8. Data structures –Seymour Lipschutz, Schaums Outlines
9. C Programming for Embedded systems, Zurell, Kirk
10. C and the 8051 Programming for Multitasking – Schultz, Thomas W
11. C with assembly language, Steven Holzner, BPB publication
12. C and the 8051: Hardware, Modular Programming and Multitasking Vol i – Schultz, Thomas W
13. Art of C Programming, JONES, ROBIN,STEWART, IAN
14. Kelley A & Pohl, " A Book on C", Addison – Wesley
15. Advanced Linux Programming Mark Mitchell, Jeffrey Oldham, and Alex Samuel, TECHMEDIA

EC539 - VLSI TECHNOLOGY AND DESIGN (Elective I)

L	T	P	To	C
4	-	-	4	4

Course Objectives:

- To learn the basic MOS Circuits
- To learn the MOS Process Technology
- To understand the operation of MOS devices.
- To impart in-depth knowledge about analog and digital CMOS circuits

Course Learning Outcomes:

- Understand the fabrication process of IC technology
- Analysis of the operation of MOS transistor
- Analysis of the physical design process of VLSI design flow
- Analysis of the design rules and layout diagram
- Design of Adders, Multipliers and memories etc
- Making sense of the ASICs
- Getting the idea of design approach

UNIT - I **(8 hours)**

VLSI Fabrication Technology

An overview of wafer fabrication, oxidation, Photo Lithography, Diffusion, Ion implantation, Metallization, Packaging,nMOS process, n well CMOS process, p well CMOS process, Twin-Tub process, Silicon on insulator process, Bi-CMOS process.

UNIT - II **(9 hours)**

Introduction to MOS Technology and Electrical Properties

Overview of VLSI Design Methodology VLSI design process- Basic MOS transistors**-** Enhancement mode transistor operation - Drain current Vs voltage derivation -NMOS inverter- Determination of pull up to pull down ratio for an NMOS inverter-CMOS inverter - DC Characteristics- Bi-CMOS inverter-Latch up in CMOS circuits.

Unit - III **(9 hours)**

Design process

VLSI Design Flow, MOS Layers, Stick diagram, Design rules, Layout generation

Circuit concepts and characterization

Sheet Resistance, Standard unit of capacitance, Delay, Driving large Capacitive Loads, Propagation delay, Wiring Capacitances, Fan-in and fan-out characteristics, Choice of layers, Introduction to scaling.

Unit - IV **(10 hours)**

CMOS Subsystem Design

Introduction, Alternative CMOS Logic structures, Design of Adders, Parity generators, One/Zero Detector, Comparators, Binary Counters, ALU, Multipliers, Shifters, memory elements.

Unit - V **(9 hours)**

Introduction to ASICs –Types, Standard Cell Array, Gate Arrays, Programmable Array Logic- PLAs, CPLDs, FPGAs,

Design Approach- Design capture tools, Design Verification Tools, Synthesis, testing.

TEXTBOOKS :

1. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell," Essentials of VLSI
circuits and systems", PHI, 2005 Edition.
2. Weste and Eshraghian, "Principles of CMOS VLSI Design", Pearson Education, 1999.

REFERENCES :

1. John P. Uyemura, "Chip Design for Submicron VLSI: CMOS Layout & Simulation",Thomson Learning.
2. John .P. Uyemura, JohnWiley, "Introduction to VLSI Circuits and Systems",2003.
3. John M. Rabaey, "Digital Integrated Circuits" PHI, EEE, 1997.
4. Wayne Wolf, "Modern VLSI Design" Pearson Education.

EC541 - NEURAL NETWORKS & FUZZY SYSTEMS (Elective I)

L	T	P	To	C
4	-	-	4	4

Course objectives

- To know the models of brain as a neuron
- To obtain the knowledge of learning strategies and learning rules
- To obtain the knowledge of feed forward and feedback network.
- To obtain the knowledge of logical components etc.,

Course Outcome

- Obtains the knowledge of Neuron model of a brain.
- Understands how different learning strategies and learning rules can be applied to various applications.
- Knows how Fuzzy logic can be useful to solve different problems.

UNIT – I **(9 hours)**

Introduction to Neural Networks: Introduction, Organization of the Brain, Biological and Artificial Neuron Models, Integrate-and-Fire Neuron Model, McCulloch-Pitts Model, Characteristics of ANN, Potential Applications of ANN. Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN -– Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

UNIT – II **(9 hours)**

Single Layer & Multi-layer Feed forward Neural Networks: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications. Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.