SREE VIDYANIKETHAN Engineering College (Autonomous) Accredited by NAAC with 'A' Grade

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

Sree Sainath Nagar, A. Rangampet-517 102

Department of Electronics and communication Engineering

Lesson Plan

Name of the Subject: Adaptive Signal Processing (14MT26101)

Class & Semester: M. Tech. (CMS) – II Semester

Name of the faculty Member: Mr T.Ravisekhar

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
UNIT – I: **INTRODUCTION TO ADAPTIVE SYSTEMS& DEVELOPMENT OF ADAPTIVE FILTER THEORY**				
1.	Definitions, Characteristics, Applications, Example of an Adaptive System	1	T2	Hermittan Matrix Properties
2.	The Adaptive Linear Combiner	1	T2	
3.	Weight Vectors, Desired Response Performance function	1	T2	
4.	Gradient & Mean Square Error	1	T2	
5.	Introduction to Filtering, Smoothing and Prediction, Problem statement	2	T1	
6.	Linear Optimum Filtering	1	T1	
7.	Principle of Orthogonality - Minimum Mean Square Error	1	T1	
8.	Wiener- Hopf equations	1	T1	
9.	Error Performance - Minimum Mean Square Error	1	T1	
	Total periods required:	**10**		
UNIT – II: **SEARCHING THE PERFORMANCE SURFACE & STEEPEST DESCENT ALGORITHMS**				
10.	Methods & Ideas of Gradient Search methods, & its Solution	2	T1	Three basic kinds of Estimation , linear optimum filters
11.	Gradient Searching Algorithm	1	T1	
12.	Stability & Rate of convergence	1	T1	
13.	Learning Curves	1	T1	
14.	Gradient Search by Newton's Method	1	T1	
15.	Method of Steepest Descent	1	T1	
16.	Comparison of Learning Curves	1	T1	
	Total periods required:	**8**		
UNIT -III: **LMS& RLS ALGORITHMS**				
17.	Overview - LMS Adaptation algorithms	1	T1	Characterization of the Autoregressive process
18.	Stability & Performance analysis of LMS Algorithms	2	T1	
19.	LMS Gradient & Stochastic algorithms	1	T1	
20.	Noise cancellation, Cancellation of		T2	

	Echoes in long distance telephone circuits and Adaptive Beam forming	2		
21.	Matrix Inversion lemma, exponentially weighted recursive least square algorithm	2	T2	
22.	update recursion for the sum of weighted error squares	2	T2	
23.	convergence analysis of RLS Algorithm	2	T2	
24.	Application of RLS algorithm on Adaptive Equalization	1	T2	
	Total periods required:	**13**		
	UNIT – IV: KALMAN FILTERING& NON LINEAR ADAPTIVE FILTERING			
25.	Introduction, Recursive Mean Square Estimation Random variables	2	T2	Regularization, Recursive computation of time average correlation matrix,
26.	The Innovations Process	1	T2	
27.	Estimation of the state using the Innovations Process	2	T2	
28.	Filtering	1	T2	
29.	Initial conditions	1	T2	
30.	Variants of Kalman filtering	2	T2	
31.	Blind Deconvolution	1	T2	
32.	Buss Gang Algorithm for blind Equalization	2	T2	
	Total periods required:	**12**		
	UNIT – V: ORDER-RECURSIVE ADAPTIVE FILTERS			
33.	Gradient-Adaptive Lattice Filter	2	T2	Sato Algorithm, Godard Algorithm **Research Topics:** Nonlinear System Identification, Signal and Information Processing EEG Bio-acoustics and sonar Secure signal processing
34.	order-recursive adaptive filters using least square estimation	1	T2	
35.	adaptive forward linear prediction, adaptive backward linear prediction	2	T2	
36.	conversion factor, l east-square lattice predictor	2	T2	
37.	angle normalized estimation errors	1	T2	
38.	first order state space models for lattice filtering	1	T2	
39.	QR-Decomposition-Based Least-Squares Lattice Filters, Recursive Least-Squares lattice Filters Using a Posteriori Estimation Errors	3	T2	
	Total periods required:	**12**		
	Grand total periods required:	**55**		

TEXT BOOKS:

T1. Bernard Widrow, Samuel D. Strearns, *Adaptive Signal Processing,* PE, 1985.

T2. Simon Haykin, *Adaptive Filter Theory,* 4th Edition, PE Asia, 2002.

REFERENCE BOOKS:

R1. Alexander D Poularikas & zayed m Ramadan, CRC, *Adaptive Filtering Primer with MATLAB,* Taylor & Francis group.

R2. Sophocles. J. Orfamadis, *Optimum signal processing: An introduction,* 2nd Edition, McGraw-Hill, Newyork, 1988.

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: Detection and Estimation of Signals (14MT23806)
Class & Semester: M. Tech. (CMS) – II Semester
Name of the faculty Member: Ms. H.D.Praveena

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
UNIT – I: Detection Theory				
1.	Maximum-likelihood decision criterion	1	T1	Neyman-Pearson criterion for Radar detection of variable amplitude signals, Conditional Probability density function, Bayes' Theorem, Q Function.
2.	Neyman-Pearson criterion	2	T1	
3.	Probability-of-error criterion	2	T1	
4.	Bayes risk criterion	1	T1	
5.	Min-max criterion	1	T1	
6.	Receiver operating characteristics	2	T1	
7.	Problems	3	T1	
Total periods required:		**12**		
UNIT – II: Binary Decisions: Multiple Observations				
8.	Vector observations	2	T1	Properties of Gaussian Probability density function, Concept of Convolution, Whitening Process.
9.	The general Gaussian problem	2	T1	
10.	Waveform Observation in Additive Gaussian Noise	1	T1	
11.	The Integrating Optimum Receiver	2	T1	
12.	Matched Filter Receiver	2	T1	
13.	problems	2	T1	
Total periods required:		**11**		
UNIT -III: Estimation Theory				
14.	Maximum likelihood estimation	1	T1	Mean & Median of Conditional Probability density function, Multiple parameter Estimation, Sequential Estimation.
15.	Bayes estimation criterion: Mean Square Error Criterion	1	T1	
16.	Uniform Cost Function	1	T1	
17.	Absolute-Value Cost Function	1	T1	

18.	Linear Minimum-Variance Method	2	T1	
19.	Least-Squares Method	1	T1	
20.	Estimation in the presence of Gaussian noise	1	T1	
21.	Linear observation	1	T1	
22.	Non-linear estimation	2	T1	
23.	problems	1	T1	
	Total periods required:	**12**		
	UNIT – IV: Properties Of Estimators			
24.	Bias	1	T1	Performance evaluation of Estimators when imperfect source and channel models are used.
25.	Efficiency	2	T1	
26.	Cramer-Rao bound	2	T1	
27.	Asymptotic properties	1	T1	
28.	Sensitivity and error analysis	1	T1	
29.	Problems	1	T1	
	Total periods required:	**08**		
	UNIT – V: State Estimation & Statistical Estimation of Parameters			
30.	**State Estimation:** Prediction	2	T1	Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh density functions. **Research topics:** Extended Kalman filter, Super resolution Array Processing.
31.	Kalman filter	2	T1	
32.	Problems	2	T2	
33.	**Statistical Estimation of Parameters:** Concept of sufficient statistics	1	R2	
34.	Exponential families of Distributions	1	R2	
35.	Exponential families and Maximum likelihood estimation	2	R2	
36.	Uniformly minimum-variance unbiased estimation	1	R2	
	Total periods required:	**11**		
	Grand total periods required:	**54**		

Text Books:

T1: James L.Melsa & David L.Cohn, “Decision and Estimation Theory”, McGraw Hill, 1978.

T2: Steven M. Kay, “Fundamentals of Statistical Signal Processing Vol. 1: Estimation Theory, Prentice Hall,
1993, Vol. 2: Detection Theory”, Prentice Hall Inc., 1998.

Reference Books:

R1: Harry L. Van Trees, “Detection, Estimation and Modulation Theory”, Part 1, John Wiley & Sons Inc. 1968.

R2: Jerry M. Mendel, “Lessons in Estimation Theory for Signal Processing, Communication and Control”, Prentice Hall Inc., 1995.

R3: Sophocles J.Orfanidis, “Optimum Signal Processing”, McGraw Hill, 2nd edition, 1988.

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Department of Electronics and communication Engineering

Lesson Plan

Name of the Subject: EMI/EMC **(14MT26103)**
Class & Semester: M. Tech. (CMS) – II Semester
Name of the faculty Member: A.Nagaraju

S.No	Topic	No. of periods	Book(s) followed	Topics for self study
UNIT-I: Introduction and Sources of EMI and Nonideal Behavior of Components				
1.	Concepts and Definition of EMI and EMC	1	T1	Non ideal behaviour of Ferromagnetic Materials, Ferrite Beads, Electromechanical Devices
2.	Natural and man-made EMI sources	3	T1	
3.	Non-ideal behaviour of components-Wires, printed circuit board (PCB) lands, effect of component leads	3	T2	
4.	Non ideal behaviour of resistors, capacitors, inductors	3	T2	
Total periods required		10		
UNIT-II: EMI/EMC Standards and Open Area Test Sites				
5.	Introduction - Standards for EMI/EMC, MIL, STD 461 /462, IEEE/AXSI Standards , CISPR/IEC Standards, FCC regulations	2	T1	
6.	open area test site measurements	1	T1	
7.	Measurement precautions ,open area test site	2	T1	
8.	Terrain Roughness, Normalized Site Attenuation,	2	T1	
9.	Measurement of test site imperfections	2	T1	
10.	Antenna factor measurement, Measurement errors	1	T1	
Total periods required		10		
UNIT-III: Radiated Interference and Conducted Interference Measurements				
11.	Anechoic chamber	2	T1	Crosstalk
12.	Transverse Electromagnetic Cell	2	T1	
13.	Reverberating chamber	1	T1	
14.	Giga-Hertz TEM Cell	1	T1	
15.	Comparison of test facilities	1	T1	
16.	Characterization of conduction currents/voltages	1	T1	
17.	Conducted EM noise on power supply lines	1	T1	

18.	Conducted EMI from equipment	1	T1	
19.	Immunity to conducted EMI , Detectors and measurement	1	T1	
Total periods required		11		
UNIT – IV: Grounding, Shielding and Bonding				
20.	Principles and Practice of Earthing	2	T1	
21.	Precautions in Earthing, Measurements of ground resistance	2	T1	
22.	System grounding for EMC, Cable shield Grounding	1	T1	
23.	Shielding Theory and Effectiveness, ,	2	T1	
24.	Shielding Materials, Shielding Integrity at discontinuities	2	T1	
25.	Conductive coatings, Cable shielding, Shielding Effectiveness measurements	2	T1	
26.	Electrical Bonding.	2	T1	
Total periods required		13		
UNIT – V: EMC Filters, Cables, Connectors and Components				
27.	Characteristics and Types of Filters	3	T1	**Research Topic:** New methods for calculating attenuation, Shielding effectiveness measurement techniques, EMI Noise filters
28.	Power Line filter Design - Common mode filter, Differential mode filter, Combined CM and DM filter	1	T1	
29.	EMI suppression cables	2	T1	
30.	EMC connectors	2	T1	
31.	Knitted WireMesh Gaskets, Wire Screen Gaskets, Oriented Wire mesh, Conductive Elastomer, Transparent Conductive windows, Conductive Adhesive, Conductive Grease. Conductive Coatings.	1	T1	
32.	Isolation transformers. Opto Isolators.	1	T1	
Total periods required		10		
Grand total periods required:		54		

Text Books

T1: V.Prasad Kodali, “Engineering Electromagnetic Compatibility”, S.Chand & company Ltd., 1st edition, 2000.

T2: Clayton R. Paul, “Introduction to Electromagnetic Compatibility”, John Wiley and Sons, 2nd edition, 2008.

Reference books

R1: Christos Christopoulos, “Principles and Techniques of Electromagnetic Compatibility”, CRC Press (Taylor & Francis Group) 2nd edition, 2007.

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Department of Electronics and communication Engineering

Lesson Plan

Name of the Subject: Information Theory and Coding Techniques **(14MT23802)**
Class & Semester: M. Tech. (CMS) – I Semester
Name of the faculty Member: P.Padmaja

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
	UNIT – I: INTRODUCTION			
1.	**Entropy:** Discrete stationary sources, Markov sources	2	T1	The entropy power inequality and the Brunn–Minkowski Inequality, Lempel-Ziv coding, Arithmetic coding.
2.	Entropy of a discrete Random variable- Joint, conditional, relative entropy, Mutual Information and conditional mutual information	2	T1	
3.	Chain rules for entropy, relative entropy and mutual Information	1	T1	
4.	Differential Entropy - Joint, relative, conditional differential entropy and Mutual information	1	T1	
5.	**Loss less Source coding:** Uniquely decodable codes	1	T1	
6.	Instantaneous codes	1	T1	
7.	Kraft’s inequality	1	T1	
8.	Optimal codes	1	T1	
9.	Huffman code	1	T1	
10.	Shannon’s Source Coding Theorem	1	T1	
	Total periods required:	**12**		
	UNIT –II: CHANNEL CAPACITY			
11.	Capacity computation for some simple channels	1	T1	Rate distortion
12.	Channel Coding Theorem,	1	T1	
13.	Fano’s inequality and the converse to the Coding Theorem,	1	T1	
14.	Equality in the converse to the coding theorem	1	T1	
15.	The joint source Channel Coding Theorem	1	T1	
16.	The Gaussian channels- Capacity	2	T1	

	calculation for Band limited Gaussian channels			Theory, Arimoto-Blahut algorithm.
17.	Parallel Gaussian Channels	2	T1	
18.	Capacity of channels with colored Gaussian noise	1	T1	
Total periods required:		**10**		
UNIT -III: CHANNEL CODING-1				
19.	**Linear Block Codes:** Introduction to Linear block codes	1	T2	Error probability after decoding, Structured Sequences, Usefulness of the Standard Array.
20.	Generator Matrix	1	T2	
21.	Systematic Linear Block codes	1	T2	
22.	Encoder Implementation of Linear Block Codes	1	T2	
23.	Parity Check Matrix	1	T2	
24.	Syndrome testing	1	T2	
25.	Error Detecting and correcting capability of Linear Block codes	1	T2	
26.	Application of Block codes for error control in data storage Systems	1	T2	
Total periods required:		**08**		
UNIT – IV: CHANNEL CODING-2				
27.	**Cyclic Codes:** Algebraic Structure of Cyclic Codes	1	T2	Trellis-Coded Modulation-The Idea Behind Trellis-Coded Modulation (TCM), TCM Encoding, TCM Decoding.
28.	Binary Cyclic Code Properties	1	T2	
29.	Encoding in Systematic Form ,Systematic Encoding with an (n - k)-Stage Shift Register	1	T2	
30.	Error Detection with an (n - k)-Stage Shift Register	1	T2	
31.	Well-Known Block Codes-Hamming Codes	1	T2	
32.	Extended Golay Code	1	T2	
33.	BCH Codes	1	T2	
34.	**Convolutional Codes:** Convolution Encoding	1	T2	
35.	Convolutional Encoder Representation	1	T2	
36.	Formulation of the Convolutional Decoding Problem	1	T2	
37.	Properties of Convolutional Codes	1	T2	

38.	Sequential Decoding	1	T2	
39.	Feedback Decoding	1	T2	
40.	Application of Viterbi and sequential decoding.	1	T2	
Total periods required:		**14**		
UNIT – V: CHANNEL CODING-3				
41.	Reed-Solomon Codes- Reed-Solom1on Error Probability	1	T2	**Research Topics**: Applications of Reed Solomon codes in Deep space Telecommunications
42.	Finite Fields, Reed-Solomon Encoding	1	T2	
43.	Reed-Solomon Decoding	1	T2	
44.	Interleaving and Concatenated Codes- Block Interleaving	1	T2	
45.	Convolutional Interleaving	1	T2	
46.	Concatenated Codes	1	T2	
47.	Coding and Interleaving Applied to the Compact Disc Digital Audio System- CIRC Encoding	1	T2	
48.	CIRC Decoding	1	T2	
49.	Turbo Codes- Turbo Code Concepts	1	T2	
50.	Encoding with Recursive Systematic Codes	1	T2	
51.	A Feedback Decoder	1	T2	
52.	The MAP Decoding Algorithm	1	T2	
Total periods required:		**12**		
Grand Total periods required:		**56**		

Text Books:

T1: Thomas M. Cover and Joy A. Thomas, Elements of Information Theory, John Wiley & Sons, 1 st Edition,1999.

T2: Bernard sklar, “Digital Communications – Fundamental and Application”, Pearson Education, 2 nd Edition, 2009.

Reference Books:

R1: John G. Proakis, “Digital Communications”, Mc. Graw Hill Publication, 5th Edition, 2010.

R2: SHU LIN and Daniel J. Costello, Jr., “Error Control Coding – Fundamentals and Applications”, Prentice Hall , Second Edition, Prentice Hall ,2002.

R3: R. J. McEliece, The Theory of Information & Coding, Addison Wesley Publishing Co., 1977.

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SREE VIDYANIKETHAN ENGINEERING COLLEGE

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Department of Electronics and communication Engineering

Lesson Plan

Name of the Subject: Radar Signal Processing (14MT26104)

Class & Semester: M. Tech. (CMS) – II Semester

Name of the faculty Member: Ms.G. Madhavilatha

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
UNIT – I: RANGE EQUATION AND MATCHED FILTER				
1.	Introduction to Radar	1	T3	System losses, Probability of detection and false alarm, Applications of radar
2.	Radar Block Diagram	1	T3	
3.	Radar Equation, Information Available from Radar Echo	1	T3	
4.	Review of Radar Range Performance– General Radar Range Equation	1	T2	
5.	Radar Detection with Noise Jamming	1	T2	
6.	Beacon and Repeater Equations	1	T2	
7.	Bistatic Radar	1	T2	
8.	Matched Filter Receiver – Impulse Response	1	T1	
9.	Frequency Response Characteristic and its Derivation	1	T1	
10.	Matched Filter and Correlation Function	1	T1	
11.	Correlation Detection and Cross-Correlation Receiver	1	T1	
12.	Efficiency of Non-Matched Filters	1	T1	

13.	Matched Filter for Non-White Noise	1	T1	
	Total periods required:	**13**		
	UNIT – II: DETECTION OF RADAR SIGNALS IN NOISE			
14.	Detection Criteria – Neyman-Pearson Observer	1	T1	Integrators- Moving window, binary integration.
15.	Likelihood-Ratio Receiver, Inverse Probability Receiver	1	T1	
16.	Sequential Observer	1	T1	
17.	Detectors –Envelope Detector, Logarithmic Detector, I/Q Detector	2	T1	
18.	Automatic Detection - CFAR Receiver	1	T1	
19.	Cell Averaging CFAR Receiver	1	T1	
20.	CFAR Loss, CFAR Uses in Radar	1	T1	
21.	Schematics, Component Parts, Resources and Constraints	2	T1	
	Total periods required:	**10**		
	UNIT III: WAVEFORM SELECTION			
22.	Radar Ambiguity Function and Ambiguity Diagram – Principles and Properties	2	T1	Weather clutter, sea clutter, other sources of atmospheric echoes
23.	Specific Cases – Ideal Case, Single Pulse of Sine Wave	1	T1	
24.	Periodic Pulse Train, Single Linear FM Pulse, Noise like Waveforms	1	T1	
25.	Waveform Design Requirements	1	T1	

26.	Introduction to clutter, surface clutter	2	T1	
27.	Land clutter	1	T1	
28.	Detection of targets in clutter	1	T1	
	Total periods required:	**09**		
	UNIT IV: PULSE COMPRESSION IN RADAR SIGNALS			
29.	Introduction, Significance, Types	1	T1	Factors affecting the choice of pulse compression system
30.	Linear FM Pulse Compression – Block Diagram	1	T1	
31.	Linear FM Pulse Compression – Characteristics	1	T1	
32.	Reduction of Time Side lobes, Stretch Techniques	2	T1	
33.	Generation and Decoding of FM Waveforms – Block Schematic and Characteristics of Passive System	1	T2	
34.	Digital Compression	1	T3	
35.	SAW Pulse Compression	1	T3	
	Total periods required:	**08**		
	UNIT V: PHASE CODING TECHNIQUES			
36.	Principles, Binary Phase Coding	1	T2	Welti codes, variants of barker code, comparison of pulse compression waveforms. **Research Topics:** Synthetic Aperture Radars & Imaging Radars
37.	Barker Codes	1	T2	
38.	Maximal Length Sequences (MLS/LRS/PN)	1	T2	
39.	Block Diagram of a Phase Coded CW Radar	1	T2	
40.	Poly phase codes- Frank Codes, Costas Codes	1	T1	
41.	Non-Linear FM Pulse Compression	1	T1	
42.	Doppler Tolerant PC Waveforms – Short Pulse	1	T1	

43.	Linear Period Modulation (LPM/HFM)	1	T1	
44.	Sidelobe Reduction for Phase Coded PC Signals	1	T1	
45.	Complementary Codes, Huffman Codes	1	T1	
46.	Limiting in Pulse Compression	1	T1	
47.	Cross-Correlation Properties, Compatibility	1	T1	
	Total periods required:	**13**		
	Grand total periods required:	**53**		

TEXT BOOKS:

T1. M.I. Skolnik, "*Introduction to Radar Systems*", TMH, 3rd Edition, 2001.

T2. Fred E. Nathanson, "*Radar Design Principles – Signal Processing and The Environment*", McGraw Hill, Inc, 2nd Edition,1991.

T3. M.I. Skolnik, *Radar Handbook*, McGraw Hill, 2nd Edition, 1991.

REFERENCE BOOKS:

R1. Peyton Z. Peebles Jr, "*Radar Principles*", John Wiley, 1998.

R2. R. Nit berg, *Radar Signal Processing and Adaptive Systems*, Artech House, 1999.

R3. F.E. Nathanson, *Radar Design Principles*, 1st Edition, McGraw Hill, 1969

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Department of Electronics and communication Engineering

Lesson Plan

Name of the Subject: Software Defined Radio (14MT26102)
Class & Semester: M. Tech. (CMS) – II Semester
Name of the faculty Member: Dr. V. R. Anitha

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
UNIT – I: INTRODUCTION TO SOFTWARE RADIO CONCEPTS				
1.	The need for Software radios and its definition	1	T1	Issues in spectrum sensing, Sensing interference limit
2.	Characteristics and benefits of Software radio	1	T1	
3.	Design principles of a software radio.	1	T1	
4.	**Radio Frequency Implementation Issues**: Purpose of RF front – end	1	T1	
5.	Dynamic range	1	T1	
6.	RF receiver front – end topologies	2	T1	
7.	Enhanced flexibility of the RF chain with software radios, Importance of the components to overall performance	2	T1	
8.	Transmitter architectures and their issues	1	T1	
9.	Noise and distortion in the RF chain	2	T1	
10.	ADC & DAC distortion, Pre-distortion	1	T1	
11.	Flexible RF systems using micro-electromechanical systems	1	T1	
Total periods required:		**14**		
UNIT – II: MULTIRATE SIGNAL PROCESSING IN SDR				
12.	Sample rate conversion principles	2	T1	Digital filtering, spectral analysis, speech coding, and analog to digital conversion
13.	Polyphase filters	2	T1	
14.	Digital filter banks	2	T1	
15.	Timing recovery in digital receivers using multirate digital filters	2	T1	
Total periods required:		**08**		
UNIT -III: DIGITAL GENERATION OF SIGNALS				
16.	Introduction	1	T1	Sine-phase and Modified Sine-phase Difference Algorithm Approach
17.	Comparison of direct digital synthesis with analog signal synthesis	1	T1	
18.	Approaches to direct digital synthesis	2	T1	
19.	Analysis of spurious signals	2	T1	
20.	Spurious components due to periodic jitter	1	T1	
21.	Bandpass signal generation	1	T1	
22.	Performance of direct digital synthesis systems	1	T1	

23.	Hybrid DDS – PLL Systems	1	T1	
24.	Applications of direct digital synthesis	1	T1	
25.	Generation of random sequences	1	T1	
26.	ROM compression techniques	1	T1	
Total periods required:		**13**		
UNIT – IV: SMART ANTENNAS				
27.	Introduction	1	T1	Trade-offs in using DSPs, FPGAs, and ASICs
28.	Vector channel modelling	1	T1	
29.	Benefits of smart antennas, Structures for beamforming systems	1	T1	
30.	Smart antenna algorithms	1	T1	
31.	Diversity and Space time adaptive signal processing	1	T1	
32.	Algorithms for transmit STAP	2	T1	
33.	Hardware implementation of smart antennas	1	T1	
34.	Array calibration	1	T1	
35.	Digital Hardware Choices - Key hardware elements	1	T1	
36.	DSP processors, FPGAs	2	T1	
37.	Power management issues	1		
Total periods required:		**13**		
UNIT – V: OBJECT ORIENTED REPRESENTATION OF RADIOS AND NETWORK				
38.	Networks, Object –oriented programming	1	T1	CHARIOT **Research Topics :** Spectrum Sensing in Multichannel Networks, Spectrum management issues
39.	Object brokers	1	T1	
40.	Mobile application environments	1	T1	
41.	Joint Tactical radio system.	1	T1	
42.	**Case Studies in Software Radio Design**: SPEAKeasy	1	T1	
43.	JTRS , Brief introduction to Cognitive Networking.	1	T1	
44.	Wireless Information transfer system	1	T1	
45.	SDR-3000 digital transceiver subsystem	1	T1	
46.	Spectrum Ware	1	T1	
47.	Brief introduction to Cognitive Networking	1	T1	
Total periods required:		**10**		
Grand total periods required:		**58**		

Text Books:

T1: Jeffrey Hugh Reed, “Software Radio: A Modern Approach to Radio Engineering,” Prentice Hall Professional, 2002.

T2: Paul Burns, “Software Defined Radio for 3G,” Artech House, 2002.

Reference Books:

R1: Tony J Rouphael, “RF and DSP for SDR,” Elsevier Newnes Press, 2008.

R2: P. Kenington, “RF and Baseband Techniques for Software Defined Radio,” Artech House, 2005.

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Department of Electronics and Communication Engineering

Lesson Plan

Name of the Subject: TELEMETRY AND TELECONTROL (14MT26105)

Name of the faculty Member: G. Guru Prasad

Class & Semester: M.Tech & II Semester **Specialization: CMS**

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
UNIT – I: Telemetry Principles				
1.	Introduction	1	T1	comparators
2.	Functional blocks of Telemetry system	2	T1	
3.	Classification of Telemetry systems	1	T1	
4.	Non Electrical Telemetry systems	1	T1	
5.	Electrical, Pneumatic Telemetry systems	1	T1	
6.	Frequency Telemetry systems	1	T1	
7.	Power Line Carrier Communication	1	T1	
	Total periods required:	**08**		
UNIT – II: Symbols And Codes				
8.	Bits and Symbols	1	T1	Manchester encoding
9.	Time function pulses	1	T1	
10.	Line and Channel Coding	2	T1	
11.	Modulation Codes	2	T1	
12.	Intersymbol Interference	1	T1	
	Total periods required:	**07**		
UNIT III: Frequency Division & Time Division Multiplxed Systems				
13.	FDM system	1	T1	Phase locked loop
14.	IRIG Standard	1	T1	
15.	FM Circuits using varactor diode	1	T1	
16.	FM Circuits using clap oscillator	1	T1	
17.	Reactance variation type PM circuit	1	T1	
18.	Transistor type PM circuit	1	T1	
19.	PLL demodulator	1	T1	
20.	TDM-PAM systems	1	T1	
21.	PAM and PM systems	1	T1	
22.	PCM reception	1	T1	
23.	Differential PCM	1	T1	
24.	QAM Protocols	2	T1	
	Total periods required:	**13**		
UNIT IV: Satellite & Optical Telemetry				
25.	General considerations	1	T1	FDMA, TDMA, CDMA
26.	TT&C Service	1	T1	

27.	Digital Transmission systems	2	T1	
28.	TT&C Subsystems	2	T1	
29.	satellite Telemetry and Communications	1	T1	
30.	Optical fibers Cable – dispersion, losses	1	T1	
31.	connectors and splicers	1	T1	
32.	Sources and detectors	1	T1	
	Total periods required:	**10**		
UNIT V: Telecontrol Methods				
33.	Analog techniques in Telecontrol	2	T2	**Research topics:** Radio telemetry and remote control, long range closed loop telemetry.
34.	Digital techniques in Telecontrol	2	T2	
35.	Remote adjustment	2	T2	
36.	Guidance and regulation	2	T2	
37.	Telecontrol using information theory	2	T2	
38.	Example of a Telecontrol System	2	T2	
		12		
	Total periods required:	**50**		
	Grand total periods required:			

TEXT BOOKS:

T1. D. Patranabis, Telemetry Principles, Tata McGraw-Hill, 1999

T2. Swoboda G., Telecontrol Methods and Applications of Telemetry and Remote Control, Reinhold Publishing Corp., London, 1991

REFERENCES:

R1. Gruenberg L., Handbook of Telemetry and Remote Control, McGraw Hill, New York, 1987.

R2. Young R.E., Telemetry Engineering, Little Books Ltd., London, 1988.

R3. Housley T.,Data Communication and Teleprocessing System, PH Intl., Englewood Cliffs, New Jersey, 1987.

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SREE VIDYANIKETHAN ENGINEERING COLLEGE
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Sree Sainath Nagar, A. Rangampet-517 102
Department of Electronics and Communication Engineering

Lesson Plan

Name of the Subject: Wireless Communications (14MT23805)
Class & Semester: M. Tech. (DECS & CMS) – II Semester
Name of the faculty Member: Dr. C. Subhas

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
UNIT – I: INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS AND CELLULAR CONCEPT				
1.	Evolution of Mobile Radio Communication Systems	1	T1	Mobile radio systems around the world, Wireless local loop, WLAN, Bluetooth and PANs, Handoff strategies.
2.	Examples of Wireless Communication Systems	1	T1	
3.	Wireless Cellular Networks and Standards – 1G	1	T1	
4.	2G	1	T1	
5.	2.5G	1	T1	
6.	3G	1	T1	
7.	Frequency Reuse Concept	1	T1	
8.	Channel Assignment Strategies		T1	
9.	Interference and System Capacity	2	T1	
10.	Trunking and Grade of Service	1	T1	
11.	Improving Coverage and Capacity in Cellular Systems - cell splitting and sectoring	1	T1	
	Total periods required:	**11**		
UNIT – II: MOBILE RADIO PROPAGATION				
12.	**Large Scale Path Loss**: Introduction	1	T1	Simulation of Clarke's and Jake's models.
13.	Free Space Propagation Model		T1	
14.	Relating Power to Electric field	1	T1	
15.	Propagation Mechanisms – Reflection	2	T1	
16.	Diffraction and Scattering	1	T1	
17.	Practical Budget Design using Path Loss Models	1	T1	
18.	Outdoor Propagation Models	1	T1	
19.	Indoor Propagation Models	1	T1	
20.	**Small Scale Fading and Multipath**: Small Scale Multipath Propagation	1	T1	
21.	Impulse Response Model of a Multipath Channel	1	T1	
22.	Small Scale Multipath Measurements	1	T1	
23.	Parameters of Mobile Channels	1	T1	
24.	Types of Small Scale Fading (all variations)	1	T1	
25.	*Statistical Models* – Clarke's Model for Flat Fading	1	T1	
26.	Jake's Model	1	*	
	Total periods required:	**15**		

UNIT -III: EQUALIZATION & DIVERSITY TECHNIQUES				
27.	**Equalization**: Introduction, Survey of Equalization Techniques	2	T1	Fundamentals of Equalization, Training a generic adaptive equalizer, Fractionally Spaced Equalizers.
28.	Linear Equalizers – Linear Transversal Equalizer		T1	
29.	Non-linear Equalizers - Decision Feedback Equalizer (DFE)		T1	
30.	Algorithms for Adaptive Equalization – Zero Forcing	2	T1	
31.	LMS		T1	
32.	RLS		T1	
33.	**Diversity Techniques**: Realization of Independent Fading Paths	1	T2	
34.	Receiver Diversity – System Model	1	T2	
35.	Selection Combining and Threshold Combining	1	T2	
36.	Maximal Ratio Combining and Equal Gain Combining	1	T2	
37.	Rake receiver	1	T1	
38.	Transmit Diversity–Channel known at Transmitter	1	T2	
39.	Channel unknown at Transmitter – the Alamouti Scheme, analysis.	1	T2	
	Total periods required:	**11**		
UNIT – IV: MULTIPLE ACCESS TECHNIQUES & NETWORKING				
40.	**Introduction to Multiple Access**: FDMA, TDMA,	1	T1	FDD and TDD duplex techniques, Capture effect in packet radio, ISDN, SS7.
41.	CDMA and SDMA	1	T1	
42.	Packet Radio-Pure ALOHA, Slotted ALOHA	1	T1	
43.	CSMA, and reservation protocols.	1	T1	
44.	Capacity of Cellular Systems – Cellular CDMA	1	T1	
45.	**Introduction to Wireless Networking**: Introduction to Wireless Networks	1	T2	
46.	Differences between Wireless and Fixed Telephone Networks	1	T2	
47.	Development of Wireless Networks	1	T2	
48.	Traffic Routing in Wireless Networks	2	T2	
49.	Wireless Data Services	1	T2	
50.	Common Channel Signaling	1	T2	
	Total periods required:	**12**		
UNIT – V: MULTICARRIER MODULATION				
51.	Data Transmission using Multiple Carriers	1	T2	Mitigation of subcarrier fading, IEEE 802.11a WLAN standard as case study. Research Topics: MIMO wireless Systems, Cognitive Radio.
52.	Multicarrier Modulation with Overlapping Subchannels	1	T2	
53.	Discrete Implementation of Multicarrier Modulation – DFT and its properties	1	T2	
54.	The Cyclic Prefix	1	T2	
55.	Orthogonal Frequency Division Multiplexing (OFDM)	1	T2	
56.	Matrix Representation of OFDM	1	T2	

57.	Vector Coding	1	T2	
58.	Challenges in Multicarrier Systems	1	T2	
	Total periods required:	**08**		
	Grand total periods required:	**57**		

*Handout will be given.

Text Books:

T1: T. S. Rappaport, "Wireless Communications, Principles and Practice," Prentice Hall, 2nd Edition, 2002.

T2: Andrea Goldsmith, "Wireless Communications," Cambridge University Press, 2005.

Reference Books:

R1: David Tse, PramodViswanath, "Fundamentals of Wireless Communications," University Press, 2006.

R2: Dr. Kamilo Feher, "Wireless Digital Communications," Prentice Hall, 1995.

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Department of Electronics and communication Engineering

Lesson Plan

Name of the Subject: Wireless Sensor Networks (14MT257709)
Class & Semester: M. Tech. (CMS) – II Semester
Name of the faculty Member: Dr. V. R. Anitha

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
UNIT – I: INTRODUCTION TO WIRELESS SENSOR NETWORKS				
1.	Challenges for wireless sensor networks	1	T1	Security in Sensor networks
2.	Comparison of sensor network with ad hoc network	1	T1	
3. 4.	Single node architecture - Hardware components	2	T1	
5. 6.	Energy consumption of sensor nodes	2	T1	
7.	Network architecture: Sensor network scenarios - types of sources and sinks	1	T1	
8.	Single hop versus multi-hop networks, multiple sinks and sources	1	T1	
9. 10. 11.	Design principles for wireless sensor networks	3	T1	
Total periods required:		**11**		
UNIT – II: PHYSICAL LAYER				
12.	Introduction, wireless channel and communication fundamentals	1	T1	Localization, IEEE 802.15.4 low rate WPAN
13.	Frequency allocation	1	T1	
14.	Modulation and demodulation	1	T1	
15.	Wave propagation effects and noise,	1	T1	
16.	Channels models	1	T1	
17.	Spread spectrum communication	1	T1	
18.	Packet transmission and synchronization	1	T1	
19.	Quality of wireless channels and measures for improvement	1	T1	
20.	Physical layer and transceiver design consideration in wireless sensor networks - Energy usage profile	1	T1	
21. 22.	Choice of modulation, Power Management .	2	T1	
Total periods required:		**11**		
UNIT -III: DATA LINK LAYER				
23.	MAC protocols: fundamentals of wireless MAC protocols	2	T1	Practical implementation issues
24.	Requirements and design constraints for wireless MAC protocols			

25.	Important classes of MAC protocols,	1	T1	
26.	MAC protocols for wireless sensor networks	1	T1	
27.	Low duty cycle protocols and wakeup concepts	1	T1	
28.	Sparse topology and energy management (STEM)	1	T1	
29.	S-MAC	1	T1	
30.	Wakeup radio concepts	1	T1	
31.	Contention-based protocols - CSMA protocols	1	T1	
32.	PAMAS	1	T1	
33.	Schedule-based protocols - SMAC, BMAC	1	T1	
34.	Traffic-adaptive medium access protocol (TRAMA)	1	T1	
35.	Link Layer protocols – fundamentals task and requirements	1	T1	
36.	Error control - Causes and characteristics of transmission errors, ARQ techniques,	1	T1	
37.	FEC techniques	1	T1	
38.	Hybrid schemes, Power control	1	T1	
Total periods required:		**16**		
UNIT – IV: NETWORK LAYER				
39.	Gossiping and agent-based uni-cast forwarding - Basic idea, Randomized forwarding, Energy-efficient unicast	1	T1	
40.	Broadcast and multicast - Source-based tree protocols	1	T1	
41.	Shared, core-based tree protocols, Mesh-based protocols	1	T1	
42.	Geographic routing - Basics of position-based routing	1	T1	
43.	Geocasting	1	T1	
44.	Mobile nodes - Mobile sinks, Mobile data collectors	1	T1	
45.	Mobile regions	1	T1	
46.	Data centric and content-based networking - Introduction	1	T1	
47.	Data-centric routing	1	T1	
48.	Data aggregation	1	T1	
Total periods required:		**10**		
UNIT – V: TRANSPORT LAYER				
49.	The transport layer and QoS in wireless sensor networks - Quality of service/reliabilitym, Transport protocols	1	T1	Sensor Node Hardware- Node-level software platforms **standardization:** IEEE 802.15.4 & IEEE 802.11 **Research Topics:** Node-level simulators Wireless Sensor
50.	Coverage and deployment - Sensing models, Coverage measures	1	T1	
51.	Uniform random deployments: Poisson point processes, Coverage of random deployments: Boolean sensing model, general sensing model	2	T1	

52.	Coverage determination, Coverage of grid deployments, Reliable data transport	1	T1 T1	Networks
53.	Single packet delivery - Using a single path, Multiple paths, Multiple receivers	1	T1	
54.	Congestion control and rate control - Congestion situations in sensor networks	1	T1	
55.	Mechanisms for congestion detection and handling	1		
56.	Protocols with rate control	1		
57.	The CODA congestion-control framework	1		
Total periods required:		**09**		
Grand total periods required:		**57**		

Text Books:

T1: Holger Karl , Andreas willig “Protocol and Architecture for Wireless Sensor Networks”, John wiley publication, Oct 2007.

Reference Books:

R1: Feng zhao, Leonidas guibas, Elsivier , “Wireless Sensor Networks: an information processing approach –publication, 2004.

R2: Edgar H .Callaway, First Edition,”Wireless Sensor Networks : Architecture and protocol”, CRC press 2003.

R3: C.S.Raghavendra Krishna, M.Sivalingam and Tarib znati, “Wireless Sensor Networks”, Springer publication, 2006

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