffer, NAND₂, NOR₂

Complex logic gate, 4 input AOI - 100, 101, 102,

103, 104, 105

Stick diagram representations - 107

Layouts of Basic structure - 150 to 163

latch-up prevention - 163

UNIT-III : Fabrication of CMOS IC

CMOS process flow - 132

Design rules - 140

Cell Concepts - 167

Logic gates as basic cells -

Creation of cells using basic gates

- 180

DC Characteristics of CMOS

Inverter - 237

Layouts - 243

Inverter Switching

Characteristics - 244 (upto propagation
to 253 delay)

Driving large capacitive loads - 303

Delay minimization in I.C - 306

Unit - IV

Pseudo n-MOS : 342

Tri-state circuits - 344

Clocked CMOS - 346

Charge leakage - 349

Dynamic CMOS logic C's - 353 (precharge, evaluation
charge sharing (353 to 356))

Domino logic - 356

Dual-Rail logic N/w's - 360

CVSL - 361

CP L - 364

The SRAM - 483

6T SRAM - 484 -

(writing, resistor model, multiport) (upto 487)

SRAM arrays - 488

Dynamic RAMS - 498 to 508 (upto refresh)

ROM : NOR based (506

using nmos (507

Floating gate mos fet (508)

Effects of charge storage - 510

E² PROM - 511

Logic gate of PLA - 513, 514.

NOR based design - 515

CMOS PLA - 515

gate arrays - 516.

Unit - V

VLSI Design flow - 372

Structural gate level Modeling - 373

Gate delays - 379

Switch level Modeling - 383

Behavioral & RTL - 392

Timing Controls - 395

B & Non B asri - 395

Conditional stmts - 397

Data flow Modeling & RTL - 399

Comparator & PE barrel shifter - 413 to 424

D latch - 425

D FF - 431

Arithmetic Circuits:

half adder, full adder, AOI, Tg based
- (443 to 450)

Rca - 451

Cla - 454

High speed adders - 467

Multiplexers - 471

Interconnect Modelling - 525

clocking - 571

Testing of VLSI - 613