

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**Lesson Plan**

**Name of the Subject:** Computer Architectures (14MT13801)

**Name(s) of the faculty Member(s) framing syllabus:** P. Madhu Kumar

**Class & Semester:** M. Tech (DECS) I SEM.

S. No.	Topic	No. of periods	Book(s) followed	Topics for Self Study
<b>Unit I: Fundamentals of Computer Design</b>				
1.	Architecture definition-ISA, Organization and Hardware to meet goals	1	T1	Pentium architecture features and pitfalls.
2.	Technology trends	2	T1	
3.	Trends in cost- cost of an IC, Cost VS Price	2	T1	
4.	Performance-measuring, reporting and summarization.	2	T1	
5.	Quantitative principles of computer design- Amdahl's law	2	T1	
6.	Processor performance equation	1	T1	
<b>Total periods required:</b>		<b>10</b>		
<b>Unit II: Instruction Level Parallelism</b>				
7.	<b>ILP:</b> Concepts and challenges-various dependencies	1	T1	Performance analysis of Pentium 4.
8.	Compiler techniques for exposing ILP-Pipeline Scheduling & loop unrolling,	1	T1	
9.	Branch prediction – static. Dynamic- Tomasulo's Approach, Structure of MIPS FPU	2	T1	

10.	Speculation – Hardware speculation, MIPS FPU Extension to handle speculation.	2	T1	
11.	Exploiting ILP Using Multiple Issue and Static Scheduling Techniques	2	T1	
12.	Techniques for instruction delivery and speculation-branch prediction	2	T1	
13.	<b>ILP Limitations:</b> Hardware model, Window size & Maximum issue count, Branch prediction, finite register effects,	2	T1	
<b>Total periods required:</b>		<b>12</b>		
<b>Unit III: Multiprocessors and Thread Level Parallelism</b>				
14.	<b>Introduction:</b> Taxonomy of Parallel Architectures-categorization of parallel architectures, Shared and distributed memory multiprocessors.	2	T1	Exploitation of thread level parallelism in modern processors.
15.	Memory Architecture and Communication models	1	T1	Simultaneous Multithreading,
16.	Parallel Processing Challenges	1	T1	SMT vs TLP
17.	<b>Symmetric shared memory architectures:</b> cache coherence, schemes for enforcing coherence, snooping protocols, limitations,	2	T1	
18.	<b>Distributed shared memory architectures:</b> Directory based coherence protocols	2	T1	
19.	Synchronization-hardware primitives, locks using coherency	2	T1	
20.	Models of memory consistency-sequential consistency, programmers view	2	T1	
<b>Total periods required:</b>		<b>12</b>		
<b>Unit IV: Memory Hierarchy Design</b>				

21.	<b>Introduction:</b> Levels in Memory Hierarchy, basics of caching	2	T1	Multi level cache in Pentium and Pentium Pro processors
22.	Optimizations for Cache Performance	3	T1	
23.	<b>Memory Technology and Optimizations:</b> SRAM, DRAM with improved performance.	2	T1	
24.	<b>Protection:</b> Virtual Memory and Virtual Machines.	1	T1	
25.	<b>Design of Memory Hierarchies:</b> ISA, Speculative execution and memory system, I/O and consistency of cached data	3	T1	
<b>Total periods required:</b>		<b>11</b>		
<b>Unit V: Multiprocessor Interconnection Network</b>				
26.	Interconnection Networks and their Taxonomy	1	T2	High Performance Networks  <b>Research Topic:</b>  Multi core interconnection networks
27.	<b>Bus based Dynamic Interconnection Networks:</b> Single bus & Multiple bus systems, bus synchronization,	2	T2	
28.	<b>Switch based Interconnection Networks:</b> Cross bar, Single stage, Multi stage,	3	T2	
29.	<b>Static Interconnection Networks:</b> Completely connected, Limited connection, Cube connected, Mesh connected networks,	2	T2	
30.	K-ary n-cube networks	1	T2	
31.	<b>Analysis and Performance Metrics:</b> dynamic and static networks.	2	T2	
<b>Total periods required:</b>		<b>11</b>		
<b>Grand total periods required:</b>		<b>55</b>		

**Text Books:**

T1: John L. Hennessey and David A. Patterson, "Computer architecture – A quantitative approach", Morgan Kaufmann / Elsevier Publishers, 4th. Edition, 2007.

T2: Hesham El-Rewini, Mostafa Abd-El-Barr, "Advanced Computer Architecture and Parallel Processing", A John Wiley & Sons, Inc Publication, 2005.

**Reference Books:**

R1: David E. Culler, Jaswinder Pal Singh, "Parallel computing architecture: A hardware/software approach", Morgan Kaufmann /Elsevier Publishers, 1999.

R2: Kai Hwang and Zhi.Wei Xu, "Scalable Parallel Computing", Tata McGraw Hill, New Delhi, 2003.

**Signature(s) of the faculty Member(s)**

**Signature of the Chairman (BOS)**

**framing the syllabus**



**SREE VIDYANIKETHAN ENGINEERING COLLEGE**  
(Autonomous)

SreeSainath Nagar, A. Rangampet-517 102

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

**Lesson Plan**

**Name of the Subject:** COMPUTER NETWORKS(14MT13805)

**Name(s) of the faculty Member(s) framing syllabus:** Mr. R. Nagendra

**Class & Semester:** M. Tech I SEM.(DECS & CMS)

S. No.	Topic	No. of periods	Book(s) followed	Topics for Self Study
<b>Unit I: Introduction to Computer Networks</b>				
1.	Data communications & Networking for Today's Enterprise	1	T1	Client – Server model, Network components, Network standards and protocols.
2.	Data Communications	1	T1	
3.	Network Edge	1	T3	
4.	Network core	1	T3	
5.	Internet	1	T1	
6.	OSI Reference model	1	T1	
7.	TCP/IP models	1	T1	
8.	HDLC	2	T1, T2	
9.	Point to Point Protocol (PPP)	2	T1, T2	
<b>Total periods required:</b>		<b>11</b>		
<b>Unit II: Wired &amp; Wireless LANs</b>				
10.	Ethernet	1	T2	Multiple Access protocols
11.	FastEthernet	1	T2	
12.	Gigabit Ethernet	1		
13.	WLANS – Architecture and Services, Applications	1	T1	
14.	IEEE 802.11 WLAN Standard – Physical Layer	1	T1	
15.	MAC Layer, Frame structure	1	T1, T3	
16.	IEEE 802.11 a, b, g, e and n standards	1	T1	
17.	Bluetooth	2	T2	
18.	WiMax features	1	T1	
19.	standards, protocols and utility	1	T1	
20.	Virtual LANs	1	T1	
<b>Total periods required:</b>		<b>12</b>		
<b>Unit III: Advanced Network Architectures</b>				
21.	Circuit switching network - SONET/SDH	2	T1	N-ISDN & B-ISDN Networks, X.25.
22.	Virtual Circuit Networks – Frame Relay	2	T1	
23.	ATM architectures and services	1	T1	
24.	ATM Layer	1	T1	
25.	ATM Adaptation Layer	1	T1	
26.	Signaling Protocols – MPLS	1	T1	
27.	RSVP	1	T1	
28.	VPN architecture	1	T2	

S. No.	Topic	No. of periods	Book(s) followed	Topics for Self Study
29.	IP over ATM	1	T1, T2	
30.	Repeaters & Bridges	1	T2	
31.	Routers & Gateways	1	T2	
<b>Total periods required:</b>		<b>13</b>		
<b>Unit IV:</b>				
32.	IPv6 protocol	1	T1, T2	Internet protocol IPV4, P2P file sharing, Congestion control in circuit switching networks, Congestion Control in ATM
33.	TCP	1	T1, T2	
34.	UDP	1		
35.	Congestion control in TCP	1	T1, T2	
36.	Socket programming with TCP and UDP	1	T3	
37.	Web and HTTP	2	T3	
38.	FTP	1	T3	
39.	Simple Mail Transfer Protocol	1	T3	
40.	Domain Name System	1	T3	
41.	Multimedia Applications – RTP	1	T1, T3	
42.	Voice Over IP.	1	T1, T2	
<b>Total periods required:</b>		<b>12</b>		
<b>Unit V: Security in Computer Networks</b>				
43.	Simple Network Management Protocol	1	T2	Routing algorithms in ATM/ TCP networks
44.	Network security	1	T3	
45.	Cryptography – Symmetric Key Cryptography	1	T3	
46.	Public Key Encryption	1	T3	
47.	Firewalls – Packet filtering	1	T3	
48.	Application Gateway	1	T3	
49.	Digital Signature	1	T2	
50.	IP Sec.	1	T2	
<b>Total periods required:</b>		<b>08</b>		
<b>Grand total periods required:</b>		<b>56</b>		

**TEXT BOOKS:**

- T1. William Stallings, "Data and Computer Communication", 9th edition, Prentice hall, 2010  
T2. Behrouz A. Forouzan, "Data Communications and Networking", 4th Ed, Tata McGraw-Hill, New Delhi, 2006  
T3. Jim Kurose, Keith Ross, "Computer Networking: A Top Down Approach", 4th edition, Addison Wesley, July 2007.

**REFERENCE BOOKS:**

- R1. Andrew S. Tanenbaum "Computer Networks", 4th Edition, Pearson Education, 2008  
R2. LEON-GARCIA, INDRA WIDJAJA, "Communication Networks – Fundamental concepts and Key architectures", TMH, 2000

**Signature(s) of the faculty Member(s)  
framing the syllabus**

**Signature of the Chairman (BOS)**

**Name of the Subject:** DIGITAL COMMUNICATION TECHNIQUES (14MT13802)

**Class & Semester:** M. Tech (DECS & CMS) – I Semester

**Name of the faculty Member:** M. Sivasubramanyam

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
<b>UNIT – I: Characterization Of Communication Signals And Systems</b>				
1.	<i>Review of Random Variables and Processes</i>	4	T1	Representation of Band-Pass Stationary Stochastic Processes, Representation of Biorthogonal Signals, Simplex Signals and Signal waveforms from binary codes
2.	Representation of Band-Pass Signals	1	T1	
3.	Representation of Linear Band-Pass System, Response of a Band-Pass System to a Band-Pass Signal	1	T1	
4.	Signal Space Representations – Vector Space Concepts, Signal Space Concepts	1	T1	
5.	Orthogonal Expansion of Signals	2	T1	
6.	Representation of PAM Signals, Phase Modulated Signals	1	T1	
7.	Representation of QAM Signals, Multidimensional Signals, Orthogonal Multidimensional Signals	1	T1	
8.	Representation of Multidimensional Signals and Orthogonal Multidimensional Signals	1	T1	
9.	Power Spectra of Linearly Modulated Signals	2	T1	
<b>Total periods required:</b>		<b>10</b>		
<b>UNIT – II: Digital Modulation Techniques</b>				
10.	Factors that Influence digital modulation techniques	1	T2	Raised Cosine Roll off Filter, Gaussian Pulse-Shaping Filter, BFSK, M-ary FSK and OFDM.
11.	Bandwidth and Power Spectral Density of Digital Signals	1	T2	
12.	Linear Modulation Techniques–Introduction, BPSK	1	T2	
13.	DPSK	1	T2	
14.	QPSK	1	T2	
15.	OQPSK,	1	T2	
16.	$\pi/4$ QPSK	1	T2	
17.	Constant envelope Modulation Techniques – Introduction, MSK	1	T2	
18.	GMSK	1	T2	
19.	Combined Linear and constant envelope modulation techniques – M-ary PSK	1	T2	
20.	M-ary QAM	1	T2	
<b>Total periods required:</b>		<b>11</b>		
<b>UNIT -III: Optimum Receivers For Additive Gaussian Noise Channels</b>				
21.	Optimum receiver for signals corrupted by AWGN – Correlation Demodulator	1	T1	Probability of M-ary Biorthogonal Signals, Simplex Signals and M-ary Binary-coded Signals, Comparison of Digital Modulation Method, Probability of Error for Envelope Detection of M-ary Orthogonal Signals and Correlated Binary Signals
22.	Matched Filter Demodulator	1	T1	
23.	Optimum Detector	1	T1	
24.	Performance of the optimum Receiver for Memory less Modulation – Probability of Error for Binary Modulation	1	T1	
25.	Probability of Error for M-ary Orthogonal Signals	1	T1	
26.	Probability of Error for M-ary PAM	1	T1	
27.	Probability of Error for m-ary PSK	1	T1	

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
28.	Probability of Error for QAM	1	T1	
29.	Optimum Receiver for Signals with Random Phase in AWGN Channel – Optimum Receiver for Binary Signals	1	T1	
30.	Optimum Receiver for M-ary Orthogonal Signals	1	T1	
<b>Total periods required:</b>		<b>10</b>		
<b>UNIT – IV: Spread Spectrum Techniques</b>				
31.	Introduction and Model of Spread Spectrum Digital Communication	1	T1	Digital Cellular CDMA System Based on DS Spread spectrum, A CDMA System Based on FH Spread Spectrum Signals
32.	Direct Sequence Spread Spectrum Digital Signals	2	T1	
33.	Processing Gain and Jamming Margin	1	T1	
34.	Applications of DS-Spread Spectrum Signals – Antijamming Application	1	T1	
35.	Low-Detectability Signal Transmission, Code Division Multiple Access	1	T1	
36.	Generation of PN-Sequences	2	T1	
37.	Frequency– Hopping Spread Spectrum Signals	1	T1	
38.	Other Types of Spread Spectrum Signals	1	T1	
<b>Total periods required:</b>		<b>10</b>		
<b>UNIT – V: Detection Of Spread Spectrum Signals</b>				
39.	Coherent Direct-Sequence Receivers	1	T3	Matched Filters with Acquisition-Aiding Waveforms <b>Research Area:</b> Spread Spectrum Communication System
40.	Delay-Lock Loop Analysis	1	T3	
41.	Tau-Dither Loop and Non Coherent Carrier Tracking	1	T3	
42.	Non coherent Frequency-Hop Receiver	1	T3	
43.	Acquisition of Spread-Spectrum Signals	1	T3	
44.	Acquisition by Cell-By-Cell Searching	1	T3	
45.	Reduction of Acquisition Time – Acquisition with Matched Filters	1	T3	
46.	Matched filters for PN Sequences	1	T3	
47.	Matched Filters for Frequency-Hopped Signals	1	T3	
<b>Total periods required:</b>		<b>09</b>		
<b>Grand total periods required:</b>		<b>50</b>		

#### TEXT BOOKS:

- T1. John G. Proakis, "DIGITAL COMMUNICATIONS", McGraw Hill, 4th edition, 2001.  
T2. Theodore S. Rappaport, "Wireless Communications", Pearson Education, 2nd edition, 2002.  
T3. George R. Cooper & Clare D. McGillem, "Modern Communication and Spread Spectrum", McGraw-Hill Book Company, 1986.

#### REFERENCE BOOKS:

- R1. Marvin K. Simon, Jim K Omura, Robert A. Scholtz & Barry K. Levit, "Spread Spectrum Communications", Computer Science Press, 1995.  
R2. J. Marvin, K. Simon, Sami. M. Hinedi and William C. Lindsey, "Digital Communication Techniques", PHI, 2009.

Signature of the faculty Member  
framing the syllabus

Signature of the Chairman (BOS)



**Department of Electronics and communication Engineering**

**Lesson Plan**

**Name of the Subject:** Digital System Design (14MT13803)

**Class & Semester:** M. Tech. (DECS) – I Semester

**Name of the faculty Member:** Ms. K. Sudha

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
<b>UNIT – I: DESIGN OF DIGITAL SYSTEMS</b>				
1.	ASM charts	2	T1	Design of Serial Adder with Accumulator, Binary Divider, Parallel Multiplier.
2.	Hardware description language and control sequence method	1	T1	
3.	Reduction of state tables	2	T1	
4.	State assignments	1	T1	
5.	Design of Iterative circuits	2	T1	
6.	Design of sequential circuits - using ROMs and PLAs	1	T1	
7.	Design of sequential circuits - using CPLDs	1	T1	
8.	Design of sequential circuits – using FPGAs	1	T1	
<b>Total periods required:</b>		<b>12</b>		
<b>UNIT – II: FAULT MODELING &amp; TEST PATTERN GENERATION</b>				
9.	Fault classes and models	2	T2	Basic Concepts of Fault-Tolerance Techniques.
10	Stuck at faults, bridging faults, transition and intermittent faults.	2	T2,R3	
11	Fault diagnosis of Combinational circuits by conventional methods – Path Sensitization technique	2	T2	
12	Boolean difference method	2	T2	
13	Kohavi algorithm	1	T2	
14	D – algorithm	2	R3	
15	PODEM	1	R3	
16	Random testing	1	R3	
17	Transition count testing	1	R3	
18	Signature Analysis	1	R3	
19	Testing for bridging faults	2	T3	
<b>Total periods required:</b>		<b>17</b>		
<b>UNIT -III: FAULT DIAGNOSIS IN SEQUENTIAL CIRCUITS</b>				
20	Circuit Test Approach	2	R1	Problems and Solutions for fault detection.
21	Transition Check Approach - State identification	3	R1	
22	Fault detection experiment.	2	R1	
23	Machine identification	1	R1	
24	Design of fault detection experiment	2	R1	

<b>Total periods required:</b>		<b>10</b>		
<b>UNIT – IV: PLA MINIMIZATION AND TESTING</b>				
25	PLA minimization	2	T2,T3	Design For Testability(DFT) Schemes, Built-In Self-Test.
26	PLA folding	3	T2	
27	Fault model in PLA	1	T2,T3	
28	Test generation	2	T2,T3	
29	Testable PLA design	2	T3	
<b>Total periods required:</b>		<b>10</b>		
<b>UNIT – V: ASYNCHRONOUS SEQUENTIAL MACHINES</b>				
30	Fundamental mode model	1	R2	The Finite State Model – Capabilities and limitations, State equivalence and machine minimization. <b>Research Topics:</b> Self Reconfigurable Digital Circuits
31	The Flow table	1	R2	
32	Reduction of incompletely specified machines	3	R2	
33	Races, cycles and hazards	2	R2	
<b>Total periods required:</b>		<b>7</b>		
<b>Grand total periods required:</b>		<b>56</b>		

**TEXTBOOKS:**

T1: Charles H. Roth, Jr., "Fundamentals of Logic Design ", Cengage Learning, 5<sup>th</sup> edition,2004.

T2: N. N. Biswas, "Logic Design Theory", PHI,1993.

T3: Miron Abramovici, Melvin Breuer, Arthur Friedman, "Digital Systems Testing and Testable Design", Jaico Publishing House, 2001.

**REFERENCES:**

R1: Samuel C. Lee," Digital Circuits and Logic Design, PHI,1976.

R2: Norman Balabanian, Bradley Carlson, "Digital Logic Design Principles", John Wily&Sons,Inc., 2002.

R3: Parag K. Lala," Fault Tolerant and Fault Testable Hardware Design", BS Publications,1990.

**Signature of the faculty Member framing the syllabus**

**Signature of the Chairman (BOS)**

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

**Lesson Plan**

**Name of the Subject:** EMBEDDED SYSTEM DESIGN (14MT13807)

**Name(s) of the faculty Member(s) framing syllabus:** P. Madhu Kumar

K.V. Rajendra Prasad

**Class & Semester:** M. Tech (DECS) I SEM.

S. No.	Topic	No. of periods	Book(s) followed	Topics for Self Study
<b>Unit I: An Introduction to Embedded Systems</b>				
1.	Embedded systems-definition, how are they different	2	T1	Embedded Design Life Cycle
2.	Challenges in Embedded Computing System Design	1	T1	
3.	Processor Embedded into a System, Selection Process	2	T1	
4.	Hardware Units and Devices in a System	1	T1	
5.	Exemplary Embedded Systems	2	T1	
6.	Embedded System -On-Chip (SOC) and use of VLSI Circuit Design Technology	1	T1	
7.	Classification of Embedded Systems	1		
<b>Total periods required:</b>		<b>10</b>		
<b>Unit II</b>				
8.	<b>Processor Architectures, Memory Organization and Real World Interfacing:</b>	2	T1	Examples

	Advanced Architectures			illustrating software architectures for bridge, Multimeter.
9.	Processor and Memory Organization, Performance Metrics	2	T1	
10.	Memory-Types, Maps and Addresses, Processor and Memory Selection.	2	T1	
11.	<b>Survey of Software Architectures:</b> Round-Robin	1	T2	
12.	Round- Robin with Interrupts	1	T2	
13.	Function-Queue Scheduling	2	T2	
14.	Real-Time Operating System Architectures	1	T2	
15.	Selecting Architecture	1	T2	
<b>Total periods required:</b>		<b>12</b>		
<b>Unit III: Programming Concepts and Embedded Programming in C, C++, VC++ and JAVA</b>				
16.	Software Programming in Assembly language and in High-Level languages	1	T1	ARM, SHARC architectures and their instruction sets.
17.	C Program Elements- Header, Source Files and Preprocessor Directives	2	T1	
18.	Macros and Functions	1	T1	
19.	Data Types	2	T1	
20.	Data Structures, Modifiers	2	T1	
21.	Statements, Loops and Pointers	1	T1	
22.	Embedded Object-Oriented Programming	1	T1	
23.	Introduction to programming in C++, Java	1	T1	
<b>Total periods required:</b>		<b>11</b>		
<b>Unit IV: Processes and Operating Systems</b>				
24.	Introduction	1	T3	Comparison of RTOS to General Purpose OS, Kernel Services.
25.	Multiple Tasks and Processes	2	T3	
26.	Pre-emptive RTOS	2	T3	
27.	Priority Based Scheduling	2	T3	

28.	Inter process Communication Mechanisms	1	T3	Design example: Telephone Answering Machine.
29.	Evaluation OS Performance	1	T3	
30.	Power Management and Optimization for Processes	2	T3	
<b>Total periods required:</b>		<b>11</b>		
<b>Unit V</b>				
31.	<b>Embedded Software Development</b> <b>TOOLS:</b> Host and Target Machines	2	T2	Debugging techniques
32.	Linkers/Locators for Embedded Software	1	T2	<b>Research Topic:</b>  Real Time System Characterization
33.	Getting Software into the Target System	1	T2	
34.	<b>System Design Techniques:</b> Introduction, Design Methodologies,	2	T3	
35.	Requirement Analysis	2	T3	
36.	Specifications	1	T3	
37.	System Analysis and Architecture Design	2	T3	
<b>Total periods required:</b>		<b>11</b>		
<b>Grand total periods required:</b>		<b>55</b>		

#### Text Books:

T1: Rajkamal, "Embedded systems: Architecture, Programming and Design", TMH, Second Edition, 2008.

T2: David E. Simon, "An embedded software primer", Pearson Education, 2008

T3: Wayne Wolf, "Computers as a component: principles of embedded computing system design", Morgan Kaufmann Publishers, Second Edition, 2008.

#### Reference Books:

R1: Arnold S Burger, "Embedded Systems Design: An Introduction to Processes, Tools, and Techniques", CMP Books

R2: Steve Heath, Butterworth Heinenann, "Embedded systems design: Real world design", Newton mass USA 2002.

**Signature(s) of the faculty Member(s)  
framing the syllabus**

**Signature of the Chairman (BOS)**

Department of Electronics and Communication Engineering

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**Lesson Plan**

**Name of the Subject: Linear Algebra (14MT13831)**

**Name of the faculty Member:**

**Class & Semester: M. Tech. I Semester (CMS & DECS)**

**Section: -**

S. No.	Topic	No. of periods required	Book(s) followed	Topics for self study
<b>Unit-I: VECTORS AND LINEAR EQUATIONS</b>				
1.	System of linear equations	1	T1,T2	Gauss Elimination method
2.	Vector equations	1	T1,T2	
3.	The matrix and vector equations $AX=B$ and $AX=0$	2	T1,T2	
4.	Solution sets of linear system	2	T1,T2	
5.	Linear combinations , Linear dependence and independence of vectors	1	T1,T2	
6.	Solutions of equations using LU decomposition	2	T1,T2	
Total of periods required:		<b>9</b>		
<b>Unit-II: VECTOR SPACES AND LINEAR TRANSFORMATIONS</b>				
7.	Vector spaces and subspaces	1	T1,T2	Change of basis
8.	Null and column Spaces of a matrix	1	T1,T2	
9.	Bases, Coordinate systems	1	T1,T2	
10.	Dimension of a Vector Space	1	T1,T2	
11.	Linear transformation, Properties of linear transformations	2	T1,T2	
12.	Rank and Nullity	2	T1,T2	
13.	Matrix of linear transformations	2	T1,T2	
Total of periods required:		<b>10</b>		
<b>Unit-III: INNER PRODUCT SPACES</b>				
14.	Inner product, Norm	1	T1,T2	Sylvester's law of inertia, positive definiteness.
15.	Inner product space,	2	T1,T2	
16.	Orthogonality	1	T1,T2	
17.	Orthogonal sets	1	T1,T2	
18.	Ortho normal basis	2	T1,T2	
19.	Orthogonal projections	1	T1,T2	
20.	Gram-Schmidt orthogonalisation process	2	T1,T2	
Total of periods required:		<b>10</b>		
<b>Unit-IV: EIGEN VALUES AND EIGEN VECTORS</b>				
21.	Eigen Values and Eigen Vectors of a matrices	2	T1,T2	Hermitian, skew Hermitian and Unitary matrices
22.	Eigen Values and Eigen Vectors of linear transformations	1	T1,T2	

23.	Eigen values and Eigen vectors of complex matrices	2	T1,T2	Eigen filters
24.	Diagonalisation,	2	T1,T2	
25.	Quadratic forms- Nature	2	T1,T2	
26.	Orthogonality of symmetric matrices	1	T1,T2	
27.	Singular value decomposition (SVD).	2	T1,T2	
Total of periods required:		<b>12</b>		
<b>Unit-V: ENGINEERING APPLICATIONS OF LINEAR ALGEBRA</b>				
28.	Applications to Difference equations- Discrete-time signals	3	T1	Network flows
29.	Linear Independence in the space signals	2	T1	
30.	Applications to Decoupling a dynamical system	3	T1	
31.	Complex Eigen Values in Decoupling systems	3	T1	
32.	Applications of inner product spaces to Fourier Series Analysis.	3	T1	
Total of periods required:		<b>14</b>		
<b>Grand total of periods required:</b>		<b>55</b>		

**TEXT BOOKS:**

T1. David C. Lay, **Linear Algebra and its applications**, Fourth edition, Pearson education, India. (2014).

T2. Jim DeFramza and Dan Gagliardi **Introduction to Linear Algebra with applications**, The McGraw. Hill Companies, India. (2012)

**REFERENCE BOOKS:**

R1. Gilbert Strang, **Introduction to Linear Algebra**, Fourth edition, South Asian edition, Cambridge Press. (2009).

R2. Otto Bretscher, **Linear Algebra with applications**, Third edition, Pearson education, India. (2007)

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**SREE VIDYANIKETHAN ENGINEERING COLLEGE  
(Autonomous)**

Sree Sainath Nagar, A. Rangampet-517 102

**Department of Electronics and communication Engineering**

**Lesson Plan**

**Name of the Subject:** LOW POWER CMOS VLSI (14MT13806)

**Class & Semester:** M. Tech. (DECS) – I Semester

**Name of the faculty Member:** M.BHARATHI

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
<b>UNIT – I: Power Dissipation in CMOS VLSI design:</b>				
1.	Need for low power VLSI chips	1	T1	Power dissipation in CMOS-short circuit dissipation, dynamic dissipation, Load Capacitance
2.	Sources of Power dissipation	1	T1	
3.	Power dissipation in MOS Devices	1	T1	
4.	Power dissipation in CMOS Devices	1	T1	
5.	Limitations of low Power design	1	T1	
<b>Total periods required:</b>		<b>5</b>		
<b>UNIT – II: Power Estimation:</b>				
6.	Modeling of Signals	1	T1	Power dissipation in Domino CMOS, Circuit Reliability, Power Estimation at circuit level, High level power estimation, Information Theory based approaches.
7.	Signal Probability Calculation	1	T1	
8.	Probabilistic Techniques for Signal activity Estimation	2	T1	
9.	Statistical Techniques	2	T1	
10.	Estimation of Glitching Power	1	T1	
11.	Sensitivity Analysis	1	T1	
12.	Power Estimation using input vector Compaction	2	T1	
13.	Estimation of Maximum Power	2	T1	
<b>Total periods required:</b>		<b>12</b>		
<b>UNIT -III: Synthesis for Low Power &amp; Design and Test of Low Voltage CMOS Circuits</b>				
14.	Behavioral Level Transforms	4	T1	Testing deep submicron IC's with Elevated Intrinsic Leakage, Key to Minimizing SCE
15.	Logic Level optimization of low power	1	T1	
16.	Circuit level	2	T1	
17.	Circuit Design Style	2	T1	
18.	Leakage current in Deep Sub micrometer Transistors	1	T1	
19.	Low voltage Circuit Design Techniques	2	T1	



20.	Multiple Supply Voltages	1	T1	
<b>Total periods required:</b>		<b>13</b>		
<b>UNIT -IV: Low Power Static RAM Architectures</b>				
21.	Organization of Static RAM	2	T1	Reducing power in the write driver circuits, Method for achieving low core voltages from a single supply
22.	MOS Static RAM Memory Cell	3	T1	
23.	Banked Organization of SRAMs	1	T1	
24.	Reducing Voltage Swing in Bit lines	2	T1	
25.	Reducing Power in Sense Amplifier Circuits	2	T1	
<b>Total periods required:</b>		<b>10</b>		
<b>UNIT -V: Low Energy Computing using Energy Recovery Techniques &amp; Software design for low power</b>				
26.	Energy Recovery Circuit Design	1	T1	Energy dissipation in transistor channel using an RC Model, Automated low power code generation. <b>Research Topics:</b> Current Reference Precharging Techniques for Low Power Zero Crossing Pipeline SAR ADC.
27.	Designs with partially Reversible logic	4	T1	
28.	Supply Clock Generation	1	T1	
29.	Sources of software power Estimation	2	T1	
30.	software power Optimizations	2	T1	
31.	Co-design for low power	2	T1	
<b>Total periods required:</b>		<b>12</b>		
<b>Grand total periods required:</b>		<b>52</b>		

#### TEXT BOOKS:

1. Kaushik Roy, Sharat Prasad, "Low-Power CMOS VLSI Circuit Design" Wiley Student Edition, 2000.

#### REFERENCE BOOKS:

1. Kiat-Seng Yeo, Samir S. Rofail and Wang-Ling Goh, "CMOS/BiCMOS ULSI: Low power, Low Voltage", Pearson education, 2002.

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### Department of Electronics and communication Engineering

#### Lesson Plan

**Name of the Subject:** Modern Digital Signal Processing (14MT13804)

**Class & Semester:** M. Tech. ( DECS) – I Semester

**Name of the faculty Member:** Ms. D. Leela Rani

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
<b>UNIT – I: MULTIRATE FILTER BANKS</b>				
1.	Decimation, Interpolation	1	T1	Discrete Wavelet Transform
2.	Sampling rate conversion by a rational factor I/D	2	T1	
3.	Multistage Implementation of sampling rate conversion	1	T1	
4.	<b>Digital Filter Banks:</b> Two-Channel Quadrature-Mirror Filter Bank,	2	T1	
5.	Elimination of aliasing, condition for Perfect Reconstruction	1	T1	
6.	Polyphase form of QMF bank,	1	T1	
7.	Linear phase FIR QMF bank, IIR QMF bank	2	T1	
8.	Perfect Reconstruction Two-Channel FIR QMF Bank	2	T1	
<b>Total periods required:</b>		<b>12</b>		
<b>UNIT II: POWER SPECTRAL ESTIMATIONS</b>				
9.	Estimation of spectra from finite duration observation of signals	2	T1	Correlation: auto and cross correlation and their properties. Spectrum and its properties
10.	<b>Non-Parametric Methods:</b> Bartlett,	1	T1	
11.	Welch	1	T1	
12.	Blackmann & Tukey methods	1	T1	
13.	Performance Characteristics of Nonparametric Power Spectrum Estimators,	1	T1	
14.	Computational Requirements of Nonparametric Power Spectrum Estimates	1	T1	
15.	<b>Parametric Methods:</b> Relation between auto correlation & model parameters	1	T1	
16.	Yule-Waker	1	T1	
17.	Burg Methods	1	T1	
18.	MA & ARMA models for power spectrum estimation	2	T1	
<b>Total periods required:</b>		<b>12</b>		
<b>UNIT – III: DEVELOPMENT OF ADAPTIVE FILTER THEORY &amp; SEARCHING THE PERFORMANCE SURFACE</b>				
19.	Introduction to Filtering, Smoothing and Prediction, Problem statement	1	T2	Three basic kinds of Estimation , linear optimum filters
20.	Linear Optimum Filtering	1	T2	
21.	Principle of Orthogonality - Minimum	1	T2	

	Mean Square Error			
22.	Wiener- Hopf equations	1	T2	
23.	Error Performance - Minimum Mean Square Error	1	T2	
24.	Methods & Ideas of Gradient Search methods, & its Solution	2	R1	
25.	Gradient Searching Algorithm	1	R1	
26.	Stability & Rate of convergence	1	R1	
27.	Learning Curves	1	R1	
<b>Total periods required:</b>		<b>10</b>		
<b>UNIT -IV: STEEPEST DESCENT ALGORITHMS, LMS ALGORITHM &amp; APPLICATIONS</b>				
28.	Gradient Search by Newton's Method	1	R1	Characterization of the Autoregressive process
29.	Method of Steepest Descent	1	R1	
30.	Comparison of Learning Curves	1	R1	
31.	<b>LMS Algorithm:</b> Overview - LMS Adaptation algorithms	1	T2	
32.	Stability & Performance analysis of LMS Algorithms	2	T2	
33.	LMS Gradient & Stochastic algorithms	1	T2	
34.	<b>Applications:</b> Noise cancellation	1	T2	
35.	Cancellation of Echoes in long distance telephone circuits	1	T2	
36.	Adaptive Beam forming	1	T2	
<b>Total periods required:</b>		<b>10</b>		
<b>UNIT – V: RLS ALGORITHM AND KALMAN FILTERING</b>				
37.	<b>RLS Algorithm</b> : Matrix Inversion lemma, exponentially weighted recursive least square algorithm	2	T2	Regularization, Recursive computation of time average correlation matrix  <b>Research Topics:</b> Speech and video processing , Source and channel coding/decoding, RADAR, LIDAR, Equalization.
38.	update recursion for the sum of weighted error squares	2	T2	
39.	convergence analysis of RLS Algorithm	2	T2	
40.	Application of RLS algorithm on Adaptive Equalization	2	T2	
41.	<b>Kalman Filtering:</b> Introduction, Recursive Mean Square Estimation Random variables	1	T2	
42.	The Innovations Process	1	T2	
43.	Estimation of the state using the Innovations Process	1	T2	
44.	Filtering, Initial conditions	2	T2	
<b>Total periods required:</b>		<b>13</b>		
<b>Grand total periods required:</b>		<b>57</b>		

**TEXT BOOKS:**

- T1. John G. Proakis, Dimitris G. Manolakis, "*Digital Signal Processing, Principles, Algorithms and Applications*", Prentice Hall, 4<sup>th</sup> Edition, 2007.
- T2. Simon Haykin, "*Adaptive Filter Theory*", 4<sup>th</sup> Edition, PE Asia, 2002.

**REFERENCE BOOKS:**

- R1. Bernard Widrow, Samuel D. Stearns, "*Adaptive Signal Processing*", PE, 1985.
- R2. Emmanuel C Ifecher Barrie. W. Jervis, "*DSP-A Practical Approach*", Pearson Education, 2<sup>nd</sup> Edition, 2002.

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**Lesson Plan**

**Name of the Subject: Research Methodology (14MT10310)**

**Name of the faculty Member:**

**Class & Semester: M. Tech. - I Semester**

**Section:**

S. No.	Topic	No. of periods required	Book(s) followed	Topics for self study
<b>Unit-I: Introduction to Research Methodology</b>				
1.	Research objective and Motivation	1	T1	Problems encountered by researchers.
2.	Types of Research –Descriptive vs Analytical, Applied vs Fundamental, Quantitative vs Qualitative, Conceptual vs Empirical	1	T1	
3.	Research Approaches	1	T1	
4.	Research and Scientific Methods	1	T1	
5.	Research Process	2	T1	
6.	Criteria of Good Research	1	T1	
Total of periods required:		<b>7</b>		
<b>Unit-II: Research Problem and Design</b>				
7.	What is Research Problem?	1	T1	Experimental designs. Developing research plan.
8.	Selecting the Problem	1	T1	
9.	Necessity of Defining the Problem	1	T1	
10.	Techniques involved in Defining a Problem	2	T1	
11.	What is Research Design? Its need and features	1	T1	
12.	Important concepts of Research Design	1	T1	
13.	Designing Methods: Research design in case of exploratory research studies, Research design in case of descriptive and diagnostic research studies, Research design in case of hypothesis-testing research studies	2	T1	
Total of periods required:		<b>9</b>		
<b>Unit-III: Data Collection, Analysis, and Hypothesis</b>				
14.	Collection of Primary Data: Observation Method, Interview Method, Questionnaires, Schedules, Other Methods	1	T1	Guidelines for constructing questionnaires and interviews.
15.	Collection of Secondary Data	1	T1	
16.	Selection of Appropriate Method for Data Collection	1	T1	
17.	Processing Operations: Editing, Coding, Classification and Tabulation	2	T1	
18.	Types of Analysis	1	T1	
19.	What is Hypothesis? Basic Concepts of Testing Hypothesis: Null hypothesis and alternative hypothesis, Level of significance,	2	T1	

	Decision rule, Type I and Type II errors, Two-tailed and One-tailed tests			
20.	Hypothesis Testing Procedure	1	T1	
Total of periods required:		<b>9</b>		
<b>Unit-IV: Statistics in Research</b>				
21.	Review of Statistical Techniques: Mean, Median, Mode	1	T1	Simple regression analysis.
22.	Geometric Mean, Harmonic Mean, Variance, Standard Deviation	1	T1	
23.	Measure of Asymmetry	1	T1	
24.	Normal Distribution	2		
25.	Chi-Square as a Test for Comparing Variance	1	T1	
26.	Steps Involved in Applying Chi-Square Test	1	T1	
27.	Problems	2		
Total of periods required:		<b>9</b>		
<b>Unit-V: Interpretation and Report Writing</b>				
28.	Interpretation: Meaning, Importance	1	T1	Mechanics of writing research report.
29.	Interpretation: Techniques and Precautions	1	T1	
30.	Report Writing: Significance and Different Steps	2	T1	
31.	Types of Reports	1	T1	
32.	Precautions in Report Writing	1	T1	
Total of periods required:		<b>6</b>		
<b>Grand total of periods required:</b>		<b>40</b>		

**Text Book:**

T1. C.R. Kothari, *Research Methodology: Methods and Techniques*, New Age International Publishers, New Delhi, 2<sup>nd</sup> Revised Edition, 2004.

**Reference Books:**

R1. Ranjit Kumar, *Research Methodology: A step-by-step guide for beginners*, Sage South Asia, 3<sup>rd</sup> ed., 2011.

R2. R. Panneerselvam, *Research Methodology*, PHI learning Pvt. Ltd., 2009

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**Department of Electronics and communication Engineering**

**Lesson Plan**

**Name of the Subject:** Transform Techniques (14MT13808)

**Class & Semester:** M. Tech. (CMS & DECS) – I Semester

**Name of the faculty Member:** Mr. K. V Koteswara Rao

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
<b>UNIT – I</b>				
1.	<b>Review of Transforms:</b> Vector space, functions and function spaces	1	T2	Parseval's Identity for the CWT, Inverse CWT as a many-to-One Operation.
2.	Fourier transform	2	T2	
3.	Short-Time Fourier Transform	2	T2	
4.	Walsh, Hadamard, Haar	1	R1	
5.	Slant, KLT, Hilbert transforms	1	R1	
6.	<b>Continuous Wavelet Transform:</b> Introduction, Continuous-Time Wavelets	1	T1	
7.	Definition of the CWT	1	T1	
8.	The CWT as a correlation	1	T1	
9.	Constant Q-Factor Filtering Interpretation and Time-Frequency Resolution	2	T1	
10.	The CWT as an operator	1	T1	
11.	Inverse CWT	1	T1	
<b>Total periods required:</b>		<b>14</b>		
<b>UNIT -II: DISCRETE WAVELET TRANSFORM AND ORTHOGONAL WAVELET DECOMPOSITION</b>				
12.	Introduction	1	T1	Regularity and convergence, Band limited Bi-orthogonal Decomposition, Design and Selection of Wavelets.
13.	Approximations of vectors in nested linear vector spaces	1	T1	
14.	Example of an MRA-Bases for the Approximation Subspaces and Harr Scaling Function	2	T1	
15.	Bases for the Detail Subspaces and Harr Wavelet	2	T1	
16.	Digital Filter Implementation of the Harr Wavelet Decomposition	2	T1	
<b>Total periods required:</b>		<b>08</b>		
<b>UNIT -III: MRA ORTHONORMAL WAVELETS, AND THEIR RELATIONSHIP TO FILTER BANKS</b>				
17.	Introduction	1	T1	Daubechies construction of Orthonormal Scaling
18.	Formal Definition of an MRA	1	T1	
19.	Construction of a General Orthonormal	2	T1	



	MRA			Functions.
20.	A Wavelet basis for MRA	2	T1	
21.	Digital Filtering Interpretation	1	T1	
22.	Examples of Orthogonal Basis Generating Wavelets	1	T1	
23.	Interpreting Orthonormal MRAs for Discrete time signals	2	T1	
24.	Miscellaneous issues Related to PRQMF Filter Banks	1	T1	
25.	Generating Scaling Functions and Wavelets from Filter Coefficients	1	T1	
<b>Total periods required:</b>		<b>12</b>		
<b>UNIT – IV: ALTERNATIVE WAVELET REPRESENTATIONS</b>				
26.	Bi-orthogonal Wavelet Bases	2	T1	M-Band Wavelets, Lifting Scheme.
27.	Filtering Relationship for Bi-orthogonal Filters	1	T1	
28.	Examples of Bi-orthogonal Scaling Functions and Wavelets	1	T1	
29.	Two-Dimensional Wavelets	2	T1	
30.	Non-separable Multidimensional Wavelets	1	T1	
31.	Wavelet Packets	2	T1	
<b>Total periods required:</b>		<b>09</b>		
<b>UNIT – V: APPLICATIONS OF WAVELETS</b>				
32.	Wavelet De-noising	2	T1	Wavelets in Boundary Value Problems. <b>Research Topics:</b> Adaptive Wavelet Transforms, Stationary Wavelet Transforms, Cycle Wavelet Transforms.
33.	Speckle Removal	1	T1	
34.	Edge Detection and Object Isolation	2	T1	
35.	Image Fusion	2	T1	
36.	Object Detection by Wavelet Transforms of Projections	1	T1	
37.	Scaling Functions as signaling pulses	2	T1	
38.	Discrete Wavelet Multitone Modulation	1	T1	
<b>Total periods required:</b>		<b>11</b>		
<b>Grand total periods required:</b>		<b>54</b>		

**Text Books:**

T1: Raghuvver M.Rao and Ajit S.Bopardikar, “*Wavelet Transforms-Introduction to theory and applications*”, Pearson edu, 1998.

T2: Soman.K.P, Ramachandran.K.I, Resmi.N.G, “*Insight into Wavelets from theory to Practice*”, PHI, Third Edition, 2010.

**Reference Books:**

R1. R. C. Gonzalez, R. E. Woods, “*Digital Image Processing,*” 2nd Edition, Pearson Education, 1992.

R2: Jaideva C Goswami, Andrew K.Chan, “*Fundamentals of Wavelets-Theory, Algorithms and Applications*”, John Wiley and sons, 1999.

R3: C.Sidney Burrus, Ramesh A Gopinath and Haitao Guo, “*Introduction to Wavelets and Wavelet Transforms*”, Prentice Hall, 1998.

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