Digital Signal Processing

Course Title : Digital Signal Processing Course Code:: EC 321

Total Credits : 04

UNIT I. DFT and FFT
Introduction to DSP system, DFT, Relation between DFT and Z Transform, Properties of DFT, Circular convolution ,IDFT. DIT FFT & DIF FFT algorithm implementation, fast convolution signal, overlap save & overlap-add algorithm segmentation, correlation, circular correlation, IFFT, DFT properties of circular correlation.

UNIT II. FIR Filter Design
Characteristics of FIR filter, properties of FIR filter, digital network for FIR filter, frequency sampling, Fourier series & windowing method, filter design using Kaiser window, Realization of FIR by direct form structures, cascade, parallel form.

UNIT III. IIR Filter Design
Impulse invariant technique, Bilinear transformation Placement of poles & zeros, frequency band transformation, analog filter approximation ,quantization and rounding problems, Effect of finite word length on stability and frequency response, Realization of IIR by direct form structures, cascade & parallel form.

UNIT IV. Adaptive Filter
Introduction to adaptive signal processing, Adaptive direct form FIR filters, Least Mean Square (LMS) algorithm.

UNIT V. DCT and Wavelet Transform
Forward DCT, Inverse DCT, DCT as a orthogonal transformer. Introduction to wavelets, time ,frequency representations, continues time wavelet, Continues wavelet transform (CWT), Inverse CWT,

Properties of CWT, Discrete wavelet transform, STFT, Comparison of Fourier transform & wavelet transform ,Application of wavelets transforms .

UNIT VI. Application of Digital Signal Processing
Mobile communication, Bio-medical Engineering, image processing, Acoustic Noise Canceller, Dynamic range compression, LPC analysis and synthesis, SSB modulation, Radar tracking & implementation, Study of architecture of TMS 320C6XXX processor

Text Books :
1. John G Prokis , “Digital Signal Processing ,Principles, Algorithms and Application”, PHI
2. S.K.Mitra, “Digital Signal Processing”, TMH
3. E. C. Ifleachor and B. W. Jervis, “Digital Signal Processing- A Practical Approach”, Second Edition, Pearson education.
4.Avtar Singh, S. Srinivasan, “Digital Signal Processing Implementation using DSP, Microprocessors with examples from TMS 320C6XXX”, Thomas Publication.

Reference Books :
1. A.V.Oppenheins and R.W. Schalfer , “Discrete Time Signal Processing”, PHI
2. S. Salivahanam, A Vallavaraj, C. Guanapriya, “Digital Signal Processing”,TMH
3. Raghuveer M. Rao and Ajit S. Boperdikar , “Wavelet Transforms – Introduction to theory and applications”, Pearson Education.
4. Smith, “Scientist and Engg. Guide on Digital Signal Processing”

Operating Systems

EC 322 - Operating Systems

UNIT I: Overview of Operating Systems
Abstract view of an operating system, Fundamental principles of OS operations, OS interaction with the computer and user programs, Efficiency, system performance and user service, Multiprogramming System, The Time Sharing System, The Real Time Operating System, Distributed operating system, Operation of OS, Operating system with monolithic structure, Virtual machine operating system, Kernel based operating system, Microkernel based operating system

UNIT II: Processes, Threads and Synchronization
Processes and programs, Implementing processes, Threads, Process

synchronization, Race condition, Critical Section, Synchronization approaches, Classic process, synchronization problems, Semaphores, Monitors. Process Scheduling: Scheduling terminology and concepts, Non preemptive scheduling policies, Preemptive scheduling policies, Long, Medium and short term scheduling.

UNIT III: Memory Management and Deadlock
What is deadlock, Deadlock in resource allocation, Handling Deadlocks: Deadlock, Detection and Resolution, Deadlock prevention, Deadlock avoidance, managing the memory hierarchy, Memory allocation to a process, Heap Management, Contiguous Memory Allocation and Non Contiguous Allocation, Segmentation and Segmentation with paging, Virtual memory basics, Demand paging, and Page replacement policies, controlling memory allocation to a processes.

UNIT IV: File systems and I/O systems
Overview of file processing, Files and file operations, Fundamental file organizations and access methods, Overview of I/O system, I/O hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O request to h/w operation.

UNIT V: Case Study
Linux: Linux History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output, Interposes Communication, Network Structure, Security. Windows 7: History, Design Principles, System Components, Terminal Services and Fast User, Switching, File System, Networking, Programmer Interface.

UNIT VI: Real Time Operating Systems
RTOS, scheduler, objects, scheduler, services, RTOS characteristics. Tasks: Tasks states and scheduling, synchronization, communication , concurrency, deadlocks, Semaphores: definition, operations, Queue: queue states, queue content, use of message queue in communication. Exceptions and interrupts, processing of general exceptions. Memory: Dynamic memory allocation, fixed size memory management, hardware memory
management

Text Books :
1. Operating System Concepts - Abraham Silberschatz, Peter B. Galvin & Grege Gagne
(Wiley)

2. Operating Systems - A Concept Based approach - Dhananjay M Dhamdhere (TMGH).

Reference Books :

1. Unix Concepts and Applications – Sumtabha Das (TMGH).
2) Operating System : Concepts and Design - Milan Milenkovic (TMGH)
3) Operating System with case studies in Unix, Netware and Windows NT - Achyut S.
Godbole (TMGH).

VLSI Design

VLSI Design (EC 324)

UNIT.1 MOS Devices

Introduction to MOS Technology, I – V Characteristics of NMOS and PMOS, Transfer Characteristics Of CMOS Inverter, Detailed analysis of CMOS inverter, Logic realization using nMOS and CMOS circuits, effect of parasitic elements.

UNIT.2 CMOS IC Fabrication and Layout

Basic CMOS Technology: Self aligned CMOS process, N well, P well, Twin tub, Layout of CMOS Inverter, CMOS Layout and Design rules. Silicon on Insulator technology

UNIT.3 Introduction To VHDL

Introduction to VHDL, Elements of VHDL, Modeling styles: Sequential, Behavioral, Structural and data flow modeling, sequential and concurrent statements, Design flow, Data types and data objects in VHDL, lexicals in VHDL, Operators, sequential statements, Comparison of various Hardware Description Languages. Test benches

UNIT.4 Design using VHDL

Designing basic gates, combinational circuit, designing general purpose processor, datapath, ALU, encoder, decoder, comparator, adder, subtractor, multiplexer, de-multiplexer, tri-state drivers,PIPO

UNIT.5 Circuit Design Using CPLD & FPGA

Introduction, study of architecture of CPLDs and FPGAs. Function block architecture, input/output Block and interconnect, switch matrix, FPGA fabric. Study of architecture of Xilinx 9500 series and

Altera MAX 700 series CPLD . Study of architecture of Xilinx Spartan 4000 architecture.

UNIT.6 Design for Testability

Fault model, need of design for testability, path sensitizing, random tests, BIST(built inself test), boundary scan test. Introduction to fault coverage, Testability, Design for testability concept, stuck at Fault Model, stuck Open and Stuck short faults, Boundary Scan check, JTAG technology, TAP controller and TAP controller state diagram, Scan path, Full and partial scan

Text Books :

1) N. Weste and K. Eshranghian, “Principles of CMOS VLSI Design”, Addison Wesley.
2) Douglas Perry, “VHDL”, Tata MC-Graw Hill
3) J Bhasker, “A VHDL Synthesis Primer”, Addison Wesley
4) Angsuman Sarkar, Swapnadip De, Ckandan Kumar Sarkar, “VLSI Design and EDA tools”, Scitech
5) Stephen Brown and Zvonko, “ Vranesic,Fundamaentals of Digital Logic with VHDL design”, Tata McGraw Hill
6) BushnellAgrawal , “Essentials of Electronic Testing for digital memory and mixed signal VLSI circuits”, Kulwar Academic Publisher
7) Charles H. Roth, “Systems design using VHDL”, PWS publishing company

Reference Books :

1) The Programmable Logic data Book. Xilinx data manual
2) John F. Wakerly, “ Digital Design, Principles and Practices”, Pentice Hall, Publication.
3) Amar Mukharjee, “Introduction to nMOS and cMOS VLSI systems design”, Prentice Hall
4) Peter Ashenden, “ The Designer‟s Guide to VHDL”, Harcourt Asia PTE LTD
6) www.xilink.com
7) www.altera.com
8) www.actel.com