SCHEME AND SYLLABI

FOR

M. Tech. DEGREE PROGRAMME

IN

ELECTRONICS AND COMMUNICATION ENGG

WITH SPECIALIZATION

ADVANCED COMMUNICATION AND INFORMATION SYSTEMS

(2011ADMISSION ONWARDS)

SCHEME AND SYLLABI FOR M. Tech. DEGREE PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGG

WITH SPECIALIZATION

ADVANCED COMMUNICATION AND INFORMATION SYSTEMS

SEMESTER - I

Sl. No.	Course No.	Subject	Hrs / Week			Evaluation Scheme (Marks)					Credits (C)
			L	T	P	Sessional			ESE	Total	
						TA	CT	Sub Total			
1	MECCI 101	Applied Mathematics	3	1	0	25	25	50	100	150	4
2	MECCI 102	Probability and Random Process	3	1	0	25	25	50	100	150	4
3	MECCI 103	Cryptography and Network Security	3	1	0	25	25	50	100	150	4
4	MECCI 104	Communication Networks	3	1	0	25	25	50	100	150	4
5	MECCI 105	Elective I	3	0	0	25	25	50	100	150	3
6	MECCI 106	Elective II	3	0	0	25	25	50	100	150	3
7	MECCI 107	Communication Systems Lab	0	0	3	25	25	50	100	150	2
8	MECCI 108	Seminar I	0	0	2	50	0	50	0	50	1
Total			**18**	**4**	**5**	**225**	**175**	**400**	**700**	**1100**	**25**

Elective – I (MECCI 105)		Elective – II (MECCI 106)	
MECCI 105 - 1	Digital Image Processing	MECCI 106 - 1	Pattern Recognition
MECCI 105 - 2	Satellite Communication	MECCI 106 - 2	Data Mining & Data Warehousing
MECCI 105 - 3	Systems Programming & Operating Systems	MECCI 106 - 3	Multimedia Systems
MECCI 105 - 4	Advanced Database Design	MECCI 106 - 4	Real time & Embedded Systems

L – Lecture, **T** – Tutorial, **P** – Practical

TA – Teacher's Assessment (Assignments, attendance, group discussion, Quiz, tutorials, seminars, etc.)

CT – Class Test (Minimum of two tests to be conducted by the Institute)

ESE – End Semester Examination to be conducted by the University

Electives: New Electives may be added by the department according to the needs of emerging fields of technology. The name of the elective and its syllabus should be submitted to the University before the course is offered

SEMESTER - II

Sl. No.	Course No.	Subject	Hrs / Week			Evaluation Scheme (Marks)					Credits (C)
			L	T	P	Sessional			ESE	Total	
						TA	CT	Sub Total			
1	MECCI 201	Signal Compression	3	1	0	25	25	50	100	150	4
2	MECCI 202	Wireless Communication	3	1	0	25	25	50	100	150	4
3	MECCI 203	Advanced Digital Communication	3	1	0	25	25	50	100	150	4
4	MECCI 204	Soft computing Techniques	3	1	0	25	25	50	100	150	4
5	MECCI 205	Elective III	3	0	0	25	25	50	100	150	3
6	MECCI 206	Elective IV	3	0	0	25	25	50	100	150	3
7	MECCI 207	Soft Computing Lab	0	0	3	25	25	50	100	150	2
8	MECCI 208	Seminar II	0	0	2	50	0	50	0	50	1
Total			**18**	**4**	**5**	**225**	**175**	**400**	**700**	**1100**	**25**

Elective – III (MECCI 205)		Elective – IV (MECCI 206)	
MECCI 205 - 1	Speech and Audio Processing	MECCI 206 - 1	Advanced Computer Architecture
MECCI 205 - 2	Adaptive Filter Theory	MECCI 206 - 2	Estimation and Detection Theory
MECCI 205 - 3	Computational Biology and Bioinformatics	MECCI 206 - 3	Advanced Digital Signal Processing
MECCI 205 - 4	Network Administration	MECCI 206 - 4	Management Information Systems

L – Lecture, **T** – Tutorial, **P** – Practical

TA – Teacher's Assessment (Assignments, attendance, group discussion, quiz, tutorials, seminars, etc.)

CT – Class Test (Minimum of two tests to be conducted by the Institute)

ESE – End Semester Examination to be conducted by the University

Electives: New Electives may be added by the department according to the needs of emerging fields of technology. The name of the elective and its syllabus should be submitted to the University before the course is offered

SEMESTER - III

Sl. No.	Course No.	Subject	Hrs / Week			Evaluation Scheme (Marks)					Credits (C)
			L	T	P	Sessional			ESE** (Oral)	Total	
						TA*	CT	Sub Total			
1	MECCI 301	Industrial Training or Industrial Training and Mini Project	0	0	20	50	0	50	100	150	10
2	MECCI 302	Master's Thesis Phase - I	0	0	10	100***	0	100	0	100	5
Total			**0**	**0**	**30**	**150**	**0**	**150**	**100**	**250**	**15**

* TA based on a Technical Report submitted together with presentation at the end of the Industrial Training **and** Mini Project

** Evaluation of the Industrial Training **and** Mini Project will be conducted at the end of the third semester by a panel of examiners, with at least one external examiner, constituted by the University.

*** The marks will be awarded by a panel of examiners constituted by the concerned institute

SEMESTER - IV

Sl. No.	Course No.	Subject	Hrs / Week			Evaluation Scheme (Marks)					Credits (C)
			L	T	P	Sessional			ESE** (Oral & Viva)	Total	
						TA*	CT	Sub Total			
1	MECCI 401	Master's Thesis	0	0	30	100	0	100	100	200	15
2	MECCI 402	Master's Comprehensive Viva							100	100	
Total					**30**	**100**	**0**	**100**	**200**	**300**	**15**
Grand Total of all Semesters										**2750**	**80**

* 50% of the marks to be awarded by the Project Guide and the remaining 50% to be awarded by a panel of examiners, including the Project Guide, constituted by the Department

** Thesis evaluation and Viva-voce will be conducted at the end of the fourth semester by a panel of examiners, with at least one external examiner, constituted by the University.

MECCI 101 **APPLIED MATHEMATICS**

L	T	P	C
3	1	0	4

Module :1.

Matrices and Gaussian Elimination: Introduction, The geometry of linear equations – Gaussian elimination – Matrix notation and matrix multiplication – Triangular factors and row exchanges – Inverses and transposes – Special matrices and applications.

Vector Spaces and Linear Equations: Vector Spaces and Subspaces – The solution of m equations in n unknowns – Linear independence, Basis and Dimension – The four fundamental subspaces – Networks and incidence matrices – Linear transformations

Module :2

Orthogonality: Perpendicular vectors and orthogonal subspaces – Inner products and projections onto lines – Projections and least squares approximations – Orthogonal bases, orthogonal matrices and Gram-Schmidt orthogonalization – FFT

Determinants: Introduction – Properties of the Determinant – Formulas for the determinant – Applications

Module: 3

Eigenvalues and Eigenvectors: Introduction – The diagonalization of a matrix – Difference equations and the powers – Differential equations and the exponential – Complex matrices: Symmetric vs. Hermitian and Orthogonal vs. Unitary – Similarity transformations

Module: 4

Positive Definite Matrices: Minima, Maxima and Saddle Points – Tests for Positive Definiteness – Semidefinite and Indefinite Matrices – Minimum Principles and the Rayleigh Quotient – The finite element method

Computations with Matrices: Introduction – The Norm and Condition number of a matrix – The computation of Eigen values – Iterative methods for Ax=b

References:

1. G. Strang, “Linear Algebra and its Applications”, Thomson
2. H Anton, “Elementary Linear Algebra”, Wiley
3. B Noble, J W Daniel, “Applied Linear Algebra”, Prentice Hall
4. C D Meyer, “Matrix analysis and Applied Linear Algebra”, Siam
5. D C Lay, “Linear Algebra and its Applications”, Pearson Education
6. Hoffmann, Kunze, “Linear Algebra”, Prentice Hall of India.

MECCI 102 PROBABILITY AND RANDOM PROCESS

L	T	P	C
3	1	0	4

Module:1.

Basic Probability: Introduction, definitions of probability, set theory, axioms of probability, Conditional probability, Total probability and Bayes' theorem, combined experiment and independence.

Random variables: Definition, cumulative distribution function (CDF), continuous, discrete and mixed random variables, probability density function (pdf), probability mass function(PMF),properties of distribution functions, Specific random variables: Gaussian, Exponential, Rayleigh, Uniform, Binomial and Poisson distributions.

Module:2

Functions of Random variables: Function of random variable, distribution of function of random variable, Mean and variance of random variable, Moments of random variables, Chebyshev inequality, Markov inequality, Characteristic functions.

Module :3

Two random variables: Bivariate distributions , joint distribution and density, - definition and properties, marginal distribution and density, independence of random variables, joint normality, one function of two random variables, two functions of two random variable, joint density, Linear transformation, joint moments, Conditional distributions, Conditional expected values

Module:4

Random processes: Definition, Statistics of stochastic processes, mean, autocorrelation and autocovariance, independent process, Stationary and ergodic processes: strict-sense stationary, wide-sense stationary random processes, transmission of random process through a linear filter - relationship between input and output processes, power spectral density (PSD) - definition and properties, cross spectral densities, Gaussian random process – properties.

References:

1. A. Papoulis, S. U. Pillai, “Probability, Random Variables and Stochastic Processes”, Tata McGraw Hill
2. A L Garcia, “Probability and Random Process for Electrical Engineers”, Pearson Education
3. R. M. Gray, L. D. Davisson, “An Introduction to Statistical Signal Processing”, Cambridge University Press, 2004.
4. H. Stark and J. W. Woods, “ Probability and Random Processes with Applications to Signal Processing “,Pearson Education.
5. P.Z.Peebles, “Probability, Random variables and Random signal principles”, Tata McGraw Hill
6. S L Miller, D G.Childers, “Probability and Random Processes”, Academic press.
7. Y. Viniotis, “Probability and Random Processes for Electrical Engineers”, McGraw Hill.

MECCI 103 CRYPTOGRAPHY AND NETWORK SECURITY

L	T	P	C
3	1	0	4

Module :1

Foundations of cryptography and security: Ciphers and secret messages-security attacks and services- **Mathematical tools for cryptography:** substitutions and permutations-modular arithmetic- algebraic structures: - group-ring-field-Finite fields-GF (p) and GF (2^n)-polynomial arithmetic.

Module :2

Symmetric Key Cryptography: Symmetric cipher model -substitution- transposition-Modern block ciphers and its theory of design- Data Encryption Standard-DES analysis-double DES and triple DES-the AES cipher- Modern stream ciphers and its design.

Module:3

Public Key Cryptography: Principles of public key cryptosystem-the RSA algorithm-Diffie-Hellman key exchange- ElGamal encryption system-message authentication and Hash Algorithm- Digital signature-Digital Signature Standard (DSS)

Module :4

Network security: Authentication of systems-Kerberos-X.509 authentication service-Electronic mail security-Pretty Good Privacy (PGP)-S/MIME- Electronic commerce security-Secure Electronic Transaction (SET)

References:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Prentice Hall of India, Fourth Edition, 2006.
2. Behrouz.A. Forouzan "Cryptography &Network security",TataMcGrawHill
3. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
4. Stamatios V Kartalopoulos ,"Security of Information and communication networks",Wiley
5. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.

MEC CI 104 COMMUNICATION NETWORKS

L	T	P	C
3	1	0	4

Module I

Queuing Theory: Discrete/continuous state and discrete/continuous parameter RP-independent RP– renewal process –Poisson and exponential processes – Markov process – birth-death process. Discrete and continuous parameter Markov chains – transition probabilities, limiting distributions – theory of M/M/1 and M/M/m queues – Little's theorem

Module II

Review of Networking Concepts: Packet switched Networks:OSI and IP models, Ethernet(IEEE 802.3), token ring(IEEE802.5), fiber distributed data interface (FDDI), distributed-queue dual-bus(DQDB), Frame Relay and switched multimegabit data service(SMDS). .

Module III

a) Internet and TCP/IP networks: Internet protocol,IPV4,Algorithms, Multicast IP, Mobile IP,IPV6, TCP and UDP ,FTP, performance of TCP/IP Networks.Circuit switched networks, SONET Frame structure -PON, PPL, Hybrid scheme, Intelligent network, Architecture, CATV, layered network, services.

b) ATM Network: ATM network, features, addressing, signalling, routing, ATM header structure, ATM adaptation layer (AAL), management and control, BISDN, internetworking with ATM. Optical networks, WDM systems, cross connects, optical LAN, Optical paths and Networks.

Module IV

Control of Networks: Objectives and methods of control, Circuit switched networks, blocking, routing optimizations, Datagram networks, queuing models for delay analysis, routing optimization, congestion control, ATM networks, deterministic and statistical procedures, comparison, Control of networks, theory of Markov chains and queues, analysis of circuit switched networks, datagram networks and ATM networks.

References:

1. Jean Walrand & Pravin Varaiya, “High Performance Communication Networks” , Elsevier.
2. Leon Gracia, Widjaja, “Communication Networks”, Tata McGraw Hill,
3. Sumit Kasera, Pankaj Sethi, "ATM Networks ", Tata McGraw, Hill
4. Behrouz.a. Forouzan, “Data Communication and Networking”, Tata McGraw Hill
5. Larry L. Peterson, Bruce S. Davie, “Computer networks”, 4th Edition, Elsevier

MECCI 105- 1 DIGITAL IMAGE PROCESSING

L	T	P	C
3	0	0	3

Module :1.Digital Image Fundamentals and Transforms

Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.

Module :2 ImageEnhancementTechniques

Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters : Smoothing –Sharpening filters- Homomorphic filtering.

Module 3. ImageRestoration

Model of Image Degradation/restoration process – Noise models – Inverse filtering -Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition.

Module 4. Image Compression

Lossless compression: variable length coding-LZW coding- Bit plane coding –predictive coding –DPCM.

Lossy compression: Transform coding- Wavelet coding –Basics of Image compression standards: JPEG, MPEG, Basics of Vector quantization.

References:

1. Rafael C Gonzalez, Richard E Woods, “Digital Image Processing”,2nd Edition - Pearson Education .
2. William K Pratt, “Digital Image Processing”, John Willey.

3. A.K. Jain, “Fundamentals of Digital Image Processing”. Prentice Hall of India.
4. Chanda Dutta Magundar, “Digital Image Processing and Applications”, Prentice Hall of India,

MECCI 105 - 2 SATELLITE COMMUNICATION

L	T	P	C
3	0	0	3

Module :1. Introduction to Satellite Communication

Orbital mechanics, look angle determination, orbital perturbation, launchers and launch vehicles, orbital effect in communication system performance, satellite subsystem, altitude and orbit control system, telemetry tracking command and monitoring, power system, communication subsystem, satellite antennas

Module :2. Satellite Link Design

Basic transmission, system noise temperature, G/T ratio, design of down links, satellite system using small earth station, uplink design, design of specified C/N, system design examples

Module:3.Multiple Access

Introduction, FDMA, TDMA, onboard processing, DAMA, random access, packet radio systems and protocols, CDMA.

Module :4. Propagation Effects and VSAT systems

Quantifying attenuation and depolarization, propagation effects not associated with hydrometer-rain and ice effects, prediction of rain attenuation, prediction of XPO-propagation impairment counter mechanism. Overview, network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for VSAT star network, system design procedure.

References:

1. Timothy Pratt, Charles W Bostian, Jeremy E Allnut, "Satellite Communication" Wiley, 2007.
2. Wilbur L. Pritchard, Hendri G. Suyderhood, Robert A.Nelson, "Satellite Communication Systems Engineering", 2nd Edition, Prentice Hall, New Jersey.
3. Dennis Rody, "Satellite Communication", 4th Edition, Regents/Prentice Hall,
4. Maini, Agrawal,"Satellite Communication",Wiley

5. Bruce R. Elbert, “The Satellite Communication Applications Hand Book”, Artech House

MECCI 105 – 3	SYSTEMS PROGRAMMING AND OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

1. Introduction

Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication.

2. Threads

Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors.

3.SystemModel

System Model – Deadlock Characterization – Methods for handling Deadlocks - Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management – Swapping – Contiguous Memory allocation- Paging – Segmentation – Segmentation with Paging.

4. Virtual Memory

Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection

References:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 6th Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2003.
2. Harvey M. Deitel, "Operating Systems", Second Edition, Pearson Education Pvt. Ltd, 2002

3. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India Pvt. Ltd, 2003.
4. William Stallings, "Operating System", Prentice Hall of India, 4th Edition, 2003.
5. Pramod Chandra P. Bhatt – "An Introduction to Operating Systems, Concepts and Practice", Prentice Hall of India, 2003.

MECCI 105 - 4 ADVANCED DATABASE DESIGN

L	T	P	C
3	0	0	3

Module 1. Parallel and Distributed Databases

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/OParallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Three Tier Client Server Architecture- Case Studies.

Module 2. Object and Object Relational Databases

Concepts for Object Databases: Object Identity – Object structure ,Type Constructors – Encapsulation of Operations – Methods – Persistence –Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational. Systems : Object Relational features in SQL/Oracle – Case Studies.

Module 3. XML Databases

XML Databases: XML Data Model – DTD - XML Schema - XML Querying – Web Databases – JDBC – Information Retrieval – Data Warehousing – Data Mining.

Module 4. Mobile Databases

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Mobile Database Recovery Schemes.

References:

1. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Pearson Education/Addison Wesley,
2. Thomas Cannolly and Carolyn Begg, “ Database Systems, A Practical Approach to Design, Implementation and Management”, 3rd Edition, Pearson Education.

3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, McGraw Hill
4. C.J.Date, A.Kannan and S.Swamynathan,”An Introduction to Database Systems”, Pearson Education.
5. V.S.Subramanian, “Principles of Multimedia Database Systems”, Harcourt India
6. Vijay Kumar, “ Mobile Database Systems”, John Wiley & Sons, 2006.

MECCI 106 - 1 **PATTERN RECOGINITION**

L	T	P	C
3	0	0	3

1. Basics of Pattern Recognition

Pattern recognition systems, design of pattern recognition systems, learning and adaptation, bayesian decision theory- classifiers, discriminant functions, decision surfaces, normal density and discriminant functions.

2 Estimation Methods

Maximum-likelihood estimation, bayesian estimation, gaussian mixture models, expectation, maximization. Non-parametric techniques for density estimation- parzen-window method.

3. Linear Discriminant Functions

Linear discriminant functions and decision surfaces, Non-metric methods for pattern classification- Non-numeric data or nominal data.

4. Unsupervised Learning and Clustering

Criterion functions for clustering, algorithms for clustering- K-means, hierarchical and other methods, cluster validation.

References:

1. R.O.Duda, P.E.Hart and D.G.Stork, "Pattern Classification", John Wiley
2. C.M.Bishop, "Pattern Recognition", Oxford University Press.
3.Anil K Jain, "Statistical Pattern Recognition- A Review", IEEE Transactions on Pattern Analysis and Machine Intelligence, vol.22, No.1, January 2009.

MECCI 106 - 2 DATA MINING AND DATA WARE HOUSING

L	T	P	C
3	0	0	3

Module 1. Data Warehousing & On Line Analytical processing

An Introduction to data ware housing and characteristics of a data warehouse, various aspects of data marts.

OLTP and OLAP systems, Data Modelling, OLAP Tools, web OLAP, Decision support system.

Module 2.Developing a Data Ware house

Architectural strategies and Organization Issues, Design Considerations, Tools for Data Warehousing, crucial decisions in designing a Data Ware house using ORACLE 8i / SQL server.

Module 3.Data Mining

From Data ware housing to Data Mining, Objectives of Data Mining, the Business context for Data mining, Process improvement, marketing and Customer Relationship Management (CRM), the Technical context for Data Mining, machine learning, decision support and computer technology.

Module 4. Data Mining Techniques and Algorithms

Process of data mining, Algorithms, Data base segmentation or clustering, predictive Modelling, Link Analysis, Data Mining Techniques, Automatic Cluster Detection, Decision trees and Neural Networks.

References:

1. Berry and Lin off, "Mastering Data Mining: The Art and Science of Customer Relationship Management", John Wiley and Sons, 2001.
2. C.S.R. Prabhu, "Data Ware housing: Concepts, Techniques, Products and Applications", Prentice Hall of India.
3. J.Han, M.Kamber, "Data Mining: Concepts and Techniques", Academic Press, Morgan Kanf man Publishers, 2001.

4. Pieter Adrians, Dolf Zantinge, "Data Mining",Addison Wesley,2000.
5. Seidman, "Data Mining with Microsoft SQL Server", Prentice Hall of India,2001.

MECCI 106 - 3 **MULTIMEDIA SYSTEMS**

L	T	P	C
3	0	0	3

Module 1.Introduction to Multimedia

Elements of multimedia system –need-benefits-converging technologies-multimedia applications development, multimedia building blocks - Text-Sound-images-animation-video.

Multimedia Hardware

PC Platform-SCSI, MCI (Media Control Interface)-Storage for multimedia-input devices-output hardware-communication devices, multimedia workstation.

Module 2.Multimedia Authoring

Hypertext – Hypermedia- Document architecture – MPEG, Basic tools- image editing tool- painting and drawing tools –sound editing programs, Video formats-quick time. Linking multimedia objects-OLE and DDE –office suites-presentation tools-authoring tools-User Interface design.

Module 3.Multimedia Networks

Application subsystem, Transport Subsystem, QOS, Synchronization, Presentation techniques- Multimedia synchronization -single user- multimedia on networks

Module 4.Multimedia OS, Database and Information Retrieval

Multimedia OS- Process management – File systems – Multimedia DBMS – Data Structures for storage – Indexing techniques – Information retrieval, multimedia search engine - Case Study

References:

1. Ralf Steinmetz and Klara Nahrstedt, “Multimedia: Computing, Communication and Application”, Pearson Educational Asia, 1995.
2. Tay Vaughan, “Multimedia: Making it work”, Fifth Edition, Tata McGraw-Hill .

3. Judith Jeffcoat, “Multimedia in practice – Technology and Applications, Prentice Hall of India, 1995.
4. Fred Halsall, “Multimedia Communication-Application Networks, Protocols and Standard”, Addison- Wesley, 2001.
5. John F.Koegal Buford, “Multimedia System”, Pearson Educational Asia, 1994
6. Mark Elsom Cook, “Principles of Interactive Multimedia”, Tata McGraw-Hill, 2001
7. Fred T.Hofstetter, “Multimedia Literacy”, McGraw-Hill, 2001.

MECCI 106-4 REAL TIME AND EMBEDDED SYSTEMS

L	T	P	C
3	0	0	3

Module 1. Embedded Systems and ARM processor

Embedded System, Categories of Embedded System, Requirements of Embedded Systems, Challenges and Issues in Embedded Software Development, Fundamentals of ARM processor.

Module 2. ARM processor instruction set

Data processing Instructions, Branching Instruction, Load and Store Instruction, Software Interrupt Instruction ,Program Status Register Instructions, Multiply Instructions , Coprocessor Instructions, Thump Instruction Set .

Module 3. Real Time operating Systems

Embedded Operating systems, Types of RTOS –Polled Loop Systems –Polled Loop with Interrupts-Round Robin Systems –Hybrid Systems-Interrupt Driven Systems-Co operative Multitasking , RTOS Issues –Concurrency-reentrancy-Inter task Communication.

Module 4. Java Applications & Future Trends in Embedded Systems:

Networked Java-Enabled Information Appliances, Embedded Process Control System, Mobile Java Applications, Appliance Control using Jini, System on a Chip (SOC), Smart Cards and the Cashless Society, Security in Embedded Systems.

References:

1. Daniel W Lewis , “Fundamentals of Embedded Software where C and Assembly Meet
2. Dreamtech Software Team, “ Programming for Embedded Systems”, Wiley Dreamtech.
3. Andrew N Sloss,Dominic Symes,Chris Wright , “ARM System Developer’s Guide” ,Morgan Kaufmann Publishers,2005

4. Steve Furber , “ARM System on chip Architecture”,Addison –Wiely Professional ,2000.
5. Steven F Barrett,Daniel J Pack , “Embedded Systems” .Pearson Education ,2008.

MECCI 107 COMMUNICATION SYSTEMS LAB

L	T	P	C
0	0	3	2

Communication and signal processing experiments using MATLAB., Network simulation using software tools, Experiments using DSP hardware

MECCI 108 SEMINAR – I

L	T	P	C
0	0	2	1

Each student shall prepare a seminar paper on any topic of interest related to the core/elective courses being undergone in the first semester of the M.Tech programme. He/she shall select paper from IEEE Communication/Network/related magazines. They should get the paper approved by the Programme Coordinator/Faculty Members in the concerned area of specialization and shall present it in the class in the presence of Faculty in-charge of seminar class. Every student shall participate in the seminar. Grade will be awarded on the basis of the student's paper, presentation and his/her participation in the seminar.

Goals: This course is designed to improve written and oral presentation skills and to develop confidence in making public presentations, to provide feedback on the quality and appropriateness of the work experience, and to promote discussions on design problems or new developments.

MECCI 201 **SIGNAL COMPRESSION**

L	T	P	C
3	1	0	4

Module1. Lossless Compression

Self information, average information; Models; Uniquely decodable codes, prefix codes, Kraft-McMillan Inequality; Huffman Coding, Extended Huffman Coding, Nonbinary Huffman Coding; Arithmetic Coding – Coding a Sequence, Generating a Binary Code; Dictionary Techniques –LZ77, LZ78, LZW; Context-based Compression – ppm, Burrows-Wheeler Transform.

Module 2. Lossy coding

Distortion criteria; Conditional Entropy, Average Mutual information, Differential entropy; Rate distortion theory; Rate distortion theorem, Converse of the Rate distortion theorem, Models.

Scalar Quantization: Uniform, Adaptive, Nonuniform and Entropy-Coded Quantization

Module 3. Vector Quantization

Advantages over Scalar Quantization, LBG Algorithm, Tree structured and Structured Vector Quantizers, Trellis-Coded Quantization

Differential Encoding: Basic algorithm, prediction in DPCM, Adaptive DPCM, Delta Modulation, Speech coding – G.726.

Module 4. Transform Coding:

Introduction; Karhunen-Loeve Transform, Discrete Cosine Transform, Discrete Walsh Hadamard Transform; Quantization and Coding of Transform Coefficients; JPEG, MDCT

Subband coding: Filters; Basic Subband Coding algorithm.

Wavelet Based Compression: Multiresolution Analysis, Image Compression, EZW coder, SPIHT, JPEG 2000

Audio coding:-MPEG Audio coding.

References:

1. Khalid Sayood, “Introduction to Data Compression”, 3rd Edition, Elsevier.
2. David Salomon, “Data Compression: The Complete Reference”, Springer.

3. Thomas M. Cover, Joy A. Thomas, “Elements of Information Theory," Wiley
4. Ali N. Akansu, Richard A. Haddad, “Multiresolution Signal Decomposition: Transforms, Subbands and Wavelets”, Academic Press., 1992

MECCI 202 WIRELESS COMMUNICATIONS

L	T	P	C
3	1	0	4

Module I Overview of wireless communication; path loss and shadowing

Radio wave propagation, Transmit and receive signal models, Free space path loss, ray tracing, Simplified path loss model, Empirical path loss model: okumura model - hata model - walfisch model - piecewise linear model- indoor propagation models, shadow fading, combined path loss and shadowing, Cell coverage area.

MODULE II: Capacity of wireless channel

Capacity of flat fading channel, Capacity of frequency selective fading channels

Diversity: Receiver diversity: system model - selection combining - threshold combining - maximal ratio combining - equal gain combing, Transmitter diversity: channel known at transmitter - Alamouti scheme.

Module III: Channel coding

Linear block codes: Cyclic codes - Block Coding and Interleaving for Fading Channels, Convolution codes: Trellis diagram - maximum likelihood decoding - Viterbi Algorithm - Convolution Coding and Interleaving for Fading Channels, Concatenated codes, Turbo codes, Low density parity check codes.

Module IV: Multiple Antenna and Space time communication

Narrow band MIMO Model, Parallel decomposition of MIMO, MIMO channel capacity: static and fading channel, MIMO diversity gain, Diversity/Multiplexing trade off, Space-time modulation and coding, Frequency selective MIMO channels.

Equalization: Equalizer noise enhancement, equalizer types, folded spectrum and ISI-free transmission, linear equalizer.

Multi carrier modulation: Data transmission using multiple carriers, Multi carrier modulation with overlapping sub channels, Mitigation of subcarrier fading

References:

1. Andrea Goldsmith ,"Wireless Communications", Stanford University
2. Shu Lin ,Costello Jr "Error control coding", Pearson Education
3. Andreas F Milosch, "Wireless Communication",Wiley Interscience

4. T.S. Rappaport, “Wireless Communication, principles & practice”, Prentice Hall of India
5. Kamilo Feher, 'Wireless digital communication', Prentice Hall of India, 1995.

MECCI 203 **ADVANCED DIGITAL COMMUNICATION**

L	T	P	C
3	1	0	4

Module 1. Characterization of Communication signals and systems

Elements of digital communication systems, performance , communication channels and their characteristics, mathematical models for communications channels, Representation of band pass and low pass signals , Signal space representation of waveforms:vector space concepts, signal space concepts, Gram- Schmidt procedure, Bounds on tail probability, limit theorems for sum of random variables, complex random variables, random process

Module 2.Digital modulation schemes

Representation of digitally modulated signals, memoryless modulation methods:PAM,PSK,QAM, Multidimensional signalling; orthogonal signalling, FSK, biorthogonal signalling, signalling schemes with memory: CPFSK, CPM, Power spectrum of digitally modulated signals:PSD of digitally modulated signal with memory, PSD of CPFSK and CPM

Module 3.Optimum receivers for AWGN Channels

Waveform and vector channel models:optimal detection for a general vector channel,MAP and ML,receiver,decision regions,error probability,sufficient statistics.Waveform and vector AWGN channels,optimal detection for the vector AWGN channel,Implementation of optimum receiver for AWGN channels:The correlation receiver,The matched filter receiver.

Module 4. Communication through Band Limited Channels

Characterization of band limited channels, Signal design for band limited channels. Design of band limited signals for no ISI-The Nyquist criterion, Design of band limited signal with controlled ISI-Partial response signaling, Optimum receiver with ISI & AWGN: optimum maximum likelihood receiver, A discrete time model for a channel with ISI. Maximum-Likelihood Sequence Estimation(MLSE) for a discrete time white noise filter model detectors, turbo equalization, adaptive equalization, equalizer, decision feedback equalizer, recursive least squares algorithms, blind equalization.

References:

1. J. Proakis, “Digital Communications”, McGraw Hill, 4th Edition,2007
2. Bruce Carlson, Crilly &Rutledge, Communication systems, McGraw Hill
3. B. Sklar, "Digital Communications: Fundamentals and Applications", Prentice Hall.
4. John R. Barry, Edward A. Lee, David G. Messerschmitt, "Digital Communication," Kluwer Academic
5. J. M. Wozencraft, I. M. Jacobs, "Principles of Communication Engineering", John Wiley,
6. U. Madhow, "Fundamentals of Digital Communication," Cambridge University Press.

MECCI 204 SOFT COMPUTING TECHNIQUES

L	T	P	C
3	1	0	4

Module1. Fuzzy Set Theory

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set- theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If- Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models–Input Space Partitioning and Fuzzy Modeling.

Module 2. Optimization

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

Module 3.Neural Networks

Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

Module 4. Neuro Fuzzy Modeling

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

References:

1. S. Rajasekaran, G. A. Vijayalakshmi Pai , "Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications" .Prrentice Hall of India,2010

2. Elie Sanchez, Takanori Shibata, Lotfi Asker Zadeh , “Genetic algorithms and fuzzy logic systems: soft computing perspectives”, World Scientific Publishing Company,2002.
3. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, 2004, Pearson Education 2004
4. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
5. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y., 1989
6. S.Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
7. R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, AP Professional Boston, 1996.

MECCI 205 - 1 SPEECH AND AUDIO PROCESSING

L	T	P	C
3	0	0	3

Module 1. Speech Production and Acoustic Phonetics

Human speech production mechanism, acoustic theory of speech production, nature of speech signal, articulatory phonetics, acoustic phonetics, coarticulation, prosody.

Module 2. Speech Analysis and Synthesis

Time and frequency domain analysis of speech, speech parameter estimation, linear prediction analysis, cepstral analysis, vector quantization(VQ) methods, principles of speech synthesis.

Module 3. Speech Recognition

Speech recognition, baye's rule, segmental feature extraction, mel frequency cepstral coefficient(MFCC), dynamic time –warping(DTW), hidden markov model(HMM) approaches for speech, speaker and language recognition.

Module 4. Speech Coding and Enhancement

Speech coding, quality measures, speech redundancies, time-domain waveform coding, Linear predictive coding, speech enhancement techniques.

Audio Processing

Audio processing, characteristics of audio signals, sampling, audio compression techniques, standards for audio compression in multimedia applications, MPEG audio encoding and decoding, audio databases and applications.

References:

1. Douglas O'Shaugnessy, "Speech Communication, Human and Machine", IEEE Press, 2000.
2. L. Rabiner and B. H. Juang, "Fundamentals of Speech Recognition", Prentice Hall, 1993.

3. T.F Quatieri, “Discrete-Time Speech Signal pPocessing- Principles and Practice”, Pearson,2002
4. J R Deller, J H L Hansen, J G Proakis, “Discrete-time Processing of Speech Signals, IEEE, Wiley.
5. Zi Nian Li, “Fundamentals of Multimedia”, Pearson Education, 2003.

MECCI 205 -2 **ADAPTIVE FILTER THEORY**

L	T	P	C
3	0	0	3

Module 1: Adaptive systems

Definitions and characteristics – properties - open and closed loop adaptation – application; adaptive linear combiner:- input signal and weight vectors - performance function - gradient and minimum mean square error - alternative expression of the gradient – decorrelation of error and input components; Properties of the quadratic performance surface:– normal form of the input correlation matrix – eigen values and eigen vectors of the input correlation matrix and their geometrical significance; Searching the performance surface:-gradient search methods - stability and rate of convergence - learning curve - Newton's method - method of steepest descent - comparison

Module 2: Gradient estimation and its effects on adaptation

Gradient component estimation by derivative measurement - performance penalty - variance - excess MSE and time constants – misadjustments; The LMS algorithm:- convergence of weight vector-learning curve – noise in weight vector solution – misadjustment – performance – performance function

Module 3: LMS/Newton algorithm

Properties - sequential regression algorithm - adaptive recursive filters - random-search algorithms - lattice structures; RLS adaptive filters:– The exponentially weighted RLS algorithm; Kalman filters:- recursive minimum mean square estimation for scalar random variables - statement of Kalman filtering problem - innovation process - estimation of the state – filtering - initial conditions - Kalman filter as the unifying basis for RLS filters.

Module 4: Applications

Adaptive modeling and system identification:- adaptive modeling for multipath communication channel, geophysical exploration, FIR digital filter synthesis; inverse adaptive modeling, deconvolution and equalization:- adaptive equalization of telephone channels; the concept of adaptive noise cancelling; introduction to adaptive arrays and adaptive beamforming.

References:

1. B Widrow and S D Stearns, “Adaptive Signal Processing”, Pearson Education,1985.
2. S Haykin, “Adaptive Filter Theory” , Pearson Education
3. A H Sayed, “Fundamentals of Adaptive filtering”, Wiley Inter Science.
4. D. G. Manolokis, V. K. Ingle and S. M. Kogar, “Statistical and Adaptive Signal Processing”, Mc Graw Hill

MECCI 205 - 3	COMPUTATIONAL BIOLOGY AND BIOINFORMATICS	L	T	P	C
		3	0	0	3

Module 1. Introduction and Information Retrieval

Introduction, Historical overview, Bioinformatics Applications, major databases, data management, data analysis, molecular biology, Tools for Web Search, Data Retrieval tools, Data mining of biological databases.

Module 2. Molecular Biology and Bioinformatics:

Introduction to Genes and Proteins Genome Sequences Genome rearrangement, bock alignment, global sequence alignment, ORFs, Genes, Intones, Exons, Splice Variants DNA/ RNA Secondary Structure, Triplet Coding Protein ,Sequences, bioinformatics algorithms.

Module 3.Information molecule and information flow

Central dogma of molecular biology, Problem in molecular and bioinformatics approach , Basic component, Chemistry of DNA and RNA, Basics of DNA replication. Introduction to protein, Amino acid and Protein Structure: Secondary, Tertiary, Quaternary , protein Folding protein function , protein purification and characterization, Data integration and Data Analysis, Multiplicity of Data and redundancy.

Module 4. Genome Analysis and Gene Mapping

Pair wise Sequence Alignment, Database Similarity Searching:- BLAST, FASTA, Multiple Sequence Alignment, Profiles and Hidden Markov Models, Structure prediction methods for gene, Gene expression and Microarray.

References

1. S.C. Rastogi, Namita Mendirata, Parag Rastogi, “Bioinformatics concepts Skills and Application”, CBS
2. S.C. Rastogi, Namita Mendirata, Parag Rastogi , “Bioinformatics Methods and Application”, Prentice Hall of India.
3. D. Baxevanis and F. Oulette, “Bioinformatics: A practical guide to the analysis of genes and proteins”, Wiley,2002.

4. Arthur M. Lesk, , "Introduction to Bioinformatics", Oxford University.
5. Mount D.W. "Bioinformatics. Sequence and Genome Analaysis", Cold Spring Harbar, New York, 2000.
6. Baxevanis A.D. Bioinformatics: A practical guide to the analysis of genes and proteins, 2nd Edition, John Wiley & Sons, New York, 2001.
7. Attuvod T.K. Smith D.J. Parry: Introduction to Bioinformatics, Addison Wesley,1999.

MECCI 205 - 4 NETWORK ADMINISTRATION

L	T	P	C
3	0	0	3

Module 1.Advanced Socket& I/O functions

IPV4 and IPV6 iteroperability inetd superserver.Advanced I/O functions, unix domain protocols, Nonblocking I/O, ioctl operations , Routing Sockets. Data link socket address structure, Reading and writing, sysctd operations, get-ifi-info function, Interface name & index functions. Key management Sockets: Reading and writing, Dumping the security association database(SADB), Creating a static security association(SA), Dynamically maintaining SAs.

Module 2.Broadcasting& Multicasting

Broadcast addresses, Unicast verses Broadcast, dg-cli function using broadcasting, Race function, Multicasting: Multicasting addresses, Multicasting verses Broadcasting on a LAN,Multicasting ona WAN, Source-specified multicast, Multicast socket options, mcast_join and related functions, dg_cli function using multicasting, Receiving IP multicast infrastructure session announcemnents, sending and receiving, Simple network time protocol.

Module 3.Advanced UDP sockets

Receiving flags, destination IP addresses, interface index,Datagram truncation, UDP verses TCP,. Adding reliability to UDP application , Binding interface addresses, Concurrent UDP services, IPV6 packet information, IPV6 path MTUcontrol.

Module 4.Advanced SCTP sockets

Auto closing, Partial delievery, Notification, Unordered data, Binding a subset of addresses, Determining peer and local addresses, Association of ID and IP addresses, Peeling off and association, controlling timing SCTP verses TCP. Out_of_Band data : TCP Out_of_Band data, socket:mark function.

Raw sockets

Raw sockets creation, Raw socket output, Raw socket input, ping program, trace route program, ICMP message daemon.

References :

1. Fenner, Rudoff, “UNIX Network Programming (3rd Edition) Stevens”, Pearson Education.
2. Write, Stevens, “TCP/IP illustrated (V2)” Pearson education.
3. Comer, Stevens , “Internetworking with TCP/IP (V2)”, Pearson education.

MECCI 206 - 1 ADVANCED COMPUTER ARCHITECTURE

L	T	P	C
3	0	0	3

1. **Fundamentals of Computer design**

Fundamentals of Computer design-Technology trends-cost-measuring and reporting performance quantitative principles of computer design. Instruction set architecture, 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.

2. Instruction level parallelism

Instruction level parallelism (ILP)-over coming data hazards- reducing branch costs – high performance instruction delivery- hardware based speculation- limitation of ILP. ILP software approach - compiler techniques- static branch protection- VLIW approach-H.W support for more ILP at compile time- H.W verses S.W solutions.

3. Memory hierarchy design

Memory hierarchy design – cache performance - reducing cache misses penalty and miss rate – virtual memory - protection and examples of VM. Multiprocessors and thread level parallelism - symmetric shared memory architectures- distributed shared memory-Synchronization- multi threading.

4. Storage systems, Inter connection networks and clusters

Storage systems - Types - bench marking a storage device- designing and evaluating an I/O system. Inter connection networks and clusters- interconnection network media – practical issues in interconnecting networks- examples – clusters- designing a cluster.

References:

1. John L. Hennessy & David A. Patterson, "Computer Architecture A quantitative Approach", 3rd Edition, Morgan Kufmann (An Imprint of Elsevier)
2. Kai Hwang and A. Briggs, "Computer Architecture and parallel Processing", McGraw-Hill.

3. Dezso Sima, Terence Fountain, Peter Kacsuk, “Advanced Computer Architectures”, Pearson

MECCI 206 - 2 ESTIMATION AND DETECTION THEORY

L	T	P	C
3	0	0	3

1. Hypothesis Testing

Criteria in Hypothesis Testing, neyman pearson criterion, bayes criterion and minimum probability of error criterion, likelihood ratio test, application examples- signal constellations and the matched filter, binary symmetric channel.

2. Detection

Detection with unknown signal parameters (UMP tests, GLRT, Bayes factor), MAP rule, multiple decision problem, detection of deterministic and random signals in noise.

3. Parameter Estimation

Unbiased estimates- minimum variance unbiased estimates (MVUE), methods of finding MVUE, cramer-rao bound sufficient statistics, rao-blackwell theorem, best linear unbiased estimators (BLUE).

4. Method of Moments

Method of moments, Maximum likelihood estimators, Bayes estimators (MAP, MMSE).

Linear Estimators

MA, AR, ARMA processes and their properties, MMSE linear estimate. Weiner Filter. Kalman Filter. Lattice filter structure, Levinson Durbin and innovation algorithms.

References:

1. H. L. Van Trees, “Detection, Estimation, and Modulation Theory”, Vol. I, John Wiley & Sons, 1968
2. Steven Kay, “Fundamentals of Statistical Signal Processing” Vol I: Estimation Theory. Prentice Hall.
3. Steven Kay, “Fundamentals of Statistical Signal Processing” Vol II: Detection Theory. Prentice Hall.

MECCI 206 - 3 ADVANCED DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

Module 1

Multirate Digital Signal Processing – Basic sampling rate alteration devices-Sampling rate reduction by an integer factor: Down sampler - Time and frequency domain characterization of downsampler – Anti-aliasing filter and decimation system – Sampling rate increase by an integer factor: Upsampler –Time and frequency domain characterization of upsampler – Anti-imaging filter and interpolation system – Gain of anti-imaging filter – Changing the sampling rate by rational factors – Transposition theorem- Multirate identities - Direct and Transposed FIR structures for interpolation and decimation filters – The Polyphase decomposition - Polyphase implementation of decimation and interpolation filters – Commutator models - Multistage implementation of sampling rate conversion – Filter requirements for multistage designs – Overall and individual filter requirements

Module 2

Two channel analysis and synthesis filter banks- QMF filter banks – Two channel SBC filter banks – Standard QMF banks – Optimal FIR QMF banks – Filter banks with PR – Conditions for PR – Conjugate Quadrature filters – Valid Half-band filters – Paraunitary filter banks – Paraunitary systems – Paraunitary modulation matrix – Spectral factorization – Realization with Lattice structures – Biorthogonal and Linear phase filter banks with PR - Transmultiplexer filter banks – Uniform M channel filter banks – Tree structured filter banks

Module 3

Short time Fourier Transform – Filtering interpretation of STFT – Filter bank implementation - Time frequency resolution tradeoff –Sampling of STFT in time and frequency - Motivation for Wavelet transform - The Continuous Wavelet Transform - scaling - shifting – Filtering view – Inverse CWT – Discrete Wavelet transform – dyadic sampling – Filter bank implementation – Inverse DWT

Module 4

Multiresolution formulation of Wavelet systems – Scaling function and wavelet function – dilation equation –Filter banks and the DWT - Analysis – from fine scale to coarse scale – Analysis tree – Synthesis – from coarse scale to fine scale – Synthesis tree - Input coefficients – Lattices and lifting.Wavelet based signal processing and applications: Wavelet packets – Wavelet packet algorithms – Thresholding – Interference suppression – Signal and image compression – Application to communication – OFDM multicarrier communication, Wavelet packet based MCCS

References

1. R E Crochiere, L E Rabiner, "Multirate Digital Signal Processing", Prentice Hall.
2. P P Vaidyanathan, "Multirate Systems and Filter Banks", Pearson Education.
3. N J Fliege, "Multirate Digital Signal Processing", Wiley Inter Science.
4. S K Mitra,"Digital Signal Processing: A computer based approach", Tata-McGraw Hill
5. A V Oppenheim, R W Shaffer, "Discrete time Signal Processing", Pearson Education.
6. 6. C S Burrus, R A Gopinath, H Guo, "Introduction to Wavelets and Wavelet Transforms: A primer", Prentice Hall.
7. J C Goswami, A K Chan, "Fundamentals of Wavelets: Theory, Algorithms and Applications", Wiley Inter Science.
8. G Strang and T Q Nguyen, "Filter banks and Wavelets", Wellesly Cambridge press

Module wise references:

Module 1: [1], [2], [3], [4], [5]

Module 2: [2], [3], [8]

Module 3: [2], [3], [4], [5], [8]

Module 4: [6], [7], [8]

MECCI 206 - 4 MANAGEMENT INFORMATION SYSTEM

L	T	P	C
3	0	0	3

Module 1.Introduction

Technology of Information Systems – Concepts – Definition - Role and impact of MIS - Role and importance of management –Approaches to Management - Functions of the manager - Management as a control system - Database Management Systems - Concepts - Data Models - Database Design - MIS & Client Server Architecture. Process of management - Planning – Organization – Staffing - Co-ordination and Controlling - Management by exception - MIS as a support to management - Organization structure and Theory –Basic Model and Organization structure - Organizational Behaviour.

Module 2.Decision Making and information

Decision making concepts - Methods – Tools and Procedures - Behavioral concepts in Decision making - Organizational Decision Making - Information concepts as a quality Product - Classification of the information - Methods of Data and information Collection - Value of the information - Human as a information Processor - Organization and Information System concepts – Control – Types - Handling System Complexity - Post Implementation Problems in Systems.

Module 3.System Analysis and Design

System analysis and design –Need for system Analysis - System Analysis of existing System - New Requirement - System Development Model - Structured Systems Analysis and Design - Computer System Design - Development of MIS - Development of long Range plans of the MIS - Ascertaining the class of information - Determining the Information Requirement - Development and implementation of the MIS Management of Quality - MIS Factors of success and failure.

Module 4.Decision support systems

Deterministic systems – Artificial intelligence – Knowledge Based Expert System – MIS and the role of DSS - Enterprise management systems – EMS – Enterprise Resource Planning (ERP) system – ERP basic features – benefits – selection - implementation – EMS and MIS.

References:

1. W.S.Jawadekar, “Management Information Systems”, Tata McGraw Hill .
2. Kenneth C Landon and Jane P.Laudon, “Management Information Systems “, Prentice Hall, Sixth edition, 2000.
3. Effy Oz, “Management Information Systems”, Thomson Learning, 2001.
4. Gordon B. Davis and Margerethe H.Olson, “Management Information system”, McGraw Hill 1988.
5. Jerome Karnter, “ Management Information System”, 3rd Edition, PHI, 1990.
6. David Kroenke, Management Information System, Tata McGraw Hill.1989.
7. James A O’Brien, Management Information System, Tata McGraw Hill, 1999.

MECCI 207 **SOFT COMPUTING LAB**

L	T	P	C
0	0	3	2

Soft Computing Techniques in MATLAB. Experiments for Soft Computing Techniques in Image Processing, Speech processing, Data Mining, Pattern recognition etc.

MECCI 208 **SEMINAR – II**

L	T	P	C
0	0	2	1

Each student shall prepare a seminar paper on any topic of interest related to the core/ elective courses being undergone in the second semester of the M.Tech programme. He/she shall select paper from IEEE/other reputed international journals. They should get the paper approved by the Programme Coordinator/Faculty Members in the concerned area of specialization and shall present it in the class in the presence of Faculty in-charge of seminar class. Every student shall participate in the seminar. Grade will be awarded on the basis of the student's paper, presentation and his/her participation in the seminar.

Goals: This course is designed to improve written and oral presentation skills and to develop confidence in making public presentations, to provide feedback on the quality and appropriateness of the work experience, and to promote discussions on design problems or new developments.

MECCI 301 INDUSTRIAL TRAINING AND MINIPROJECT

L	T	P	C
0	0	20	10

The student shall undergo

i) An Industrial Training of 12 weeks duration in an industry / company approved by the institution / institute and under the guidance of a staff member in the concerned field. At the end of the training he / she have to submit a report on the work being carried out.

OR

ii) An Industrial Training of 1 month duration and Mini Project of 2 months duration in an industry / company approved by the institution / institute and under the guidance of a staff member in the concerned field. At the end of the training he / she have to submit a report on the work being carried out.

MECCI 302 MASTER'S THESIS PHASE - I

L	T	P	C
0	0	10	5

The thesis (Phase - I) shall consist of research work done by the candidate or a comprehensive and critical review of any recent development in the subject or a detailed report of project work consisting of experimentation / numerical work, design and or development work that the candidate has executed.

In Phase - I of the thesis, it is expected that the student should decide a topic of thesis, which is useful in the field or practical life. It is expected that students should refer national & international journals and proceedings of national & international seminars. Emphasis should be given to the introduction to the topic, literature survey, and scope of the proposed work along with some preliminary work / experimentation carried out on the thesis topic. Student should submit two copies of the Phase - I thesis report covering the content discussed above and highlighting the features of work to be carried out in Phase – II of the thesis. Student should follow standard practice of thesis writing. The candidate will deliver a talk on the topic and the assessment will be made on the basis of the work and talks there on by a panel of internal examiners one of which will be the internal guide. These examiners should give suggestions in writing to the student to be incorporated in the Phase – II of the thesis.

MECCI 401 **MASTER'S THESIS**

L	T	P	C
0	0	30	15

In the fourth semester, the student has to continue the thesis work and after successfully finishing the work, he / she have to submit a detailed thesis report. The work carried out should lead to a publication in a National / International Conference. They should have submitted the paper before M. Tech. evaluation and specific weightage should be given to accepted papers in reputed conferences.

MECCI 402 **MASTER'S COMPREHENSIVE VIVA**

A comprehensive viva-voce examination will be conducted at the end of the fourth semester by an internal examiner and external examiners appointed by the university to assess the candidate's overall knowledge in the respective field of specialization.