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JAWAHRLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA 533003
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
M.TECH-2nd SEMESTER

SPECIALIZATION: DIP

CODE	NAME OF THE SUBJECT	L	P	C	INT	EXT	TOTAL
CORE	1.Image Processing And Pattern Recognition	**4**	**-**	**8**	**40**	**60**	**100**
	2. Detection And Estimation Of Signals	**4**	**-**	**8**	**40**	**60**	**100**
	3.Radar Signal Processing	**4**	**-**	**8**	**40**	**60**	**100**
	4. Image And Video Processing	**4**	**-**	**8**	**40**	**60**	**100**
ELECTIVE-I	Statistical Signal Processing	**4**	**-**	**8**	**40**	**60**	**100**
	Optical Communication And Networks						
	System Modeling & Simulation						
ELECTIVE-II	Wireless Communications And Networks	**4**	**-**	**8**	**40**	**60**	**100**
	Microcomputer System Design						
	DSP Processors And Architectures						
Laboratory	Advanced Signal Processing	**-**	**4**	**4**	**40**	**60**	**100**

(1)IMAGE PROCESSING AND PATTERN RECOGNITION

UNIT I : Introduction :
Fundamental steps of image processing, components of an image processing of system. The image model and image acquisition, sampling and quantization, relationship between pixels, distance functions, scanner.

UNIT II : Transformation and Filtering :
Statistical and spatial operations, Intensity functions transformations, histogram processing, smoothing & sharpening, spatial filters Frequency domain filters, homomorphic filtering, image filtering & restoration. Inverse and weiner filtering, FIR weiner filter, Filtering using image transforms, smoothing splines and interpolation.

UNIT III : Morphology :
Morphological and other area operations, basic morphological operations, opening and closing operations, dilation erosion, Hit or Miss transform, morphological algorithms, extension to grey scale images.

UNIT IV : Segmentation and Edge Detection :
Segmentation and Edge detection region operations, basic edge detection, second order detection, crack edge detection, gradient operators, compass and laplace operators, edge linking and boundary detection, thresholding, regionbased segmentation, segmentation by morphological watersheds.

UNIT V : Image compression:
Types and requirements, statistical compression, spatial compression, contour coding, quantizing compression, image data compression-predictive technique, pixel coding, transfer coding theory, lossy and lossless predictive type coding, Digital Image Water marking.

UNIT VI : Representation and Description :
Chain codes, Polygonal approximation, Signature Boundary Segments, Skeltons, Boundary Descriptors, Regional Descriptors, Relational Descriptors, Principal components for Description, Relational Descriptors

UNIT VII : Pattern Recognition Fundamentals:
Basic Concepts of pattern recognition, Fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model

UNIT VIII : Pattern classification:
Pattern classification by distance function: Measures of similarity, Clustering criteria, K-means algorithm, Pattern classification by likelihood function: Pattern classification as a Statistical decision problem, Bayes classifier for normal patterns.

Text Books :
1. Digital Image Processing, 3/e,, Rafael C. Gonzalez, Richard E. Woods**.**

(2) DETECTION AND ESTIMATION OF SIGNALS

UNIT I

Introduction to Discrete-time signals:- Fourier Transform of a discrete time signal. Amplitude and phase spectrum. Frequency content and sampling rates. Transfer function. Frequency response.

UNIT II

Random – Discrete-time signals:- Review of probability – Random data – Generation of Pseudo-random noise – Filtered signals – Autocorrelation and power spectral density – Sampling band – Limited random signals.

UNIT III

Detection of signals in noise: - Minimum probability of Error Criterion – Neyman – Person criterion for Radar detection of constant and variable – amplitude signals – Matched filters. Optimum formulation – Detection of Random signals – Simple problems thereon with multisampling cases.

UNIT IV

Estimation of signals in noise:- Linear mean squared estimation – Non linear estimates – MLP and ML estimates – Maximum likelihood estimate of parameters of linear system. Simple problems thereon.

UNIT V

Recursive linear mean squared estimation:- Estimation of a signal parameter. Estimation of time-varying signals – Kalman filtering – Filtering signals in noise – Treatment restricted to two variable case only – Simple problems.

Text Books

1. Signal processing: Discrete Spectral analysis, Detection and Estimation, Mischa Schwartz and Leonard Shaw, Mc-Graw Hill Book Company, 1975.

References

1. E.L. Van Trees, Detection, Estimation and Modulation Theory, Wiley, New York, 1968.
2. Shanmugam and Breipohl, 'Detection of signals in noise and estimation', John Wiley &Sons, New York, 1985.
3. Srinath, Rajasekaran & Viswanathan, Introduction to statistical Signal processing with Applications, Prentice Hall of India, New Delhi, 110 001,1989.

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(3) RADAR SIGNAL PROCESSING

UNIT I

Introduction [1] – Radar Block Diagram, Radar Equation, Information Available from Radar Echo. Review of Radar Range Performance [2] – General Radar Range Equation, Radar Detection with Noise Jamming, Beacon and Repeater Equations, Bistatic Radar.

UNIT II

Detection of Radar Signals in Noise - I [3] : Matched Filter Receiver – Impulse Response, Frequency Response Characteristic and its Derivation, Matched Filter and Correlation Function, Correlation Detection and Cross-Correlation Receiver. Efficiency of Non-Matched Filters, Matched Filter for Non-White Noise.

UNIT III

Detection of Radar Signals in Noise - II [3] : Detection Criteria – Neyman-Pearson Observer, Likelihood-Ratio Receiver, Inverse Probability Receiver, Sequential Observer. Detectors –Envelope Detector, Logarithmic Detector, I/Q Detector. Automatic Detection - CFAR Receiver, Cell Averaging CFAR Receiver, CFAR Loss, CFAR Uses in Radar. Radar Signal Management –Schematics, Component Parts, Resources and Constraints.

UNIT IV

Waveform Selection [3, 2] : Radar Ambiguity Function and Ambiguity Diagram – Principles and Properties; Specific Cases – Ideal Case, Single Pulse of Sine Wave, Periodic Pulse Train, Single Linear FM Pulse, Noise like Waveforms. Waveform Design Requirements. Optimum Waveforms for Detection in Clutter, Family of Radar Waveforms.

UNIT V

Pulse Compression in Radar Signals : Introduction, Significance, Types. Linear FM Pulse Compression – Block Diagram, Characteristics, Reduction of Time Sidelobes, Stretch Techniques, Generation and Decoding of FM Waveforms – Block Schematic and Characteristics of Passive System, Digital Compression, SAW Pulse Compression.

UNIT VI

Phase Coding Techniques: Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN), Block Diagram of a Phase Coded CW Radar.

UNIT VII

Poly Phase Codes : Frank Codes, Costas Codes, Non-Linear FM Pulse Compression, DopplerTolerant PC Waveforms – Short Pulse, Linear Period Modulation (LPM/HFM). Sidelobe Reduction for Phase Coded PC Signals.

UNIT VIII

Other Types of PC Waveforms – Basics of Nonlinear Binary Phase Coded Sequences, Complementary Codes, Huffman Codes, Concatenated Barker Codes. Limiting in Pulse Compression, Cross-Correlation Properties, Compatibility. Comparison of Different Pulse Compression Waveforms.

TEXT BOOKS

1) M.I. Skolnik, Radar Handbook, McGraw Hill, 2nd ed., 1991.
2) Fred E. Nathanson, Radar Design Principles – Signal Processing and The Environment, PHI,
2nd ed., 1999.
3) M.I. Skolnik, Introduction to Radar Systems, TMH, 3rd ed., 2001.

REFERENCES

1) Peyton Z. Peebles, Jr., Radar Principles, John Wiley, 2004.
2) R. Nit berg, Radar Signal Processing and Adaptive Systems, Artech House, 1999.
3) F.E. Nathanson, Radar Design Principles, McGraw Hill, 1st ed., 1969.
& Nelson Morgan, 1/e, Wiley

(4) Image and Video Processing

UNIT I

Introduction to Image processing system & Image transforms

Introduction, Image sampling, Quantization, Resolution, Image file formats, Elements of image processing system, Applications of Digital image processing Introduction, Need for transform, image transforms, Fourier transform, 2 D Discrete Fourier transform and its transforms, Importance of phase, Walsh transform, Hadamard transform, Haar Transform, slant transform Discrete cosine transform, KL transform, singular value Decomposition, Radon transform, comparison of different image transforms.

UNIT II

Image Enhancements and Image Restoration

Introduction to image enhancement, Enhancement in spatial domain, enhancement through point Operation, Types of point operation, Histogram manipulation, Linear Gray level transformation, Nonlinear Gray level transformation, Local or neighbourhood operation, Median filter, Image sharpening, Bit plane slicing, Image enhancement in the frequency domain. Introduction to Image restoration, Image degradation, Types of image blur, Classification of image restoration techniques, Image restoration model, Linear and Nonlinear image restoration techniques, Blind deconvolution

UNIT III

Image segmentation and Image compression Introduction to image segmentation, Classification of segmentation techniques, Region approach to image segmentation, clustering techniques, Image segmentation based on thresholding, Edge based segmentation, Edge detection and linking, Hough transform, Active contour

Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Fundamentals of information theory, Run length coding, Shannon – Fano coding, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standard, Wavelet-based image compression

UNIT IV

Colour Image processing

Introduction, Light and colour, colour formation, Human perception of colour, colour model The chromaticity diagram, colour image quantization, Histogram of colour image, colour image filtering, Gamma correction of a colour image, colour image segmentation

UNIT V

Video Formation, Perception, and Representation

Video capture and display, Analog video raster, Analog colour television systems, Digital video

UNIT VI

Video sampling & Video modeling

Basics of Multidimensional Continuous space signals and systems, Discrete space signals and systems**,** Basics of Lattice theory, Sampling over lattices, sampling of video signals, Filtering operations in cameras and display devices, Conversion of signals sampled on Different lattices, Sampling rate conversion of video signals Camera Model, Illumination model, Object model, Scene model, Two dimensional motion models

UNIT VII

Two Dimensional motion estimation

Optical flow, General methodologies, Pixel based motion estimation, Block Matching algorithm, Deformable block matching algorithms, Mesh based motion estimation, Global motion estimation, Region Based motion estimation, Application of motion estimation in video coding

UNIT VIII

Foundation of Video coding

Overview of coding systems, Basic notions in probability and information theory, Information theory for source coding, Binary coding, Scalar Quantization, Vector quantization Block based transform coding and Predictive coding

Text Books:

1. S.Jayaraman, S.Esakkirajan and T.VeeraKumar, "Digital Image processing, Tata Mc Graw Hill publishers, 2009

2. Yao Wang,Jorn Ostermann and Ya Qin Zhang "Video processing and Communications"
Prentice Hall Publishers, 2002, ISBN 0-13-017547-1

Reference Books:

1. R.Gonzalez, R.E.Woods, "Digital Image Processing", 3rd Edition, Pearson Education, India, 2009.

2. John W.Woods, "Multidimensional Signal, Image and Video Processing and Coding"Elsevier Academic Press Publications2006, ISBN-13: 978-0-12– 088516-9 .

STATISTICAL SIGNAL PROCESSING (ELECTIVE-1)

UNIT I

SIGNAL MODELS AND CHARACTERIZATION: Types and properties of statistical models for signals and how they relate to signal processing, Common second-order methods of characterizing signals including autocorrelation, partial correlation, cross-correlation, power spectral density and cross-power spectral density.

UNIT II

SPECTRAL ESTIMATION: Nonparametric methods for estimation of power spectral density, autocorreleation, cross-correlation, transfer functions, and coherence form Finite signal samples.

UNIT III

REVIEW OF SIGNAL PROCESSING: A review on random processes, Areview on filtering random processes, Examples.

UNIT IV

STATISTICAL PARAMETER ESTIMATION: Maximum likehood estimation, maximum a posterior estimation, Cramer-Rao bound.

UNIT V

EIGEN STRUCTURE BASED REQUENCY ESTIMATION: Pisarenko, MUSIC, ESPRIT their application sensor array direction finding.

UNIT VI

SPECTRUM ESTIMATION: Moving average (MA), Auto Regressive (AR), Auto Regressive
Moving Average (ARMA), Various non-parametric approaches.

UNIT VII

WIENER FILTERING: The finite impulse case, causal and non-causal infinite impulse responses cases.

UNIT VIII

ADAPTIVE SIGNAL PROCESSING: Least mean squares adaptation, recursive least squares adaptation, Kalman filtering.

TEXT BOOKS:

1. Steven M.Kay, fundamentals of statistical signal processing: estimation Theory, Pretice-Hall,1993.
2. Monsoon H. Hayes, Statistical digital signal processing and modeling, USA, Wiley,1996.

REFERENCE BOOKS:

Dimitris G.Manolakis, Vinay K. Ingle, and Stephen M. Kogon, Statistical and adaptive signal processing, Artech House, Inc,2005, ISBN 1580536107

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OPTICAL COMMUNICATION AND NETWORKS (ELECTIVE-1)

Unit –I

Overview of optical fiber communications: The evolution of fiber optic systems, elements of an optical fiber transmission link. Advantages of optical fiber communication, applications.

Unit – II

Optical Fibers: structures, wave guiding, Nature of light, Basic optical laws and definitions, optical fiber modes and configurations (Fiber types, Rays and modes, step index and graded index fibers). mode theory of circular waveguides.

Unit – III

Optical sources: LEDs, structures, quantum efficiency, modulation capability, Laser diodes:Laser diodes and threshold conditions, external quantum efficiency resonant frequencies, laser diode structures and radiation pattern, temperature effects, reliability.

Unit – IV

Photo Detectors: Physical principles of photodiodes (pin Photodiode, avalanche, photo diode) comparison of photo detectors, noise in detectors.

Unit – V

Fabrication, cabling and installation: Fabrication, fiber optic cables, Installation- placing the cable.

Unit – VI

Optical Communication Systems: Block diagrams of optical communication systems, direct intensity modulation, digital communication systems, Laser semiconductor transmitter, Generations of optical fiber link, description of 8 Mb/s optical fiber communication link, description of 2.5 Gb/s optical fiber communication link.

Unit – VII

Components of fiber optic Networks: Overview of fiber optic networks, Transreceiver, semiconductors optical amplifiers, couplers/splicers, wavelength division multiplexers and demultiplexers, filters, isolators and optical switches.

Unit – VIII

Fiber Optic Networks: Basic networks, SONET/SDIT, Broad cast and select WDM Networks, wavelength routed networks, optical CDMA.

Text Books:

1. Optical fiber communications – Gerd Keiser, 3 rd Ed. MGH.

2. Fiber Optic Communication Technology – Djafar K. Mynbaev and Lowell L. Scheiner, (Pearson Education Asia)
3. Optoelectronic devices and systems – S.C. Gupta, PHI, 2005.

Reference:

1. Fiber Optics Communications – Harold Kolimbiris (Pearson Education Asia)
2. Optical Fiber Communications and its applications – S.C. Gupta (PHI) 2004.
3. WDM Optical Networks – C. Siva Ram Murthy and Mohan Guru Swamy, PHI.
4. Fiber Optic communications – D.C. Agarwal, S.Chand Publications, 2004.

SYSTEM MODELLING & SIMULATION (ELECTIVE-1)

UNIT I

Basic Simulation Modeling, Systems, Models and Simulation, Discrete Event Simulation, Simulation of Single server queing system, Simulation of Inventory System, Alternative approach to modeling and simulation.

UNIT II

SIMULATION SOFTWARE:

Comparison of simulation packages with Programming Languages, Classification of Software,Desirable Software features, General purpose simulation packages – Arena, Extend and others,Object Oriented Simulation, Examples of application oriented simulation packages.

UNIT III

BUILDING SIMULATION MODELS:

Guidelines for determining levels of model detail, Techniques for increasing model validity and credibility.

UNIT IV

MODELING TIME DRIVEN SYSTEMS:

Modeling input signals, delays, System Integration, Linear Systems, Motion Control models,numerical experimentation.

UNIT V

EXOGENOUS SIGNALS AND EVENTS:

Disturbance signals, state machines, petri nets & analysis, System encapsulation.

UNIT VI

MARKOV PROCESS

Probabilistic systems, Discrete Time Markov processes, Random walks, Poisson processes, the exponential distribution, simulating a poison process, Continuous – Time Markov processes.

UNIT VII

EVEN DRIVEN MODELS:

Simulation diagrams, Queuing theory, simulating queuing systems, Types of Queues, Multiple servers.

UNIT VIII

SYSTEM OPTIMIZATION:

System identification, Searches, Alpha/beta trackers, multidimensional optimization, modeling and simulation methodology.

TEXT BOOKS:

1. System Modeling & Simulation, An introduction – Frank L.Severance, John Wiley & Sons, 2001.
2. Simulation Modeling and Analysis – Averill M.Law, W.David Kelton, TMH, 3rd Edition 2003

REFERENCE BOOKS:
Systems Simulation – Geoffery Gordon, PHI, 1978

WIRELESS COMMUNCIATIONS AND NETWORKS(ELECTIVE-2)

UNIT I

WIRELESS COMMUNICATIONS & SYSTEM FUNDAMENTALS: Introduction to wireless communications systems, examples, comparisons & trends. Cellular concepts-frequency reuse, strategies, interference & system capacity, trucking & grade of service, improving coverage & capacity in cellular systems.

UNIT II

MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION: FDMA, TDMA,SSMA (FHMA/CDMA/Hybrid techniques),SDMA technique(AS applicable to wireless communications).Packet radio access-protocols, CSMA protocols ,reservation protocols ,capture effect in packet radio , capacity of cellular systems .

UNIT III

WIRELESS NETWORKING: Introduction , differences in wireless & fixed telephone networks, traffic routing in wireless networks –circuit switching ,packet switching X.25 protocol.

UNIT IV

Wireless data services – cellular digital packet data(CDPD),advanced radio data information systems ,RAM mobile data (RMD). Common channel signaling (CCS),ISDN-Broad band ISDN & ATM ,Signaling System no .7(SS7)-protocols, network services part, user part, signaling traffic, services & performance.

UNIT V

MOBILE IP AND WIRELESS APPLICATION PROTOCOL: Mobile IP Operation of mobile IP, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol, wireless transaction, Wireless datagram protocol.

UNIT VI

WIRELESS LAN TECHNOLOGY: Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs, IEEE 802 protocol Architecture, IEEE802 architecture and services, 802.11 medium access control, 802.11 physical layer.

UNIT VII

BLUE TOOTH : Overview, Radio specification, Base band specification, Links manager specification, Logical link control and adaptation protocol. Introduction to WLL Technology.

UNIT VIII

MOBILE DATA NETWORKS: Introduction, Data oriented CDPD Network, GPRS and higher data rates, Short messaging service in GSM, Mobile application protocol.

TEXTBOOKS

1. Wireless Communication and Networking – William Stallings, PHI, 2003.
2. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, PHI, 2nd Edn., 2002.
3. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy, Pearson Education, 2002.

REFERENCES

1. Wireless Digital Communications – Kamilo Feher, PHI, 1999.

MICROCOMPUTER SYSTEM DESIGN (ELECTIVE-2)

Unit – I

Overview of microcomputer systems, Historical background, Von Neumann architecture, instruction processing, fetch and execute cycles, evolution of Intel 80x86 family of microprocessors. Architectural advances of Intel XX86 Microprocessors series from 8086 to Pentium and Pentium Pro-Addressing Modes, Instruction sets, Interrupt Processing.

Unit – II

Software model of XX86 processors, Data organization, Memory Organization, Programming with DOS and BIOS function calls.

Unit – III

8086 Processor Architecture

CPU Architecture – Programmer's model, 8086 hardware details – Pinouts and Pin function, Clock generator (8284A), Bus buffering and latching, System bus timing - Processor Read & Write bus cycles, Ready and wait state, Minimum and Maximum mode operations.

Unit – IV

Virtual Memory Management: Virtual memory concept paging, segmentation, paging algorithms, cache memory organization, Associate memory organization.

Unit –V

Memory Interfacing

Basic Concepts, Memory devices – ROM, SRAM, DRAM devices, Memory pin connections, Memory read and write timing diagrams, Address decoding techniques – Random logic (using Logic gates) decoding, block decoding (using 74LS138, 74LS139 decoders), PROM address decoding, PLD programmable decoding (using PLAs & PALs), 8086 processor-Memory interfacing – even and odd
memory banks.

Unit –VI

Basic I/O Interfacing

Basic Concepts, Parallel I/O, Programmed I/O, I/O port address decoding, The 8255A Programmable Peripheral Interface(PPI), Interface examples – Keyboard matrix interface, Printer interface and display interface, The 8254 Programmable Interval Timer (PIT).

Interrupts & Direct Memory Access

Basic concepts, Interrupt driven I/O, Software & Hardware interrupts, Interrupt vectors and vector table, Interrupt processing.

Unit – VII

The 8259A Programmable Interrupt Controller (PIC), Basic DMA operation, The 8237 DMA Controller.

Serial I/O Communication

Basic concepts, Asynchronous & Synchronous communication. Physical communication standard-EIA RS232, Programmable communication interface – Universal Asynchronous Receiver / Transmitter.

Unit – VIII

RISC & CISC Concepts, Super scalar architecture, Pipelining, Branch Prediction, Instruction and data caches, Floating point unit.

TEXT BOOKS

1. Barry B. Brey: The Intel Microprocessors 8086/8088, 80188, 80386, 80486, Pentium-Pro Processor Architecture, Programming & Interfacing (PHI) 4th Edn. 1997.

2. John Uffenbeck: The 8086/8088 family design, Programming & Interfacing, (PHI).
References:
Micro processors and interfacing-Dougles V.Hal.

DSP PROCESSORS AND ARCHITECTURES (ELECTIVE-2)

UNIT I
INTRODUCTION TO DIGITAL SIGNAL PROCESING
Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time invariant systems, Digital filters, Decimation and interpolation, Analysis and Design tool for DSP Systems MATLAB, DSP using MATLAB.

UNIT II
COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS
Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT III
ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES
Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT IV
EXECUTION CONTROL AND PIPELINING
Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

UNIT V
PROGRAMMABLE DIGITAL SIGNAL PROCESSORS
Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT VI
IMPLEMENTATIONS OF BASIC DSP ALGORITHMS
The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

UNIT VII
IMPLEMENTATION OF FFT ALGORITHMS
An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX,Computation of the signal spectrum.

UNIT VIII
INTERFACING MEMORY AND I/O PERIPHERALS TO PROGRAMMABLE DSP DEVICES
Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).
A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

TEXT BOOKS

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000.

REFERENCES

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkata Ramani and M. Bhaskar, TMH, 2004.
2. Digital Signal Processing – Jonatham Stein, John Wiley, 2005.

ADVANCED SIGNAL PROCESSING LABORATORY

The students are required to simulate the following experimental parts on the MATLAB environment by consider the relevant application based examples.

PART-1: Digital Signal Processing

1. Discrete-time Signals and Systems in the time domain.
2. z-Transforms and inverse z-Transforms.
3. The Discrete Fourier Transform properties.
4. FIR Filter Design.
5. IIR Filter Design.
6. Applications in Adaptive Filtering.

PART-2: Image Processing

1. Image Enhancement.
2. Enhancement in Frequency Domain.
3. Image Segmentation.
4. Image Compression.
5. Morphological Operations.
6. Recognition based decision theoretic methods.