involving pairs of Random variables, Independent Random variables. Complex Random variables, Engg Application.

UNIT - 6

MULTIPLE RANDOM VARIABLES: Joint and conditional PMF, CDF, PDF, EV involving multiple Random variables, Gaussian Random variable in multiple dimension, Engg application, linear prediction.

UNIT - 7

RANDOM PROCESS: Definition and characterization, Mathematical tools for studying Random Processes, Stationary and Ergodic Random processes, Properties of ACF.

UNIT - 8

EXAMPLE PROCESSES: Markov processes, Gaussian Processes, Poisson Processes, Engg application, Computer networks, Telephone networks.

TEXT BOOK:

1. Probability **and random processes: application to Signal processing and communication** - S L Miller and D C Childers: Academic Press / Elsivier 2004

REFERENCE BOOKS:

1. Probability, **Random variables and stochastic processes** - A. Papoullis and S U Pillai: McGraw Hill 2002
2. Probability, **Random variables and Random signal principles** - Peyton Z Peebles: TMH 4th Edition 2007
3. **Probability, random processes and** applications - H Stark and Woods: PHI 2001

LOW POWER VLSI DESIGN

Subject Code	: **10EC664**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT – 1

Introduction, Sources of power dissipation, designing for low power. Physics of power dissipation in MOSFET devices – MIS Structure, Long channel and sub-micron MOSFET, Gate induced Drain leakage.

H.O.D.

UNIT - 2

Power dissipation in CMOS – Short circuit dissipation, dynamic dissipation, Load capacitance. Low power design limits - Principles of low power design, Hierarchy of limits, fundamental limits, Material, device, circuit and system limits.

UNIT – 3&4

SYNTHESIS FOR LOW POWER: Behavioral, Logic and Circuit level approaches, Algorithm level transforms, Power-constrained Least squares optimization for adaptive and non-adaptive filters, Circuit activity driven architectural transformations, voltage scaling, operation reduction and substitution, pre- computation, FSM and Combinational logic, Transistor sizing.

UNIT – 5&6

DESIGN AND TEST OF LOW-VOLTAGE CMOS CIRCUITS: Introduction, Design style, Leakage current in Deep sub-micron transistors, device design issues, minimizing short channel effect, Low voltage design techniques using reverse V_{gs}, steep sub threshold swing and multiple threshold voltages, Testing with elevated intrinsic leakage, multiple supply voltages.

UNIT - 7

LOW ENERGY COMPUTING: Energy dissipation in transistor channel, Energy recovery circuit design, designs with reversible and partially reversible logic, energy recovery in adiabatic logic and SRAM core, Design of peripheral circuits – address decoder, level shifter and I/O Buffer, supply clock generation.

UNIT - 8

SOFTWARE DESIGN FOR LOW POWER: Introduction, sources of power dissipation, power estimation and optimization.

TEXT BOOK:

1. **Low-Power CMOS VLSI Circuit Design**, Kaushik Roy and Sharat C Prasad, John Wiley Pvt. Ltd, 2008.

DATA STRUCTURE USING C++

Subject Code	: **10EC665**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03

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