MANGALORE UNIVERSITY

DEPARTMENT OF ELECTRONICS

MSc Electronics

ELH 502 - LOW POWER VLSI CIRCUIT DESIGN

Unit-I

12 Hours

Low-Power CMOS VLSI: introduction, sources of power dissipation, designing for low Power. Physics of power dissipation in CMOS FET devices: introduction, physics of power Dissipation in MOSFET devices, power dissipation in CMOS, Low power VLSI design Limits.

Power Estimation; Modeling of signals, signal probability calculation, probability technique for signal activity estimation, statistical techniques, estimation of glitching power, sensitivity analysis, power estimation using input vector compaction and dissipation on in Domino CMOS, circuit reliability, high level power estimation, information theory based approaches, estimation of maximum power.

Unit-II

15 Hours

Synthesis for low power; behavioral level transforms, logic level optimization for low power, Circuit level.

Design and test on low voltage CMOS circuits; introduction, circuit design style, leakage current in sub-micrometer transistor, deep sub-micrometer device design issues, key to minimizing SCE, low voltage circuit design techniques, test deep sub-micrometer IC"s with elevated intrinsic leakage, multiple supply voltages.

Unit-III

15 Hours

Low power static RAM architecture; introduction, organization of a static RAM, MOS static RAM memory cell, banked organization of SRAMs, reducing voltage swings on bit lines, Reducing power swing in the write driver and sense amplifier circuits, method for achieving Low core voltages from a single supply. Low energy computing using energy recovery Technique; energy dissipation in transistor channel using an RC model, energy recovery Circuit design, design with partially reversible logic, supply clock generation.

Text Books:
1. "Low-power CMOS VLSI circuit design" by Kaushik Roy and Shart C. Prasad, Wiley-Interscience publication, 2000.

Reference:
1. "CMOS Low Power Digital Design," A. Chandrakasan& R. Brodersen, Kluwer Academic Pubs. 1995.
2. "Low Power Design Methodologies,"J. Rabaey& M. Pedram (Editors), Kluwer Academic Pubs. 1996.