



# SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

Sree Sainath Nagar, Tirupati – 517 102

## Department of Electronics and Communication Engineering

### Course Structure for M. Tech. (DECS)

#### M. Tech. – I Semester

Subject Code	Name of the Subject	L+T	P	Internal Marks	External Marks	Total Marks	C
10MT13801	Advanced Digital Signal Processing	4	-	40	60	100	4
10MT13802	Digital Communication Techniques	4	-	40	60	100	4
10MT13803	Digital System Design	4	-	40	60	100	4
10MT13804	Embedded Systems	4	-	40	60	100	4
10MT13805	Microcomputer System Design	4	-	40	60	100	4
<b>Elective-I</b>							
10MT13806	Advanced Computer Architectures	4	-	40	60	100	4
10MT13807	DSP Processors and Architectures						
10MT13808	Low Power VLSI Design						
10MT13809	Digital Systems Design Lab.	-	4	25	50	75	2
<b>Total</b>		<b>24</b>	<b>4</b>	<b>265</b>	<b>410</b>	<b>675</b>	<b>26</b>

#### M. Tech. – II Semester

Subject Code	Name of the Subject	L+T	P	Internal Marks	External Marks	Total Marks	C
10MT23801	Adaptive Signal Processing	4	-	40	60	100	4
10MT23802	Coding Theory and Techniques	4	-	40	60	100	4
10MT23803	Detection and Estimation of Signals	4	-	40	60	100	4
10MT23804	High Performance Networks	4	-	40	60	100	4
10MT23805	Wireless Communications	4	-	40	60	100	4
<b>Elective-II</b>							
10MT23806	Compression Techniques	4	-	40	60	100	4
10MT23807	Image Processing						
10MT23808	Optical Communications						
10MT23809	Industrial Visit/Mini-Project/Seminar	-	-	50	-	50	2
10MT23810	Communications and Signal Processing Lab.	-	4	25	50	75	2
<b>Total</b>		<b>24</b>	<b>4</b>	<b>315</b>	<b>410</b>	<b>725</b>	<b>28</b>

#### M. Tech. – III Semester

Subject Code	Name of the Subject	L+T	P	Internal Marks	External Marks	Total Marks	C
10MT33801	Project Work – Phase I	-	-	50	-	50	4
<b>Total</b>				<b>50</b>	<b>-</b>	<b>50</b>	<b>4</b>

#### M. Tech. – IV Semester

Subject Code	Name of the Subject	L+T	P	Internal Marks	External Marks	Total Marks	C
10MT43801	Project Work – Phase II	-	-	50	100	150	12
<b>Total</b>				<b>50</b>	<b>100</b>	<b>150</b>	<b>12</b>

Total Marks : 1600

Total Credits: 70

# **SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)**

**M. Tech. (DECS)  
I SEMESTER**

**L T P C  
4 - - 4**

## **(10MT13801) ADVANCED DIGITAL SIGNAL PROCESSING**

### **UNIT I**

**OVERVIEW:** Discrete-Time Signals, Sequences and sequence Representation, Discrete-Time Systems, Time-Domain Characterization and Classification of LTI Discrete-Time Systems. The Continuous-Time Fourier Transform, The discrete-Time Fourier Transform, energy Density Spectrum of a Discrete-Time Sequence, Band-Limited Discrete-Time signals, The Frequency Response of LTI Discrete-Time System.

### **UNIT II**

**LTI DISCRETE-TIME SYSTEMS IN THE TRANSFORM DOMAIN:** Types of Linear-Phase transfer functions, Simple Digital Filters, Complementary Transfer Function, Inverse Systems, System Identification, Digital Two-Pairs, Algebraic Stability Test.

### **UNIT III**

**DIGITAL FILTER STRUCTURE AND DESIGN:** 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, Digital Sine-Cosine Generator, Computational Complexity of Digital Filter Structures, Design of IIR Filter using padé' approximation, Least Square Design Methods, Design of Computationally Efficient FIR Filters.

### **UNIT IV**

**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 V**

**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 VI**

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

### **UNIT VII**

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

## **UNIT VIII**

**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.

### **TEXTBOOKS:**

1. Sanjit K Mitra, "Digital Signal Processing", Tata MCgraw Hill Publications.
2. J G Proakis, D G Manolokis, "Digital Signal Processing Principles, Algorithms and Applications", PHI.

### **REFERENCES:**

1. A V Oppenheim, R W Schaffer, "Discrete-Time Signal Processing", Pearson Education.
2. Emmanuel C Ifeachor Barrie. W. Jervis, "DSP-A Practical Approach", Pearson Education.
3. S. M .Kay, "Modern spectral Estimation techniques", PHI, 1997.

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## **(10MT13802) DIGITAL COMMUNICATION TECHNIQUES**

### **UNIT I**

**RIVIEW OF RANDOM VARIABLES AND PROCESSES:** Random Variables, Probability Densities, Statistical Averages of Random Variables, Some Useful Distributions, Chebyshev Inequality, Central Limit Theorem, Stochastic Processes, Discrete Time Stochastic Signals and Systems.

### **UNIT II**

**CHARACTERIZATION OF COMMUNICATION SIGNALS AND SYSTEMS:** Representation of Band Pass Signals and Systems, Signal Space Representation, Representation of digitally modulated signals, Spectral Characteristics of Digitally Modulated signals.

### **UNIT III**

**DIGITAL MODULATION TECHNIQUES:** Factors that Influence digital modulation techniques, Linear Modulation Techniques – BPSK, DPSK, QPSK, OQPSK,  $\pi/4$  QPSK, Constant envelope Modulation techniques - MSK, GMSK, Linear and constant envelope modulation techniques – M-ary PSK, M-ary QAM.

### **UNIT IV**

**COMMUNICATION OVER ADDITIVE GAUSSIAN NOISE CHANNELS:** Optimum receiver for signals corrupted by AWGN, Performance of the optimum Receiver for Memory less Modulation, Optimum Receiver for CPM signals, Optimum Receiver for Signals with Random Phase in AWGN Channel.

### **UNIT V**

**CARRIER RECOVERY AND SYMBOL SYNCHRONIZATION:** Carrier recovery and symbol synchronization in Signal demodulation, Phase locked loop, Effect of additive noise in phase estimation, non-decision directed loops, symbol timing estimation.

### **UNIT VI**

**COMMUNICATION THROUGH BAND LIMITED LINEAR FILTER CHANNELS:** Optimum Receiver for Channels with ISI and AWGN, Linear Equalization and its Variations, Decision Feedback Equalization.

### **UNIT VII**

**SPREAD SPECTRUM SIGNALS FOR DIGITAL COMMUNICATIONS:** Model of spread spectrum digital communication system, direct sequence spread Spectrum Digital signals, processing gain and Jamming Margin, Applications of DS-Spread Spectrum Signals, Generation of PN-Sequences, Frequency-Hopping Spread Spectrum Signals, Other Types of Spread Spectrum Signals.

### **UNIT VIII**

**SYNCHRONIZATION OF SPREAD SPECTRUM SYSTEMS:** Coherent Direct-Sequence Receivers, Carrier Tracking- Coherent & Non Coherent, Delay-Lock Loop Analysis, Tau-Dither Loop, Acquisition of Spread-Spectrum Signals, Matched filters for PN Sequences.

**Text Books:**

1. John G. Proakis, "DIGITAL COMMUNICATIONS", McGraw Hill, 3<sup>rd</sup> edition, 1995.
2. Theodore S. Rappaport, "Wireless Communications", Pearson Education, 2<sup>nd</sup> edition, 2002.
3. George R. Cooper & Clare D. McGillem, "Modern Digital Communication and Spread Spectrum", McGraw-Hill Book Company, 1986.

**References:**

1. Marvin K. Simon, Jim K Omura, Robert A. Scholtz & Barry K. Levit, "Spread Spectrum Communications", 1995.
2. J. Marvin, K. Simon, Sami. M. Hinedi and William C. Lindsey, "Digital Communication Techniques", PHI.
3. William Feller, "An Introduction to Probability Theory and Its Applications", Wiley, Vol 11, 2000.

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**M. Tech. (DECS)  
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## **(10MT13803) DIGITAL SYSTEM DESIGN**

### **UNIT I**

**DESIGN OF DIGITAL SYSTEMS:** ASM charts, Hardware description language and control sequence method, Reduction of state tables, state assignments.

### **UNIT II**

**SEQUENTIAL CIRCUIT DESIGN:** design of Iterative circuits, design of sequential circuits using ROMs and PLAs, sequential circuit design using CPLD, FPGAs.

### **UNIT III**

**FAULT MODELING:** Fault classes and models – Stuck at faults, bridging faults, transition and intermittent faults.

**TEST GENERATION:** Fault diagnosis of Combinational circuits by conventional methods – Path Sensitization technique, Boolean difference method, Kohavi algorithm.

### **UNIT IV**

**TEST PATTERN GENERATION:** D – algorithm, PODEM, Random testing, transition count testing, Signature Analysis and testing for bridging faults.

### **UNIT V**

**FAULT DIAGNOSIS IN SEQUENTIAL CIRCUITS:** State identification and fault detection experiment. Machine identification, Design of fault detection experiment.

### **UNIT VI**

**PROGRAMMING LOGIC ARRAYS:** Design using PLA's, PLA minimization and PLA folding.

### **UNIT VII**

**PLA TESTING:** Fault models, Test generation and Testable PLA design.

### **UNIT VIII**

**ASYNCHRONOUS SEQUENTIAL MACHINE:** fundamental mode model, flow table, state reduction, minimal closed covers, races, cycles and hazards.

### **TEXTBOOKS:**

1. Z. Kohavi, "Switching & finite Automata Theory", TMH.
2. N. N. Biswas, "Logic Design Theory", PHI.
3. Nolman Balabanian, Bradley Calson, "Digital Logic Design Principles", Wily Student Edition 2004.

### **REFERENCES:**

1. M. Abramovici, M.A.Breues, A.D.Friedman, "Digital System Testing and Testable Design", Jaico Publications.
2. Charles H. Roth Jr., "Fundamentals of Logic Design".
3. Frederick. J.Hill & Peterson, "Computer Aided Logic Design", Wiley 4<sup>th</sup> Edition.

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## **(10MT13804) EMBEDDED SYSTEMS**

### **UNIT I**

**INTRODUCTION:** Embedded system overview, embedded hardware units, embedded software in a system, embedded system on chip (SOC), design process, classification of embedded systems

### **UNIT II**

**EMBEDDED COMPUTING PLATFORM:** CPU Bus, memory devices, component interfacing, networks for embedded systems, communication interfacings: RS232/UART, RS422/RS485, IEEE 488 bus.

### **UNIT III**

**SURVEY OF SOFTWARE ARCHITECTURE:** Round robin, round robin with interrupts, function queue scheduling architecture, selecting an architecture saving memory space

### **UNIT IV**

**EMBEDDED SOFTWARE DEVELOPMENT TOOLS:** Host and target machines, linkers, locations for embedded software, getting embedded software into target system, debugging technique

### **UNIT V**

**RTOS CONCEPTS:** Architecture of the kernel, interrupt service routines, semaphores, message queues, pipes.

### **UNIT VI**

**INSTRUCTION SETS:** Introduction, preliminaries, ARM processor, SHARC processor.

### **UNIT VII**

**SYSTEM DESIGN TECHNIQUES:** Design methodologies, requirement analysis, specifications, system analysis and architecture design

### **UNIT VIII**

**DESIGN EXAMPLES:** Telephone PBX, ink jet printer, water tank monitoring system, GPRS, Personal Digital Assistants, Set Top boxes.

### **TEXT BOOKS:**

1. wayne wolf, "Computers as a component: principles of embedded computing system design".
2. David E. Simon, "An embedded software premier".
3. KVKK Prasad, "Embedded / real time systems", Dreamtech press, 2005.

### **REFERENCES:**

1. Sri Ram V Iyer, Pankaj Gupta, "Embedded real time systems programming", TMH, 2004.
2. Frank Vahid, Tony D. Givargis, "Embedded system design - A unified hardware/software introduction", John Willey, 2002.

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## **(10MT13805) MICROCOMPUTER SYSTEM DESIGN**

### **UNIT I**

**REVIEW OF 8086 PROCESSOR:** Architecture, Register organization, Addressing Modes and Instruction Set (Brief treatment only), Difference between 8086 and 8088 with respect to pin structures.

### **UNIT II**

**THE 80286 MICRO PROCESSORS:** Architecture, Register Organization, Addressing Modes and instruction sets of 80286 (brief treatment only)

### **UNIT III**

**THE 80386, AND 80486 MICRO PROCESSORS:** Architectural features, Register Organization, Memory management, Virtual 8086 mode, The Memory Paging Mechanism, Pin Definitions of 80386 and 80486 (brief treatment).

### **UNIT IV**

**THE PENTIUM AND PENTIUM PRO PROCESSORS:** The Memory System, Input/output system, Branch Prediction Logic, Cache Structure, Pentium Registers, Serial Pentium pro features.

### **UNIT V**

**THE PENTIUM IV AND DUAL CORE MICRO PROCESSORS:** Architecture, Special Registers and Pin Structures (brief treatment only)

### **UNIT VI**

**I/O PROGRAMMING:** Fundamentals of I/O Considerations Programmed I/O, Interrupt I/O, Block Transfers and DMA, I/O Design Example.

### **UNIT VII**

**INTRODUCTION TO MULTIPROGRAMMING:** Process Management, Semaphores Operations, Common Procedure Sharing, Memory Management, Virtual Memory Concept of 80286 and other advanced Processors.

### **UNIT VIII**

**ARITHMETIC COPROCESSOR, MMX AND SIMD TECHNOLOGIES:** Data formats for Arithmetic Coprocessor, Internal Structure of 8087 and Advanced Coprocessors. Instruction Set (brief treatment).

### **TEXTBOOKS:**

1. Barry, B. Brey, "The Intel Microprocessors", Pearson Education, 8<sup>th</sup> edition, 2009.
2. A.K.Ray and K.M.Bhurchandi, "Advanced Microprocessor and Peripherals", TMH.

### **REFERENCES:**

1. YU-Chang, Glenn A. Gibson, "Micro Computer Systems: The 8086/8088 Family Architecture, Programming and Design", Pearson Education, 2<sup>nd</sup> Edition, 2007.
2. Douglas V. Hall, "Microprocessors and Interfacing", Special Indian Edition, 2006.

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## **(10MT13806) ADVANCED COMPUTER ARCHITECTURE (ELECTIVE I)**

### **UNIT I**

**FUNDAMENTALS OF COMPUTER DESIGN:** Technology trends, cost-measuring and reporting performance quantitative principles of computer design.

### **UNIT II**

**INSTRUCTION SET PRINCIPLES AND EXAMPLES:** classifying instruction set- memory addressing- type and size of operands-addressing modes for signal processing-operations in the instruction set, instructions for control flow, encoding an instruction set, the role of compiler

### **UNIT III**

**INSTRUCTION LEVEL PARALLELISM (ILP):** over coming data hazards- reducing branch costs, high performance instruction delivery, hardware based speculation, limitation of ILP

### **UNIT IV**

**ILP SOFTWARE APPROACH:** compiler techniques- static branch protection, VLIW approach, H.W support for more ILP at compile time- H.W versus S.W solutions

### **UNIT V**

**MEMORY HIERARCHY DESIGN:** cache performance, reducing cache misses penalty and miss rate, virtual memory, protection and examples of VM.

### **UNIT VI**

**MULTIPROCESSORS AND THREAD LEVEL PARALLELISM:** symmetric shared memory architectures, distributed shared memory, Synchronization, multi threading.

### **UNIT VII**

**STORAGE SYSTEMS-** Types, Buses, RAID, errors and failures, bench marking a storage device, designing a I/O system.

### **UNIT VIII**

**INTER CONNECTION NETWORKS AND CLUSTERS:** interconnection network media, practical issues in interconnecting networks- examples, clusters, designing a cluster

### **TEXT BOOKS:**

1. John L. Hennessy & David A. Patterson Morgan Kufmann, "Computer Architecture A quantitative approach, An Imprint of Elsevier", 3<sup>rd</sup> edition.

### **REFERENCES:**

1. Kai Hwang and A.Briggs, "Computer Architecture and parallel processing", McGraw-Hill, International Edition.
2. Dezso Sima, Terence Fountain, Peter Kacsuk, "Advanced Computer Architectures", Pearson.

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**M. Tech. (DECS)  
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## **(10MT13807) DSP PROCESSORS AND ARCHITECTURES (ELECTIVE I)**

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

### **REFERENCES:**

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

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**M. Tech. (DECS)  
I SEMESTER**

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## **(10MT13808) LOW POWER VLSI DESIGN (ELECTIVE I)**

### **UNIT I**

**LOW POWER DESIGN, AN OVER VIEW:** Introduction to low- voltage low power design, limitations, Silicon-on-Insulator.

### **UNIT II**

**MOS/Bi-CMOS PROCESSES:** Bi-CMOS processes, Integration and Isolation considerations, Integrated Analog/Digital CMOS Process.

### **UNIT III**

**LOW-VOLTAGE/LOW POWER CMOS/ BICMOS PROCESSES:** Deep submicron processes, SOI CMOS, lateral BJT on SOI, future trends and directions of CMOS/Bi-CMOS processes.

### **UNIT IV**

**DEVICE BEHAVIOR AND MODELING:** Advanced MOSFET models, limitations of MOSFET models, Bipolar models. Analytical and Experimental characterization of sub-half micron MOS devices, MOSFET in a Hybrid mode environment.

### **UNIT V**

**CMOS AND Bi-CMOS LOGIC GATES:** Conventional CMOS and Bi-CMOS logic gates, Performance Evaluation.

### **UNIT VI**

**LOW- VOLTAGE LOW POWER LOGIC CIRCUITS:** Comparison of advanced Bi-CMOS Digital circuits. ESD-free Bi-CMOS, Digital circuit operation and comparative Evaluation.

### **UNIT VII**

**LOW POWER LATCHES AND FLIP FLOPS:** Evolution of Latches and Flip flops-quality measures for latches and Flip flops, Design perspective.

### **UNIT VIII**

**SPECIAL TECHNIQUES:** Power Reduction in Clock Networks, CMOS Floating Node, Low Power Bus, Delay Balancing, Low Power Techniques for SRAM.

### **TEXT BOOKS:**

1. Yeo Rofail/ Gohl (3 Authors), "CMOS/Bi-CMOS ULSI low voltage, low power", Pearson Education Asia 1st Indian reprint, 2002.
2. Gary K. Yeap, "Practical Low Power Digital VLSI Design", KAP, 2002.

### **REFERENCES:**

1. Douglas A.Pucknell & Kamran Eshraghian, "Basic VLSI Design", PHI, 3<sup>rd</sup> edition.
2. J.Rabaey, "Digital Integrated circuits", PH. N.J 1996.
3. Sung-mo Kang & yusuf leblebici, "CMOS Digital ICs", TMH, 3<sup>rd</sup> edition, 2003.
4. IEEE Trans on Electron Devices, IEEE J. Solid State Circuits, and other National and International Conferences and Symposia.

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**M. Tech. (DECS)  
I SEMESTER**

**L T P C  
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## **(10MT13809) DIGITAL SYSTEM DESIGN LAB**

### **CYCLE 1:**

1. Simulation and Verification of Logic Gates.
2. Design and Simulation of Half adder, Serial Binary Adder, Multi Precession Adder, Carry Look Ahead Adder and Full Adder.
3. Simulation and Verification of Decoder, MUXs, Encoder using all Modeling Styles.
4. Modeling of Flip-Flops with Synchronous and Asynchronous reset.
5. Design and Simulation of Counters- Ring Counter, Johnson Counter, and Up- Down Counter, Ripple Counter.
6. Design of a N- bit Register of Serial-in Serial-out, Serial in Parallel out, Parallel in Serial out and Parallel in Parallel Out.
7. Design of Sequence Detector (Finite State Machine- Mealy and Moore Machines).
8. 4- Bit Multiplier, Divider. (for 4-Bit Operand)
9. Design ALU to Perform – ADD, SUB, AND-OR, 1's and 2's COMPLIMENT, Multiplication, Division.

### **CYCLE 2: After Digital Circuit Description Using Verilog/ VHDL.**

1. Verification of the Functionality of the circuit using function Simulators.
2. Timing Simulator for Critical Path time Calculation.
3. Synthesis of Digital Circuit.
4. Place and Router Techniques for FPGA's like Xilinx, Altera, Cypress, etc.,
5. Implementation of Design using FPGA and CPLD Devices.

# **SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)**

**M. Tech. (DECS)  
II SEMESTER**

**L T P C  
4 - - 4**

## **(10MT23801) ADAPTIVE SIGNAL PROCESSING**

### **UNIT I**

**EIGEN ANALYSIS:** Eigen Value Problem, Properties of eigen values and eigen vectors, Eigen Filters, eigen Value computations.

### **UNIT II**

**INTRODUCTION TO ADAPTIVE SYSTEMS:** Definitions, Characteristics, Applications, Example of an Adaptive System. The Adaptive Linear Combiner - Description, Weight Vectors, Desired Response Performance function, Gradient & Mean Square Error.

### **UNIT III**

**DEVELOPMENT OF ADAPTIVE FILTER THEORY & SEARCHING THE PERFORMANCE SURFACE:** Introduction to Filtering, Smoothing and Prediction, Linear Optimum Filtering, Problem statement, Principle of Orthogonality - Minimum Mean Square Error, Wiener- Hopf equations, Error Performance - Minimum Mean Square Error.

**SEARCHING THE PERFORMANCE SURFACE** – Methods & Ideas of Gradient Search methods, Gradient Searching Algorithm & its Solution, Stability & Rate of convergence - Learning Curves.

### **UNIT IV**

**STEEPEST DESCENT ALGORITHMS:** Gradient Search by Newton's Method, Method of Steepest Descent, Comparison of Learning Curves.

### **UNIT V**

**LMS ALGORITHM & APPLICATIONS:** Overview - LMS Adaptation algorithms, Stability & Performance analysis of LMS Algorithms - LMS Gradient & Stochastic algorithms, Convergence of LMS algorithm.

**Applications:** Noise cancellation, Cancellation of Echoes in long distance telephone circuits, Adaptive Beam forming.

### **UNIT-VI**

**RLS ALGORITHM:** Matrix Inversion lemma, Exponentially weighted recursive least square algorithm, update recursion for the sum of weighted error squares, convergence analysis of RLS Algorithm, Application of RLS algorithm on Adaptive Equalization

### **UNIT VII**

**KALMAN FILTERING:** Introduction, Recursive Mean Square Estimation Random variables, Statement of Kalman filtering problem, Filtering, Initial conditions, Variants of Kalman filtering, Extend Kalman filtering.

## **UNIT VIII**

**NON LINEAR ADAPTIVE FILTERING:** Theoretical and Practical considerations of Blind Deconvolution, Buss Gang Algorithm for blind Equalization of real base band Channels.

### **TEXT BOOKS:**

1. Bernard Widrow, Samuel D.Stearns, "Adaptive Signal Processing", PE, 2005.
2. Simon Haykin, "Adaptive Filter Theory", PE Asia, 4<sup>th</sup> edition, 2002.

### **REFERENCES:**

1. Sophocles. J.Orfamadis, "Optimum signal processing: An introduction", McGraw-Hill, Newyork, 2<sup>nd</sup> edition, 1988.
2. S.Thomas Alexander, "Adaptive signal processing-Theory and Applications", Springer -Verlag, 1986.

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II SEMESTER**

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## **(10MT23802) CODING THEORY AND TECHNIQUES**

### **UNIT I**

**SOURCE CODING:** Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, coding for Discrete less sources, Source coding theorem, fixed length and variable length coding, properties of prefix codes.

### **UNIT II**

Shannon-Fano coding, Huffman code, Huffman code applied for pair of symbols, efficiency calculations, Lempel-Ziv codes.

### **UNIT III**

**LINEAR BLOCK CODES:** Introduction to Linear block codes, Generator Matrix, Systematic Linear Block codes, Encoder Implementation of Linear Block Codes, Parity Check Matrix, Syndrome testing, Error Detecting and correcting capability of Linear Block codes.

### **UNIT IV**

Hamming Codes, Probability of an undetected error for linear codes over a Binary Symmetric Channel, Weight Enumerators and Mac-Williams identities, Perfect codes, Application of Block codes for error control in data storage Systems.

### **UNIT V**

**CYCLIC CODES:** Algebraic structure of cyclic codes, Binary Cyclic code properties, Encoding in systematic and non-systematic form, Encoder using (n-k) bit shift register, Syndrome Computation and Error detection, Decoding of Cyclic Codes.

### **UNIT VI**

**CONVOLUTIONAL CODES:** encoding of Convolutional codes, Structural properties of Convolutional codes, state diagram, Tree diagram, Trellis Diagram, maximum, Likelihood decoding of Convolutional codes.

### **UNIT VII**

Viterbi Algorithm, Fano, Stack Sequential decoding algorithms, Application of Viterbi and sequential decoding.

### **UNIT VIII**

**BCH CODES:** Groups, fields, binary Fields arithmetic, construction of Falois fields  $GF(2^m)$ , Basic properties of Falois Fields, Computation using Falois Field  $GF(2^m)$  arithmetic, Description of BCH codes, Decoding procedure for BCH codes.

**TEXT BOOKS:**

1. SHU LIN and Daniel J. Costello, Jr., "Error Control Coding – Fundamentals and Applications", Prentice Hall Inc.
2. Bernard sklar, "Digital Communications – Fundamental and Application", Pearson Education, Asia.
3. Man Young Rhee, "Error Control Coding Theory", McGraw Hill Publications.

**REFERENCES:**

1. John G. Proakis, "Digital Communications", Mc. Graw Hill Publication.
2. K.Sam Shanmugam, "Digital and Analog Communication Systems", Wisley Publications.
3. Symon Haykin, "Digital Communications", Wisley Publications.

# **SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)**

**M. Tech. (DECS)  
II SEMESTER**

**L T P C  
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## **(10MT23803) DETECTION AND ESTIMATION OF SIGNALS**

### **UNIT I**

**DETECTION THEORY: Binary decisions - Single observation-** Maximum likelihood decision criterion, Neymann-Pearson criterion, Probability of error criterion, Bayes risk criterion, Minimax criterion, Robust detection, Receiver operating characteristics.

### **UNIT II&III**

**BINARY DECISIONS - MULTIPLE OBSERVATIONS:** Vector observations, the general Gaussian Problem, Waveform Observation in Additive Gaussian Noise, The Integrating Optimum Receiver; Matched Filter Receiver.

### **UNIT IV&V**

**ESTIMATION THEORY: Methods** -Maximum likelihood estimation; Bayes cost method Bayes estimation criterion - Mean square error criterion; Uniform cost function; absolute value cost function; Linear minimum variance - Least squares method; Estimation in the presence of Gaussian noise - Linear observation; Non-linear estimation.

### **UNIT VI**

**PROPERTIES OF ESTIMATORS:** Bias, Efficiency, Cramer Rao bound Asymptotic properties, Sensitivity and error analysis.

### **UNIT VII**

**STATE ESTIMATION:** Prediction, Kalman filter.

### **UNIT VIII**

**SUFFICIENT STATISTICS AND STATISTICAL ESTIMATION OF PARAMETERS:** Concept of sufficient statistics, Exponential families of Distributions, Exponential families and Maximum likelihood estimation, uniformly minimum variance unbiased estimation.

### **TEXT BOOKS:**

1. James L.Melsa & David L.Cohn, "Decision and Estimation Theory", McGraw Hill, 1978.
2. Dimitri Kazakos, P. Papantoni Kazakos, "Detection and Estimation", Computer Science Press, 1990.
3. Steven M. Kay, "Statistical Signal Processing Vol. 1: Estimation Theory, Vol. 2: Detection Theory", Prentice Hall Inc., 1998.

### **REFERENCES:**

1. Harry L. Van Trees, "Detection, Estimation and Modulation Theory", Part 1, John Wiley & Sons Inc. 1968.
2. Jerry M. Mendel, "Lessons in Estimation Theory for Signal Processing, Communication and Control", Prentice Hall Inc., 1995.
3. Sophocles J.Orfanidis, "Optimum Signal Processing", McGraw Hill, 2<sup>nd</sup> edition, 1988.
4. Monson H. Hayes, "Statistical Digital Signal Processing and Modeling", John Wiley & Sons Inc., 1996.

# **SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)**

**M. Tech. (DECS)  
II SEMESTER**

**L T P C  
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## **(10MT23804) HIGH PERFORMANCE NETWORKS**

### **UNIT I**

**NETWORK SERVICES & LAYERED ARCHITECTURE:** Traffic characterization and quality of service, Network services, High performance networks, Network elements, Basic network mechanisms, layered architecture.

### **UNIT II**

**ISDN & B-ISDN:** Over view of ISDN, ISDN channels, User access, ISDN protocols, Brief history of B-ISDN and ATM, ATM based services and applications, principles and building block of B-ISDN, general architecture of B-ISDN, frame relay.

### **UNIT III**

**ATM NETWORKS:** Network layering, switching of virtual channels and virtual paths, applications of virtual channels and connections.

### **UNIT IV**

QOS parameters, traffic descriptors, ATM service categories, ATM cell header, ATM layer, ATM adaptation layer.

### **UNIT V**

**INTERCONNECTION NETWORKS:** Introduction, Banyan Networks, Routing algorithm & blocking phenomenon, Batchter-Banyan networks, crossbar switch, three stage class networks.

### **UNIT VI**

**REARRANGEABLE NETWORKS:** Rearrangeable class networks, folding algorithm, bens network, looping algorithm.

### **UNIT VII**

**ATM SIGNALING, ROUTING AND TRAFFIC CONTROL:** ATM addressing, UNI signaling, PNNI signaling, PNNI routing, ABR Traffic management.

### **UNIT VIII**

**TCP/IP NETWORKS:** History of TCP/IP, TCP application and Services, Motivation, TCP, UDP, IP services and Header formats, Internetworking, TCP congestion control, Queue management: Passive & active, QOS in IP networks: differentiated and integrated services.

### **TEXT BOOKS:**

1. William Stallings, "ISDN & B-ISDN with Frame Relay", PHI.
2. Leon Garcia widjaja, "Communication Networks", TMH, 2000.
3. N. N. Biswas, "ATM Fundamentals", Adventure books publishers, 1998.

# **SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)**

**M. Tech. (DECS)  
II SEMESTER**

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## **(10MT23805) WIRELESS COMMUNICATIONS**

### **UNIT I**

**INTRODUCTION TO WIRELESS COMMUNICATIONS SYSTEMS:** Evolution, Examples of wireless communications systems, Comparison, Second Generation Cellular Networks, WLL, Bluetooth and Personal Area networks.

### **UNIT II**

**LARGE SCALE PATH LOSS AND SHADOWING:** Introduction to radio wave propagation, Free Space Propagation Model, Propagation mechanisms, Reflection, Ground Reflection (Two Ray) model, Diffraction, Scattering, outdoor Propagation Model and In door Propagation model.

### **UNIT III**

**SMALL SCALE FADING AND MULTIPATH:** Small Scale Multipath Propagation, Impulse Response Model of a multipath Channel, Small Scale Multipath Measurements, Parameters of a Mobile Multipath Channels, types of Small Scale Fading, Statistical models for Multipath Fading Channels, Theory of Multipath Shape Factors for Small Scale Fading Wireless Channels.

### **UNIT IV**

**DIVERSITY TECHNIQUES:** Time Diversity, Frequency Diversity, polarization Diversity and Space Diversity, Receiver Diversity-Concept of diversity branches and signal paths, combining methods: Selective diversity combining, Scanning diversity, maximal ratio combining and Equal gain combining, Performance analysis for Rayleigh fading channels (of selection and maximal ratio combining),RAKE Receiver, Interleaving as time diversity.

### **UNIT V**

**CELLULAR CONCEPT- SYSTEM DESIGN FUNDMENTALS:** Frequency reuse, Channel assignment strategies, Handoff strategies, Interface and System Capacity—Co-channel Interface and System Capacity, Capacity of Cellular CDMA, Capacity of CDMA with Multiple Cells, Channel Planning for Wireless systems, Adjacent channel interface, Trunking and Grade of Service, Improving Capacity-Cell Splitting and Sectorization,

### **UNIT VI**

**ACCESS AND DUPLEX TECHNIQUES:** FDMA, TDMA, Frame Slot Format for TDMA Systems, Super Frame Format, Synchronization of Slot, Frame & Super Frame, CDMA, Near Far Problem and Power Control, Synchronization Specific for CDMA, Comparison of FDMA, TDMA and CDMA, FDD&TDD.

### **UNIT VII**

**INTRODUCTION TO SPACE-TIME WIRELESS COMMUNICATIONS:** Introduction, Exploiting Multiple antennas in wireless links, Space-Time (ST) Channel and Signal Models-SIMO, MISO, MIMO Channels, Physical Scattering Models for ST Channels, Sampled Signal Model, Capacity of ST Channels-Capacity of Frequency flat deterministic MIMO channel, Channel unknown & known to the transmitter, Capacity of random MIMO channels, Capacity to frequency selective MIMO channels.

## **UNIT VIII**

**WIRELESS SYSTEMS AND STANDARDS:** GSM for Mobile - Specifications and Air Interface, CDMA digital Cellular Standard (IS 95)-Frequency and Channel Specifications, Forward and Reverse Channels, CDMA 3G Systems: UMTS & CDMA 2000 standards and Specifications.

### **TEXT BOOKS:**

1. T.S. Rappaport, "Wireless communications, principals & practice", PHI, 2<sup>nd</sup> edition, 2001.
2. Andrea Goldsmith, "Wireless communications", Cambridge University press.
3. Arogya Swamy Paulraj, Rohit Nabar & D.Gore, "Introduction to Space-Time Wireless Communications", Cambridge university press, 2003.
4. G.L.Stuber, "Principals of mobile communications", kluwer academic publishers, 2<sup>nd</sup> edition.

### **REFERENCES:**

1. Seiichi Samei, "Applications of Digital Wireless Technologies to Global Wireless Communications", Prentice Hall PTR, NJ, 1997.
2. A.J.Viterbi, "CDMA- Principals of Spread Spectrum", Addison Wesley, 1995.
3. Kamilo Feher, "Wireless Digital Communication", PHI, 1995.
4. R.L Peterson, R.E. Ziemer and David E.Borth, "Introduction to Spread Spectrum Communication", Pearson Education.
5. T L Singal, "Wireless Communications", Tata McGraw Hill, 2010.
6. Simon Haykin and Michael, "Modern Wireless Communications", Pearson Education.

# **SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)**

**M. Tech. (DECS)  
II SEMESTER**

**L T P C  
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## **(10MT23806) COMPRESSION TECHNIQUES (ELECTIVE II)**

### **UNIT I&II**

**REVIEW OF INFORMATION THEORY:** The discrete memoryless information source, Kraft inequality; optimal codes Source coding theorem. Compression Techniques, Lossless and Lossy Compression, Mathematical Preliminaries for Lossless Compression, Huffman Coding, Optimality of Huffman codes, Extended Huffman Coding, Adaptive Huffman Coding, Arithmetic Coding, Adaptive Arithmetic coding, Run Length Coding.

### **UNIT III**

**DICTIONARY TECHNIQUES:** Static Dictionary, Adaptive Dictionary, LZ77, LZ78, LZW, Applications, Predictive Coding, Prediction with Partial Match, Burrows Wheeler Transform, Sequitur, Lossless Compression Standards (files, text, and images, faxes), Dynamic Markov Compression.

### **UNIT IV**

**MATHEMATICAL PRELIMINARIES FOR LOSSY CODING:** Rate distortion theory: Rate distortion function  $R(D)$ , Properties of  $R(D)$ ; Calculation of  $R(D)$  for the binary source and the Gaussian source, Rate distortion theorem, Converse of the Rate distortion theorem,

### **UNIT V**

**QUANTIZATION:** Uniform & Non-uniform, optimal and adaptive quantization, vector quantization and structures for VQ, Optimality conditions for VQ, Predictive Coding, Differential Encoding Schemes.

### **UNIT VI**

**MATHEMATICAL PRELIMINARIES FOR TRANSFORMS:** Karhunen Loeve Transform, Discrete Cosine and Sine Transforms, Discrete Walsh Hadamard Transform, Lapped transforms- Transform coding, Subband coding, Wavelet Based Compression, Analysis/Synthesis Schemes.

### **UNIT VII**

**DATA COMPRESSION STANDARDS:** Zip and Gzip, Speech Compression Standards: MPEG, JPEG 2000. MPEG, H264.

### **UNIT VIII**

**IMAGE COMPRESSION STANDARDS:** Binary Image Compression Standards, Continuous Tone Still Image Compression Standards, Video Compression Standards.

### **TEXT BOOKS:**

1. Khalid Sayood, "Introduction to Data Compression", Morgan Kaufmann Publishers., 2<sup>nd</sup> edition, 2005.
2. David Salomon, "Data Compression: The Complete Reference", Springer Publications, 4<sup>th</sup> edition, 2006.
3. Thomas M.Cover, Joy A.Thomas, "Elements of Information Theory", John Wiley & Sons, Inc., 1991.

**REFERENCES:**

1. Toby Berger, "Rate Distortion Theory: A Mathematical Basis for Data Compression", Prentice Hall, Inc., 1971.
2. K.R.Rao, P.C.Yip, "The Transform and Data Compression Handbook", CRC Press, 2001.
3. R.G.Gallager, "Information Theory and Reliable Communication", John Wiley & Sons, Inc., 1968.
4. Ali N. Akansu, Richard A. Haddad, "Multiresolution Signal Decomposition: Transforms, Subbands and Wavelets", Academic Press, 1992.
5. Martin Vetterli, Jelena Kovacevic, "Wavelets and Subband Coding", Prentice Hall Inc., 1995.
6. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Pearson Education.

# **SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)**

**M. Tech. (DECS)  
II SEMESTER**

**L T P C  
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## **(10MT23807) IMAGE PROCESSING (ELECTIVE II)**

### **UNIT I**

**IMAGE REPRESENTATION:** Gray scale and colour Images, image sampling and quantization. Two dimensional orthogonal transforms: DFT, WHT, Haar transform, KLT, DCT.

### **UNIT II**

**IMAGE ENHANCEMENT:** Filters in spatial and frequency domains, histogram-based processing, homomorphic filtering. Edge detection, non parametric and model based approaches, LOG filters, localization problem.

### **UNIT III**

**IMAGE RESTORATION:** Degradation Models, PSF, circulant and block - circulant matrices, deconvolution, restoration using inverse filtering, Wiener filtering and maximum entropy-based methods.

### **UNIT IV**

**IMAGE SEGMENTATION:** Pixel classification, Bi-level Thresholding, Multi-level Thresholding, P-tile method, Adaptive Thresholding, Spectral & spatial classification, Edge detection, Hough transform, Region growing.

### **UNIT V**

**FUNDAMENTAL CONCEPTS OF IMAGE COMPRESSION:** Compression models, Information theoretic perspective, Fundamental coding theorem.

### **UNIT VI**

**LOSSLESS COMPRESSION:** Huffman Coding, Arithmetic coding, Bit plane coding, Run length coding, Lossy compression: Transform coding, Image compression standards.

### **UNIT VII**

**VIDEO PROCESSING:** Representation of Digital Video, Spatio-temporal sampling, Motion Estimation.

### **UNIT VIII**

Video Filtering, Video Compression, Video coding standards.

### **TEXT BOOKS/REFERENCES:**

1. R.C.Gonzalez, R.E.Woods, "Digital Image Processing", Pearson Education. 2<sup>nd</sup> edition, 2002.
2. W. K. Pratt, "Digital image processing", Prentice Hall, 1989.
3. A.Rosenfold & A.C.Kak, "Digital image processing", Prentice Hall, Vols.1&2, 1986.
4. H.C.Andrew & B.R.Hunt, "Digital image restoration", Prentice Hall, 1977.
5. R.Jain, R.Kasturi and B.G.Schunck, "Machine Vision", McGraw-Hill International Edition, 1995.
6. A.M.Tekalp, "Digital Video Processing", Prentice-Hall, 1995.
7. A.Bovik, "Handbook of Image & Video Processing", Academic Press, 2000.

# **SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)**

**M. Tech. (DECS)  
II SEMESTER**

**L T P C  
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## **(10MT23808) OPTICAL COMMUNICATIONS (ELECTIVE II)**

### **UNIT I**

**INTRODUCTION:** Evolution of fiber types, guiding properties of fibers, cross talk between fibers, coupled modes and mode mixing, dispersion properties of fibers, nonlinear properties of optical fibers, SRS, SBS, intensity dependent refractive index.

### **UNIT II**

#### **OPTICAL AND MECHANICAL CHARACTERIZATION OF FIBERS**

Fiber design considerations: diameter, cladding, thickness, low and high bit rate systems, characterization of materials for fibers, fiber perform preparation, fiber drawing and control, roles of coating and jacketing.

### **UNIT III**

**OPTICAL CABLE DESIGN:** Design objectives and cable structures, fiber splicing, fiber end preparation, single and array splices, measurement of splicing efficiency, optical fiber connectors, Connector alignments.

### **UNIT IV**

**OPTICAL SOURCES AND DETECTORS:** optical sources for communication, LED, injection lasers, modulation technique, direct and indirect methods, optical waveguide devices. Photodiodes in repeaters, receiver design, digital and analog, transmission system design, system design choices, passive and low speed active optical components for fiber system, micro-optic components, lens-less components.

### **UNIT V**

**OPTICAL FIBER COMPONENTS:** couplers, Isolators and Circulators, Multiplexers, Bragg grating, Fabry-perot Filters, Mach zender interferometers, Arrayed waveguide grating, tunable filters, hi-channel count multiplexer architectures, optical amplifiers, direct and external modulation transmitters, pump sources for amplifiers, optical switching and wave length converters.

### **UNIT VI**

**OPTICAL FIBER TECHNIQUES:** Modulation and demodulation, signal formats, direction detection receivers, coherent detection.

### **UNIT-VII**

**ACCESS NETWORK:** Network architecture, HFC, FTTC, optical access network architecture, deployment considerations, upgrading the transmission capacity, SDM, TDM, WDM, application areas, inter exchange, undersea, local exchange networks; Packaging and cabling of photonics components- photonic packet switching, OTDM, multiplexing and demultiplexing, optical logic gates, synchronization, broadcast OTDM network, OTDM testbeds.

## **UNIT-VIII**

**SOLITON COMMUNICATION:** Basic principle, metropolitan optical network, cable TV network, optical access network, photonics simulation tools, error control coding techniques, nonlinear optical effects in WDM transmission.

### **TEXT BOOKS:**

1. S.E.Miller, A.G.Chynoweth, "Optical Fiber Telecommunication", (Unit I, II, III, VI).
2. Rajiv Ramaswamy and Kumar and N. Sivarajan, "Optical Networks", (Unit V, VI, VII).
3. I Kaninov, T Li, "Optical Fiber Telecommunication IV B", (Unit VIII).

### **REFERENCES:**

1. S E Miller, I Kaninov, "Optical Fiber Telecommunication II".
2. Govind Agarwal, "Optical Fiber Communications".
3. Gil Held, "Deploying Optical Network Components".
4. Gerd Kaiser, "Optical Fiber Communication", McGraw Hill.
5. John. M. Senior, "Optical fiber communications: Principles and Practice".

**SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)**

**M. Tech. (DECS)  
II SEMESTER**

**L T P C  
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**(10MT23810) COMMUNICATIONS AND SIGNAL PROCESSING LAB**

1. Simulation Rayleigh Fading Channel Using Either Clarke's Model or Jake's Model for different Doppler Spreads (Ex. 50 Hz and 100 Hz).
2. Generation of Maximal Sequences and Gold Sequences.
3. Design and Simulation FIR Filter Using any Windowing Technique.
4. Design of IIR Filters from Analog Filters.
5. Performance Evaluation of QPSK System over Gaussian AWGN Channel.
6. Performance Evaluation of QPSK System over Rayleigh Fading Channel.
7. Equalization of Multipath Channel using LMS or RLS Algorithms.
8. Performance Evaluation of RAKE Receiver over Slow Fading Channel.

**NOTE:** Use Matlab / COM SIM.

# **SREE VIDYANIKETHAN ENGINEERING COLLEGE**

**(AUTONOMOUS)**

Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

## **Salient Features of Prohibition of Ragging in Educational Institutional Act 26 of 1997**

- Ragging within or outside the college is prohibited.
- Ragging means doing an act which causes or is likely to cause insult or annoyance or fear or apprehension or threat or intimidation or outrage of modesty or injury to a student

<b>Nature of Ragging</b>	<b>Punishment</b>
Teasing, Embarrassing and humiliating	Imprisonment up to 6 months or fine up to Rs. 1,000/- or Both
Assaulting or using criminal force or criminal intimidation	Imprisonment up to 1 year or fine up to Rs. 2,000/- or Both
Wrongfully restraining or confining or causing hurt	Imprisonment up to 2 years or fine up to Rs. 5,000/- or Both
Causing grievous hurt, Kidnapping or rape or committing unnatural offence	Imprisonment up to 5 years or fine up to Rs. 10,000/-
Causing death or abetting suicide	Imprisonment up to 10 years or fine up to Rs. 50,000/-

### **Note:**

1. A student convicted of any of the above offences, will be expelled from the College.
2. A student imprisoned for more than six months for any of the above offences will not be admitted in any other College.
3. A student against whom there is prima facie evidence of ragging in any form will be suspended from the College immediately.
4. The full text of Act 26 of 1997 and UGC Regulations on Curbing the Menace of Ragging in Higher Educational Institutions, 2009 **(Dated 17<sup>th</sup> June, 2009)** are placed in the College library for reference.