

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Course Structure and Syllabi for Pre Ph.D
(For 2017-18 Admitted Batch)
ELECTRONICS & COMMUNICATION ENGINEERING

PART - I

Choose any **one** subject of the following

S.No.	PAPER	PAPER CODE
1.	Digital Data Communications and Networks	17PH04101
2.	Electromagnetics and Microwave Engineering	17PH04102
3.	Micro Electronics	17PH04103
4.	Advanced Signal Processing	17PH04104
5.	Instrumentation and Embedded Systems	17PH04105

PART - II

Choose any **one** subject of the following

S.NO	PAPER	PAPER CODE
1	Broadband Wireless Communications & Networks	17PH04201
2	Spread Spectrum Communications	17PH04202
3	Advanced Computer Networks	17PH04203
4	Microwave Antennas	17PH04204
5	Microwave Integrated Circuits (MIC's)	17PH04205
6	Radar Engineering	17PH04206
7	Digital IC Design	17PH04207
8	Analog IC Design	17PH04208
9	Mixed Signal Design	17PH04209
10	Digital Voice & Picture Communications	17PH04210
11	Stochastic Signal Processing	17PH04211
12	Digital Video Processing	17PH04212
13	Advanced Microcontrollers	17PH04213
14	Intelligent Systems & Signal Processing	17PH04214
15	Advanced DSP Architectures	17PH04215

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04101) DIGITAL DATA COMMUNICATIONS AND NETWORKS

UNIT – I:

Digital Modulation: Introduction, Information Capacity Bits, Bit Rate, Baud and M-ARY Coding, ASK,FSK, PSK, QAM, BPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK, Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.

UNIT – II:

Basic Concepts of Data Communication, Interfaces and Modems: Data Communication., Components, Networks, Distributed Processing, Network Criteria- Applications, Protocols and Standards, Standards Organizations, Regulatory Agencies, Line Configuration – Point – to – point- Multipoint, Topology, Mesh, Star, Tree, Bus, Ring, Hybrids Topologies, Transmission Modes, Simplex, Half duplex – Full Duplex, Categories of Networks – LAN,MAN,WAN and Internetworking, digital Data Transmission – parallel and Serial, DTE-DCE Interface-Data Terminal Equipment , Data Circuit- Terminating Equipment, Standards EIA 232 Interface, other Interface Standards, Modems- Transmission Rates.

UNIT – III:

Error Detection and Correction: types of Errors- Single- Bit Error, CRC (Cyclic Redundancy Check), performance, Checksum, Error Correction- Single-Bit Error Correction, Hamming Code. Switching: Circuit Switching – Space division Switches- Time Division Switches, TDM Bus Space and Time Division Switching Combinations, public Switched Telephone Network, Packet Switching-Datagram Approach-Virtual Circuit Approach, Circuit Switched Connection Versus Virtual Circuit Connection, Message Switching. Multiplexing : Time Division multiplexing (TDM), Synchronous Time Division Multiplexing , digital Hierarchy, Statistical Time Division Multiplexing, Concept of OFDM & its application. Channel allocation methods – TDM, FDM, ALOHA, Carrier sense multiple access protocols, Collision Free protocols – IEEE standard 802 for LANs – Ethernet, Token Bus, token ring – Bridges.

UNIT – IV:

The data Link layer design issues – Error detection and correction – Elementary Data Link Protocols – Sliding Window protocols – Data link layer in HDLC, Internet and ATM. The Transport Layer Elements of transport protocols – addressing establishing a connection, releasing connection, flow control and buffering and crash recovery, END TO END PROTOCOLS –UDP, reliable Byte Stream (TCP) end format, segment format, connection establishment and termination, sliding window revisited, adaptive retransmission, TCP extension, Remote Procedure Call – BLAST, CHAN, SELECT, DCE.

UNIT-V:

Network LAYER Routing Algorithms – Shortest path, flooding, flow based Distance Vector, Link state , Hierarchical, Broadcast routing, congestion Control algorithms- General principles of congestion control, Congestion prevention polices, Choke packets and Load shedding.

REFERENCES:

1. “Data Communication and Computer Networking ” by .A.Forouzan, 3/e, TMH, 2008.
2. “Advanced Electronic Communication Systems” by W.Toprmasi, 5ed., PE12008.
- 3.Computer Networks Andrew Tanenbaum by prentice Hall of India New Delhi – third edition.
4. “Data and Computer Communications” by William Stallings, 8th ed., PHI 2007.
5. “Data Communication and Tele processing Systems” by T.Housely, 2/e, BSP, 2008.
- 6.Computer Networks – A System Approach by o Larry L. Peterson & Bruce S. Davie – Second Edition – Harcourt Asia PTE LTD.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04102) ELECTROMAGNETICS & MICROWAVE ENGINEERING

UNIT- I:

Maxwell equations, faradays law, Gauss laws for electric & magnetic fields, conservation of charge , Amperes law, displacement current, Summary of Maxwells equations, constitutive properties of media, boundary conditions on field vectors, power flow & pointing vector, related problems.

UNIT – II:

Uniform plane waves for different media Incidence (Normal, oblique) of Uniform plane waves on plane boundaries.

Wave guides:

rectangular , Circular & dielectric , Wave guides –their modes, electromagnetic field patterns of different modes in rectangular & circular wave guides.

UNIT – III:

Resonators :

Types of Resonators, field expressions for resonant frequencies in different modes, Applications of resonators.

O-type Tubes :

Klystron amplifiers velocity modulation with space charge forces, gain characteristics, Reflex Klystrons , Traveling wave tubes, Analysis of Traveling wave interaction, helix TWTS, coupled cavity TWTS, efficiency of tubes.

Cross field tubes:

Magnetrons , different types of modes of operation, performance analysis, cross fields amplifiers, M-Type backward wave oscillators, voltage tunable magnetrons, efficiency of tubes.

UNIT – IV:

Solid State Microwave devices:

Construction, Principle operation, characteristics of GUNN diode, PIN diode , IMPATT diode, TRAPATT Low noise Microwave Amplifiers.

UNIT – V:

Microwave components & Measurements:

Principle, characteristics & applications of Two port, Three port and four port microwave components (Reciprocal, Nonreciprocal), scattering of matrix and its characteristics, scattering parameters of microwave components. Measurement of power, frequency, VSWR, Impedance , Q using microwave bench setup.

REFERENCES:

1. Microwave Tubes by A.S.Gilmour , Artech House
2. Introduction to Electromagnetic fields by Clayton R paul, Keith W Whites, Syed A Nasar , Tata Mcgraw hill.
3. Microwave Engineering & its applications by Om. P. Gandhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04103) MICRO ELECTRONICS

UNIT-I:

Analysis of clock sequential N/Ws, sequential parity checker, analysis of signal tracking & timing charts – state tables & graphs

Review of combinational N/W design – design of N/W with limited gating Fan-in. Simulation & testing of logic N/Ws.

Logic families:

Performance analysis of DTL, DCTL, RTL, TTL, ECL logic families

UNIT-II:

Linear Ics:

DC effects & limitations of OP-amps, low frequency model of OP-AMP, input & output impedance, gain, noise, offset voltage & currents. Applications of OP-AMPs.

UNIT-III:

Building blocks for CMOS amplifiers, CMOS Transconductance amplifier, design of single ended telescopic, cascade, folded cascade & two stage amplifier. Frequency compensation scheme. Fundamentals of data converters, next rate A/D converters (Flash interpolating over sampled A/D & D/A converters

UNIT-IV:

Digital Ics:

CMOS open drain & Tri-state outputs. CMOS Transmission gate. Design using TTL 74XX & CMOS 40XX series of code converters, decoders, de-multiplexers, priority encoders, digital arithmetic operations, digital comparators & counters.

UNIT-V:

VLSI:

Building blocks of digital design. Multiplexer, De-multiplexer, encoder, comparator, adder, ALU carry look ahead adder.

FPGA Architectures:

Channel type of FPGAs- Xilinx, Actel, Structured programmable logic, Altera, computational logic arrays, algotronix, VLSI primitives-bench mark

REFERENCES:

1. Operational amplifiers with linear integrated circuits by William D. Stanley LPE Fourth edition
2. Fundamentals of Logic Design By Charles H. Roth ,Jr.,Jaico publications,4Th Ed. 2006
3. The Art of Digital design by Processer & Winkel, Prentice Hall,1994.
4. FPGAs: Old Field & DORF by Prentice Hall.
5. Analog MOS integrated circuits for Signal Processing by R.Gregorian & Temes.
6. Analog VLSI by Mohammed Ismail & Terri Fiez .McGraw-Hill,19994.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04104) ADVANCED SIGNAL PROCESSING

UNIT I

OVERVIEW : Discrete-Time Signals, Discrete-Time Systems, Classification of LTI Discrete-Time Systems. The Frequency Response of LTI Discrete-Time System. Types of Linear-Phase transfer functions, Simple Digital Filters, Complementary Transfer Function, Inverse Systems, System Identification, Digital Two-Pairs, Algebraic Stability Test. All Pass Filters, Tunable IIR Digital Filter, IIR Tapped Cascade Lattice Structures, FIR Cascaded Lattice Structures, Parallel All Pass Realization of IIR Transfer Functions, State Space Structures, Polyphase Structures, Computational Complexity of Digital Filter Structures, Design of IIR Filter using padé approximation, Least Square Design Methods, Design of Computationally Efficient FIR Filters.

UNIT II

DSP ALGORITHMS: Fast DFT algorithms based on Index mapping, Sliding Discrete Fourier Transform, DFT Computation Over a narrow Frequency Band, Split Radix FFT, Linear filtering approach to Computation of DFT using Chirp Z-Transform.

UNIT III

MULTI RATE SIGNAL PROCESSING: Decimation by a factor D , Interpolation by a factor I , Sampling rate conversion by a rational factor I/D , Filter design & Implementation for sampling rate conversion.

UNIT IV

POWER SPECTRAL ESTIMATION: Estimation of spectra from finite duration observation of signals, Non-parametric methods: Bartlett, Welch & Blackmann & Tukey methods.

PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION: Relation between auto correlation & model parameters, Yule-Waker & Burg Methods, MA & ARMA models for power spectrum estimation.

UNIT V

ANALYSIS OF FINITE WORDLENGTH EFFECTS IN FIXED-POINT DSP SYSTEMS: Fixed, Floating Point Arithmetic – ADC quantization noise & signal quality-Finite word length effect in IIR digital Filters – Finite word-length effects in FFT algorithms.

APPLICATIONS OF DIGITAL SIGNAL PROCESSING: Dual Tone Multi-frequency Signal Detection, Spectral Analysis of Sinusoidal Signals, Spectral Analysis of Non stationary Signals, Musical Sound Processing, Over Sampling A/D Converter, Over Sampling D/A Converter, Discrete-Time Analytic Signal Generation.

REFERENCES:

1. Digital Signal Processing by Sanjit K Mitra, Tata MCgraw Hill Publications.
2. Digital Signal Processing Principles, Algorithms, Applications by J G Proakis, D G Manolokis, PHI.
3. Discrete-Time Signal Processing by A V Oppenheim, R W Schaffer, Pearson Education.
4. DSP- A Practical Approach- Emmanuel C Ifeache Barrie. W. Jervis, Pearson Education.
5. Modern spectral Estimation techniques by S. M .Kay, PHI, 1997.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04105) INSTRUMENTATION & EMBEDDED SYSTEMS

UNIT- I:

GENERALISED PERFORMANCE CHARACTERISTICS OF INSTRUMENTS: Functional elements of an instrument, Generalised performance characteristics of instruments - static characteristics, dynamic characteristics, Zero order, first order, second order instruments - step response ramp response and impulse response. Response of general form of instruments to periodic input and to transient input. Experimental determination of measurement system parameters, loading effects under dynamic conditions.

UNIT- II:

TRANSDUCERS FOR MOTION AND DIMENSIONAL MEASUREMENTS: Relative displacement, translation and rotational resistive potentiometers, resistance strain gauges, LVDT, synchros, capacitance pickups. Piezo-electric transducers, electro-optical devices, nozzle-flapper transducers, digital displacement transducers, ultrasonic transducers. Magnetic and photoelectric pulse counting methods, relative acceleration measurements, seismic acceleration pickups, calibration of vibration pickups, gyroscopic sensors.

UNIT- III:

DESIGN OF FOLLOWING CONFIGURATIONS WITH EXAMPLES: Inverting amplifier, non-inverting amplifier, summer/ difference amplifier, practical integrator and differentiator circuits, charge amplifiers and impedance converters, voltage to current and current to voltage converters, Current booster for output stage, logarithmic circuits, precision rectifiers, comparator with and without hysteresis, active filters, analog multipliers and PLLs.

INSTRUMENTATION AMPLIFIERS: Specifications and use of instrumentation amplifiers for signal conditioning circuits using commercial ICs.

UNIT- IV:

BUILDING BLOCKS FOR DIGITAL DESIGN: Multiplexer, Demultiplexer, Decoder, Encoder, Comparator, Adder, ALU, Carry-look-ahead adder.

UNIT- V:

MEMORY MANAGEMENT - Virtual memory concepts, memory management unit.

Differences between 80386 and 80486, Pentium processor architectural enhancements.

MICROCONTROLLERS: Overview of microcontrollers - 8051 family microcontrollers, architecture, instruction set, pin out, programming examples, application examples - implementation of UART, use of parallel ports, ADC/ DAC interface.

DISPLAY SYSTEMS: LCD Flat panel displays, Storage CRT displays, Plasma displays, Projection Systems and their interfacing.

REFERENCES:

1. Operational amplifiers with linear integrated circuits by William D. Stanley LPE Fourth edition
2. Measurement Systems-Application And Design Doebelin by E.O McGraw-Hill Fourth Ed 1990
3. Hand Book Of Operational Amplifiers Circuit Design by DAVID F STOUT and MILTON KAUFMAN
4. Users hand book of D/A and A/D converters by ERHNATEK
5. Electronic Analog and Digital converters by H.SCHMID
6. Intel Microprocessor, Architecture, Programming and Interfacing – 8086/8088, 80186, 80286, 80386 and 80486 by Barry B. Brey, PHI, 1995.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04201) BROADBAND WIRELESS COMMUNICATIONS & NETWORKS

UNIT I

INTRODUCTION TO WIRELESS COMMUNICATIONS SYSTEMS: Evolution, Examples of Wireless Communication systems, Comparison, Second Generation Cellular Networks, WLL, Bluetooth and Personal Area Networks.

UNIT II

MOBILE RADIO PROPAGATION: Large-Scale Path Loss, Introduction to Radio Wave Propagation, Free Space Propagation Model, Propagation Mechanisms, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering.

Small-Scale Fading and Multipath, Impulse Response Model of a Multipath Channel, Small-Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small-Scale Fading, Rayleigh and Ricean Distributions, Statistical Models for Multipath Fading Channels, Theory of Multipath Shape Factors for Small-Scale Fading Wireless Channels.

UNIT III

DIVERSITY TECHNIQUES: Repetition coding and Time Diversity- Frequency and Space Diversity, Receive Diversity- Concept of diversity branches and signal paths- Combining methods- Selective diversity combining - Switched combining- maximal ratio combining- Equal gain combining- performance analysis for Rayleigh fading channels.

DIVERSITY IN DS-SS SYSTEMS: Rake Receiver- Performance analysis. Spread Spectrum Multiple Access, CDMA Systems- Interference Analysis for Broadcast and Multiple Access Channels, Capacity of cellular CDMA networks- Reverse link power control, Hard and Soft hand off strategies.

UNIT IV

CELLULAR COMMUNICATION: Cellular Networks, Multiple Access: FDM/TDM/FDMA/TDMA, Spatial reuse, Co-channel interference Analysis, Hand over Analysis, Erlang Capacity Analysis, Spectral efficiency and Grade of Service- Improving capacity - Cell splitting and sectorization.

CELLULAR WIRELESS COMMUNICATION STANDARDS: GSM specifications and Air Interface, specifications, IS 95 CDMA- 3G systems: UMTS & CDMA 2000 standards and specifications.

UNIT V

SPREAD SPECTRUM AND CDMA: Motivation- Direct sequence spread spectrum- Frequency Hopping systems, Time Hopping., Anti-jamming- Pseudo Random (PN) sequence, Maximal length sequences, Gold sequences, Generation of PN sequences.

FADING CHANNEL CAPACITY: Capacity of Wireless Channels- Capacity of flat and frequency selective fading channels, Multiple Input Multiple output (MIMO) systems- Narrow band multiple antenna system model, Parallel Decomposition of MIMO Channels- Capacity of MIMO Channels.

REFERENCES:

1. "Wireless Communications" by Andrea Goldsmith, Cambridge University press.
2. "Modern Wireless Communications" by Simon Haykin and Michael Moher, Person Education.
3. "Wireless Communication, principles & practice" by T.S. Rappaport, PHI, 2001.
4. "Principles of Mobile Communications" by G.L Stuber 2nd edition, Kluwer Academic Publishers.
5. 'Wireless digital communication' by Kamilo Feher PHI, 1995.
6. "Introduction to Spread Spectrum Communication" by R.L Peterson, R.E. Ziemer and David E. Borth, Pearson Education.
7. "CDMA- Principles of Spread Spectrum" by A.J.Viterbi, Addison Wesley, 1995.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04202) SPREAD SPECTRUM COMMUNICATIONS

UNIT I

PERFORMANCE CHARACTERIZATION OF DIGITAL DATA TRANSMISSION

Detection of binary signals in AWGN - Quadrature multiplexed signaling schemes - Signaling through band limited channels - Equalization of digital data transmission system - Realization imperfections - Degradations in performance. Communication in the presence of pulse noise jamming - Low probability detection scheme - Direct Sequence Spread Spectrum (DSSS) and Frequency Hop Spread Spectrum Systems and examples of Spread Spectrum Systems.

UNIT II

SPREAD SPECTRUM SYSTEMS

Direct sequence spread spectrum methods employing BPSK, QPSK and MSK - Frequency Hop spread spectrum methods - Coherent slow frequency Hop technique - Non coherent slow and fast frequency Hop spread spectrum techniques - Hybrid DS/FH spread spectrum - Complex envelope representation of spread spectrum systems.

UNIT III

BINARY SHIFT REGISTER SEQUENCES FOR SPREAD SPECTRUM SYSTEMS

Definition - PN sequence generator fundamentals - Maximal length sequences - Properties, Power spectrum and Polynomial tables for maximal length sequences- Gold codes - Rapid Acquisition systems - Non-linear code generators.

UNIT IV

SYNCHRONIZATION OF SPREAD SPECTRUM SYSTEMS

Optimal tracking of wideband signals - Early-late tracking loops - Code tracking loops for FHSS - Optimum synchronization techniques - Multiple dwell and sequential detectors - Synchronization using a matched filter - Synchronization by estimating the received spreading code.

UNIT V

PERFORMANCE OF SPREAD SPECTRUM SYSTEM

SS Systems communications models - Performance without coding under AWGN and different jamming environments - spread spectrum systems performances with forward error correction -Block coding - Convolutional coding and specific error correcting codes - Inter leaving - Random coding bounds.

REFERENCES:

1. Ziemer R E and Peterson R L, "Digital Communication and Spread Spectrum Systems", Macmillan Publishing Co., 1985.
2. Dixon R C, "Spread Spectrum Systems", Wiley Interscience, 1976.
3. Holms J K, "Coherent Spread Spectrum Systems", Wiley Interscience, 1982

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04203) ADVANCED COMPUTER NETWORKS

UNIT I

Review Computer Networks and the Internet: What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet - **Foundation of Networking Protocols:** 5-layer TCP/IP Model, 7-layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM -Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.

UNIT II

The Link Layer and Local Area Networks: Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques,- Multiple Access Protocols, Link Layer Addressing, Ethernet, Interconnections: Hubs and Switches, PPP: The Point-to-Point Protocol, Link Visualization - **Routing and Internetworking:** Network-Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intra-domain Routing Protocols, Inter-domain Routing Protocols, Congestion Control at Network Layer

UNIT III

Logical Addressing: IPv4 Addresses, IPv6 Addresses - Internet Protocol: Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 - Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intra-domain Multicast Protocols, Inter-domain Multicast Protocols, Node-Level Multicast algorithms - **Transport and End-to-End Protocols:** Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control - Application Layer: Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, Building a Simple Web Server

UNIT IV

Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies. IEEE802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) - **Optical Networks and WDM Systems:** Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks, Case Study: An All-Optical Switch

UNIT V

VPNs, Tunneling and Overlay Networks: Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks-VoIP and Multimedia Networking: Overview of IP Telephony, VoIP Signaling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control Transmission Protocol - **Mobile Ad-Hoc Networks:** Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks - **Wireless Sensor Networks:** Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

REFERENCES:

1. Computer Networking: A Top-Down Approach Featuring the Internet, James E Kuro.se, Keith W. Ross, Third Edition, Pearson Education, 2007
2. Computer and Communication Networks, Nader F. Mir, Pearson Education. 2007
3. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill, 2007
4. An Engineering Approach to Computer Networking ,S.Keshav. Pearson Education.
5. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04204) MICROWAVE ANTENNAS

UNIT-I:

Antenna Parameters: Radiation Patterns, Radiation Power Density, Radiation Intensity, Gain, Antenna Efficiency, Bandwidth, Polarization, Input Impedance, Antenna Radiation Efficiency, Antenna as an Aperture, Directivity and maximum Aperture, Friis Transmission Equation, Antenna Temperature.

UNIT-II:

Reflector Antennas: Plane Reflector, Corner Reflector, 90° Corner Reflector, Other Corner Reflectors, Parabolic Reflector, Front-Fed Parabolic Reflector, Cassegrain Reflectors, Lens Antennas, Lenses with $n > 1$, Lenses with $n < 1$, Lenses with Variable Index of Refraction.

UNIT-III:

Antenna Arrays: Introduction, Two Element Array, N-Element Linear Array- Uniform amplitude and Spacing, Broadside Array, Ordinary End-Fire Array, Phased Array, Hansen-Woodyard End-Fire Array, N-Element Linear Array- Directivity, Nonuniform Amplitude, Binomial Array-Design equations.

UNIT-IV:

Microstrip Radiators: Definition of microstrip antenna, advantages and disadvantages of microstrip antennas, applications, Radiation mechanism and Radiation fields of microstrip antennas, excitation techniques.

UNIT-V:

Rectangular microstrip patch antennas: Introduction, Analysis of Rectangular patch radiators, The vector potential approach, Dyadic Green's Function Techniques, the cavity model, Model Expansion Model, the transmission line model, Bandwidth Enhancement Techniques.

REFERENCES:

1. Antennas by J.D. Kraus MC Graw-Hill, ISE, 1988.
2. Antenna theory analysis and Design by Constantine A. Balanis, John Wiley.
3. Microstrip antennas by J.J. Bahl and Bhartia, Artech House, 1982.
4. Microwave Antenna – Theory and Design by Samuel Silver, IEE Press, London 1984.
5. Microstrip Antenna – Theory and Design by James J. Hall, P.S. Wood, 1981.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04205) MICROWAVE INTEGRATED CIRCUITS

Unit-I:

Introduction to Microwave circuit concepts: one port junction, terminal voltages & currents in multi port junctions, Poynting's Energy Theorem, Normalized waves and scattering matrix. Properties of [S] matrix.

Unit-II:

Relation between [S], [Z] and [Y] parameters, Wave amplitude transmission matrix [A], relation between [A] and [S], [S] matrix of magic T, E and H plane Tees, directional coupler, Application of Hybrid junction and magic tee.

Unit-III:

MIC technology – Thick film & thin film technology, Hybrid MICs. Lumped elements for MIC's design & fabrication of lumped elements, circuits using lumped elements.

Unit-IV:

STRIP LINES:

Analysis of strip lines, Characteristic parameters of strip lines , Impedance transformers.

MICRO STRIP LINES: Analysis of Micro strip lines, method of conformal transformation, characteristic parameters of micro strip lines, micro strip circuit design, lumped constant micro strip circuits. Design of Micro-strip circuits - high power & low power circuits.

Unit-V:

BASIC CONCEPTS OF RF DESIGN: Non-linearity and time variance ISI, random process and noise, sensitivity, dynamic range, passive impedance transformation.

REFERENCES:

1. Microwave Circuits by Altman, JL., D. Van Nostrand Co., Inc., 1964.
2. Microwave Integrated Circuits by D. Van Nostrand Co. Inc.
3. Microwave Integrated Circuits by K.G. Gupta & Amarjit Singh.
4. Advances in Microwave by Leo young.
5. The design of CMOS radio frequency integrated circuits by Thomas H.Lee, Cambridge university press

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04206) RADAR ENGINEERING

UNIT –I

INTRODUCTION: basic radar equation, range delay, velocity delay, Doppler effect, accuracy, resolution and ambiguity .Tradeoffs and penalties in waveform design .Significance of matched filter in radar signal analysis: complex representation of band-pass signal, matched filter response to Doppler shifted signal.

AMBIGUITY FUNCTION: main properties of ambiguity function, cuts through ambiguity function, periodic ambiguity functions .Basic radar signals: constant frequency pulse, linear frequency modulated pulse, Costas frequency modulated pulse, nonlinear frequency modulation.

UNIT –II

PHASE CODED PULSE: Barker code, chirp-like phase code, asymptotically perfect codes, Huffman code, and bandwidth considerations in phase-coded signals. Diverse pulse repetition interval (PRI) pulse trains: introduction to moving target indication (MTI) radar, blind speed, MTI radar performance analysis, optimal MTI weights, diversifying the PRI.

UNIT- III

MULTI CARRIER PHASE CODED SIGNAL IN RADAR SIGNALS: Bistatic radar: advantages of a bistatic configuration, bistatic RCS, bistatic range-ambiguity function, multistatic radar configuration. Synthetic aperture radar (SAR): SAR principle, k-space understanding of SAR, different compensation techniques, sparse SAR, nonlinear SAR, apodization.

UNIT- IV

DETECTION AND RECOGNITION USING RADAR: detection and recognition using 1-D range profile, detection and recognition using SAR image. Space time adaptive processing (STAP): understanding STAP, uses of STAP, bistatic STAP .Civilian uses of radar: space based SAR, segmentation of SAR images from satellite.

Radio direction finding and radio ranges, the loop antenna, The goniometer, errors in direction finding the LF/MF four-course radio range, VHF-VOR, VOR receiving equipment.

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 schematick and characteristics of passive system, digital compression SAW pulse compression

REFERENCES:

1. Radar Signals by N. Levanon, and E. Mozeson, Wiley-Interscience, 2004.
2. Radar Principles by P. Z. Peebles, John Wiley, 2004.
3. Introduction to Radar Systems by M. I. Skolnik, Tata McGraw Hill, 2001.
4. Radar System Analysis and Modeling by D. K. Barton Artech House, 2005
5. IEEE standards on radar related areas by IEEE Explorer.
6. Introduction to Radar Systems by “M.I.Skolmik”, 2nd edition – TMH 1980.
7. Elements on Electronic Navigation by “N.S.Nagaraja”, 2nd edition - TMH 1996.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04207) DIGITAL IC DESIGN

UNIT-I

MOS Design Pseudo NMOS Logic: Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II

Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III

Sequential MOS Logic Circuits: Behavior of bi-stable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV

Dynamic Logic Circuits: Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT-V

Semiconductor Memories: Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash

REFERENCES:

1. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.
2. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.
3. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011
4. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, AnanthaChandrakasan, BorivojeNikolic, 2nd Ed., PHI.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04208) ANLOG IC DESIGN

UNIT –I

MOS Devices and Modeling: The MOS Transistor, Passive Components-Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

UNIT –II

Analog CMOS Sub-Circuits: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage REFERENCE BOOKS, Band gap Reference.

UNIT –III

CMOS Amplifiers: Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures, Mismatch-offset cancellation techniques, Reduction of Noise by offset cancellation techniques, Alternative definition of CMRR.

UNIT –IV

CMOS Operational Amplifiers: Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

UNIT –V

Comparators: Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.

REFERENCES:

1. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition.
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
3. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn, 2013.
4. CMOS: Circuit Design, Layout and Simulation- Baker, Li and Boyce,
5. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition, 2010.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04209) MIXED SIGNAL DESIGN

UNIT-I

Switched Capacitor Circuits Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, bi-quad filters.

UNIT-II

Phased Lock Loop (PLL) Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non-idealities, Jitter in PLLs, Delay locked loops, applications.

UNIT-III

Data Converter Fundamentals DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters

UNIT-IV

Nyquist Rate A/D Converters Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

UNIT-V

Oversampling Converters Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multi-bit quantizers, Delta sigma D/A

REFERENCES:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
3. Analog Integrated Circuit Design- David A. Johns, Ken Martin, Wiley Student Edition, 2013
4. CMOS Integrated Analog-to-Digital and Digital-to-Analog converters- Rudy Van De Plassche, Kluwer Academic Publishers, 2003
5. Understanding Delta-Sigma Data converters-Richard Schreier, Wiley Interscience, 2005.
6. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04210) DIGITAL VOICE AND PICTURE COMMUNICATION

UNIT-I

Digital speech communication; Digital TV communication; Characteristics of speech signals; Characteristics of picture signals; Subjective and objective testing; Bit rates in speech and picture communication CCITT recommendations for speech digitization;

Introduction, Speech Production Model, Speech Coding : Objectives and Requirements, Quantizers for Speech Signal, Mew - Law and Optimum Quantizer, Adaptive Quantizer, Differential Quantization,

UNIT-II

LDM and ADM, Differential PCM and Adaptive Prediction, Linear Prediction of Speech, Computational Aspects of LPC parameters, Cholesky Decomposition, Lattice Formulation of LPC Coefficient,

UNIT-III

Linear Predictive Synthesizer, LPC Vocoder, Introduction to Image and Video Coding Lossy Image Compression : DCT DCT Quantization and Limitations, DCT Quantization and Limitations Theory of Wavelets

UNIT-IV

Discrete Wavelet Transforms DWT on the Images and its Encoding Embedded Zero Tree Wavelet Encoding Video Coding : Basic Building Blocks Motion Estimate Techniques Fast Motion Estimation Techniques. HDTV, Low resolution TV and Videoconferencing requirements; Time domain waveform coding of speech-PCM, DPCM,ADPCM, DM and sub-band coding; Frequency domain waveform coding of speech-LTC, ATC; Parameter coding of speech-channel, format and LPC vocoders;

UNIT-V

Coding of monochrome and color video signals-Transform and Adaptive transform coding; Sub-band coding; Vector quantization; Inter - frame and Hybrid coding; Delayed decision and run length coding; Effects of transmission errors; Audio and Video conferencing; Video telephone. Video Coding Standards AC -3 Decoder MPEG - 1 Audio Coding Introduction to VoIP, VoIP Signaling : H.323 Protocol H.323 Call Controls and Enhancements Interworking with PSTN Limitations and Solution, Multiplexing Schemes H.323:Multiplexing:Header Compression and BW ISDN Video Conferencing Video Conferencing : SIP Protocol,4G Multimedia Conferencing .

REFERENCES:

1. L.R. Rabiner, Digital Processing of Speech Signals
2. Kondozi, Digital Speech: Coding for low bit rate communication systems; , John Wiley publication
3. K.R. Rao, Z. S. Bojkovic, D. A. Milovanovic, Introduction to Multimedia Communications Applications, Middleware, Networking, Wiley publication
4. Philip A. Chou , Mihaela van der Schaar, Multimedia over IP and wireless networks compression, networking, and systems, Elsevier Academic Press
5. H.R. Wu and K.R. Rao, Digital Video Image Quality and Perceptual Coding, CRC Press, Taylor and Francis Group
6. Jerry Whitaker, "Mastering Digital Television: The Complete Guide to the DTV Conversion", Mc Graw Hill

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04211) STOCHASTIC SIGNAL PROCESSING

UNIT-I

Introduction to Stochastic Processes: Definition, properties, stationary and non-stationary processes. **Characteristics of Stochastic Processes & Wiener Filtering:** Partial characterization of a discrete-time stochastic process. Properties of correlation matrix Eigenvalue problem, Properties of eigenvalues & eigenvectors. Power spectral density, Auto regressive models, other stationary stochastic models, Selecting the order of the model, Statement of optimum filtering problem, solution to Wiener half equation, Error performance surface, Normal equation, Principle of orthogonality Minimum mean squared error, Canonical form of error – performance surface.

UNIT II

Linear Prediction:

Linear prediction, forward & backward predictions, prediction-error filter, Levinson-durbin recursion, Relation among the auto correlation function & the reflection coefficients, Transfer function of prediction-error filter, Whitening property, Eigenvector representations of lattice predictors and their correlation properties, prediction errors viewed as a Gram – Schmidt Orthogonalization process, Relation between backward prediction – error vector, positive definiteness of the correlation – matrix of the tap inputs and the minimum – phase property of the prediction error filter, Burg formula.

UNIT - III

Method of Estimation by LMS Algorithm:

Structure of adaptive filter, Method of steepest descent, Stability of steepest – descent algorithm, mean squared error, Average tap weight vector and error correlation matrix, Average mean – squared error, Properties of transient behavior of it, Summary of LMS Algorithm, LMS Algorithm in a non-stationary environment, Digital implementation of LMS Algorithm.

UNIT -IV

Kalman Filter Theory and its Applications:

Recursive minimum mean square estimation for scalar random variables, Statement of Kalman filtering problem, Innovation process, Estimation of state using the innovations process, Filtering methods of LS.

UNIT -V

Method of Least Squares:

Statement of linear least – squares estimation problem, Windowing of the data, Principle of orthogonality, Uniqueness theorem, Minimum sum of error squares, Reformulation of deterministic normal equation in terms of correlation functions, Properties of least squares estimates, Linear prediction problem Singular – value decomposition, Estimation of sine waves in the presence of additive noise.

REFERENCES:

1. Adaptive filter theory by Simon Haykin
2. Probability, Random Variables and Stochastic processes - by A.Papulis(TMh)
3. Probability, Random Variables and Stochastic processes - by Peebles

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04212) DIGITAL VIDEO PROCESSING

UNIT – I

IMAGE REPRESENTATION AND MODELING: Monochrome and color representation, color-ordinate systems Monochrome and Color vision Model, sampling and Quantization – Rectangular and Nonrectangular Grid sampling and interlacing. Optimum Liloyd-Max quantizer, Compandor design, Practical limitations. Two dimensional Orthogonal Transforms- DFT, Hadamard Haar, Slant, DCT and KL Transforms.

UNIT-II

IMAGE ENHANCEMENT AND RESTORATION:

SUD techniques Image Enhancement, Point operation, Histogram Modeling, Spatial operations, Transform cooperations, Image Restoration-Increase and Weian Filtering, Filtering using transforms, Least square and constrained least square restoration. Maximum Entropy Restoration.

UNIT - III

IMAGE ANALYSIS AND VISION : Spatial features extraction, Transform, Features, Edge detection, Boundary detection, region representation, Moment Refresevation, Structures sgape, Texture, Scene Matching, Image segmentation and classification techniques.

UNIT – IV

IMAGE DATA COMPRESSION: Huffman coding, Pixel coding, Entropy coding, Run-length coding, Bit plane coding. Predictive coding. Delta and DPCM techniques, Transform coding –zonal versus threshold coding. Adaptive transform coding. Vector quantization for compression.

UNIT V

VIDEO PROCESSING: Representation of Digital Video, Spatio-temporal sampling, Motion Estimation. Video Filtering, Video Compression, Video coding standards.

REFERENCES:

1. Digital Image Processing by Woods R. C. Gonzalez, R. E. Pearson Education. 2nd edition,2002
2. Digital image processing by W. K. Pratt Prentice Hall, 1989
3. Digital image processing by A. Rosenfold and A. C. Kak, Vols. 1 and 2, Prentice Hall, 1986.
4. Digital Video Processing by A. M. Tekalp, Prentice-Hall, 1995
5. Handbook of Image & Video Processing by A. Bovik, Academic Press, 2000

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04213) ADVANCED MICROCONTROLLERS

UNIT I

INTEL 8051: Architecture of 8051, Memory Organization, Register banks, Bit addressing media, SFR area, addressing modes, Instruction set, Programming examples.

8051 Interrupt structure, Timer modules, Serial Features, Port structure, Power saving modes.

UNIT II

MOTOROLA 68HC11: Controllers features, Different modes of operation and memory map, Functions of I/O ports in single chip and expanded multiplexed mode, Timer system.

Input capture, Output compare and pulsed accumulator features of 68HC11, Serial peripherals, Serial Communication interface, Analog to digital conversion features.

UNIT III

PIC MICROCONTROLLERS: Program memory, CPU registers, Register file structure, Block diagram of PIC 16C74, I/O ports. Timer 0,1 and 2 features, Interrupt logic, serial peripheral interface, I²C bus, ADC, UART, PIC family parts.

UNIT IV

MICROCONTROLLER INTERFACING: 8051, 68HC11, PIC-16C6X and ATMEL External Memory Interfacing – Memory Management Unit, Instruction and data cache, memory controller. On Chip Counters, Timers, Serial I/O, Interrupts and their use. PWM, Watch dog, ISP, IAP features.

UNIT V

INTERRUPT SYNCHRONIZATION: Interrupt vectors & priority, external interrupt design. Serial I/O Devices RS232 Specifications, RS422/Apple Talk/ RS 423/RS435 & other communication protocols. Serial Communication Controller.

CASE STUDIES: Design of Embedded Systems using the micro controller 8051/ARM6TDMI, for applications in the area of Communications, Automotives, industrial control.

REFERENCES:

1. “The 8051 Micro Controller & Embedded Systems” by M.A. Mazadi & J.G. Mazidi, Pearson Education. Asia (2000).
2. Designing with PIC Micro Controllers by John B. Peatman, Pearson Education.
3. Embedded Microcomputer systems by Jonathan W. Valvano, Real Time Interfacing, Brookes/Cole, Thomas learning, 1999.
4. 8-bit Embedded Controllers by INTEL Corporation 1990.
- 5 “Designing with PIC Microcontrollers” by John B. Peatman, Pearson Education Inc, India, 2005.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04214) INTELLIGENT SYSTEMS AND SIGNAL PROCESSING

UNIT – I

Concept of Artificial Intelligence. Areas of Artificial Intelligence. Foundations of Fuzzy Logic. Foundations of Fuzzy Control. Types of Fuzzy Controllers. Fuzzy Logic Toolbox. Creation of Fuzzy Inference System with Fuzzy Logic Toolbox.

UNIT – II

Creation of Fuzzy Controllers. Weather-compensated Temperature Control of a Heat Exchanger using Fuzzy Controllers. Neural Networks. Neuron Model. Perceptron Model. Modelling of Basic Logic Functions using the Perceptron. Fuzzy expert systems, fuzzy sets and their operations, linguistic variable, fuzzy rules, fuzzy inference, defuzzification.

UNIT –III

Feed forward Neural Network with Back propagation Error. Approximation of Functions by a Two-layer Feed forward Neural Network. Character Recognition using Two-layer Feed forward Neural Network. Creation of a Neural Network with Neural Network Toolbox.

UNIT – IV

Signal Processing. Introduction, History and Background, Applications, DSP Overview, Digital to Analog Converter (DAC), Analog to Digital Converter (ADC), Quantization, Signals and Systems, Discrete-Time Signals, Important Discrete-time Signals, Linear Shift-Invariant (LSI) System, System Theory Basics, Laplace, Fourier, Z-Transform, Laplace Transform, Fourier Transform, Z-Transform, DSP Fundamentals, Discrete Fourier Series, Discrete-Time Fourier Transform(DTFT), Discrete Fourier Transform.

UNIT – V

Sampling, Introduction, The Sampling Theorem, Aliasing, Sample and Hold, Zero-order Hold, Decimation, Interpolation, Decimation & Interpolation, Digital Filtering, Structures for Digital Filters, Filter Types: IIR and FIR, Design of Digital Filters, Design of IIR Filters, Design of FIR Filters

REFERENCES:

1. M. Negnevitsky, Artificial Intelligence – A guide to intelligent systems Addison-Wesley, 2005.
2. Ukil, A. Intelligent Systems and Signal Processing in Power Engineering, Springer, 2007.
3. S Hayking, Neural Networks, Prentice Hall, 2nd edition.
4. Artificial Intelligence: Structures and Strategies for Complex Problem-Solving, 5th edition, Addison-Wesley, 2005.
5. Proakis, John G., and Dimitris K. Manolakis. *Digital Signal Processing*. 4th ed. Upper Saddle River, NJ: Prentice Hall, 2006.
6. Oppenheim, Alan V., Ronald W. Schaffer, and John R. Buck. *Discrete-Time Signal Processing*. 2nd ed. Upper Saddle River, NJ: Prentice Hall, 1999.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH04215) ADVANCED DSP ARCHITECTURES

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, 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 II

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. Execution Control And Pipelining: Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Programming models.

UNIT III

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 IV

IMPLEMENTATION OF BASIC DSP & FFT ALGORITHMS: The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing. 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 V

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.

REFERENCES:

1. Digital Signal Processing by Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. DSP Processor Fundamentals, Architectures & Features by Lapsley et al. S. Chand & Co, 2000.
3. Digital Signal Processors, Architecture, Programming and Applications by B.Venkata Ramani and M. Bhaskar, TMH, 2004.
4. Digital Signal Processing by Jonatham Stein, John Wiley, 2005.