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PERIYAR MANIAMMAI UNIVERSITY
Under Sec. 3 of UGC Act, 1956

M.E- COMPUTER AND COMMUNICATION

(THREE YEAR PART TIME)

CURRICULUM 2008

SEMESTER I

Code No	Course Title	L	T	P	C
	THEORY				
QCC101	Applied Mathematics For Electronics Engineers	3	1	0	4
QCC102	Internet Concepts and Programming	3	1	0	4
QCC103*	Elective I	3	0	0	3
	PRACTICAL				
QCC104	Internet Concepts and Programming Lab	0	0	4	2

Total Hours:15 **Total Credits:13**

SEMESTER II

Code No	Course Title	L	T	P	C
	THEORY				
QCC201	Advanced Microprocessors and Micro controllers	3	1	0	4
QCC202	Digital Communication Techniques	3	1	0	4
QCC203*	Elective – II	3	0	0	3
	PRACTICAL				
QCC204	Computer and Communication Lab I	0	0	4	2

Total Hours:15 **Total Credits:13**

SEMESTER III

Code No	Course Title	L	T	P	C
	THEORY				
QCC301	Optical Communication Systems	3	1	0	4
QCC302	High Performance Communication Networks	3	1	0	4
QCC303*	Elective – III	3	0	0	3
	PRACTICAL				
QCC304	Computer and Comunication Lab II	0	0	4	2

Total Hours:15 **Total Credits:13**

SEMESTER IV

Code No	Course Title	L	T	P	C
	THEORY				
QCC401	Wireless Communication Systems	3	1	0	4
QCC402	Network Security	3	1	0	4
QCC403*	Elective – IV	3	0	0	3
	PRACTICAL				
QCC404	Network Security Lab	0	0	4	2

Total Hours:15 **Total Credits:13**

SEMESTER V

Code No	Course Title	L	T	P	C
	PRACTICAL				
QCC501	Project Work (Phase I)	0	0	20	10

Total Hours:20 **Total Credits:10**

SEMESTER VI

Code No	Course Title	L	T	P	C
QCC601	Project Work (Phase II)	0	0	25	13

Total Hours:25 **Total Credits:13**

Over all Credits:75

LIST OF ELECTIVES

Code No	Course Title	L	T	P	C
Elective -1					
QCC103A	DSP Architecture and applications	3	0	0	3
QCC103B	Image Processing	3	0	0	3
QCC103C	Advanced Concepts in Operating Systems	3	0	0	3
QCC103D	Data Structures and Algorithms	3	0	0	3
Elective- 2					
QCC203A	Parallel Computer Architecture	3	0	0	3
QCC203B	Software Engineering	3	0	0	3
QCC203C	Embedded Systems & Applications	3	0	0	3
QCC203D	Pattern Recognition	3	0	0	3
Elective-3					
QCC303A	Advanced Concepts in Database Systems	3	0	0	3
QCC303B	Neural Network and applications	3	0	0	3
QCC303C	Adhoc Networks	3	0	0	3
QCC303D	XML and Web Services	3	0	0	3
Elective-4					
QCC403A	CDMA Systems And Techniques	3	0	0	3
QCC403B	Object Oriented System Design	3	0	0	3
QCC403C	Speech Processing	3	0	0	3
QCC403D	Distributed Systems	3	0	0	3

SYLLABUS

QCC 101 - APPLIED MATHEMATICS FOR ELECTRONICS ENGINEERS

3 1 0 4

UNIT – I

LINEAR ALGEBRAIC EQUATION AND EIGEN VALUE PROBLEM 9

System of Equations – Solution by Gauss Elimination, Gauss-Jordan and LU decomposition method – Jacobi, Gauss – Seidal iteration methods – Eigen value of a matrix by Jacobi and Power methods.

UNIT – II

WAVE EQUATION 9

Solution of initial and boundary value problems – Charactertics – D'Alembert's Solution – Significance of characteristic curves – Laplace transforms solutions for displacement in a long string – a long string under its weight – Longitudinal vibration of a elastic bar with prescribed force on one end – free vibrations of string.

UNIT – III

SPECIAL FUNCTIONS 9

Bessel's equation – Bessel Functions – Lengendre's equation – Legendre polynomials – Rodrigue's formula – Recurrence relations – generating functions and orthogonal property of Bessel functions and Lengendre Polynomials.

UNIT – IV

RANDOM VARIABLES 9

One-dimensional Random Variables – Moments and MGF – Binormal, Poisson, Geometrical, Uniform, Exponential, Normal and welbull distributions – Two – dimensional Random Variable – Marginal and Conditional distribution – Covariance and correlation coefficient – Functions of one-dimensional and two-dimensional Random Variable.

UNIT – V

QUEUING THEORY **9**

Single and Multiple server Markovian queuing models – steady state system size probabilities – Little's formula – Customer impatience – Priority queues – M'G/1 queuing system – P.K.formula.

L: 45; T:15; Total:60

REFERENCES:

1. Jain M.K.Iyengar, S.R.K. & Jain R.K. "Numerical Methods for Scientific and Engineering Computation" New age International (p) Ltd., Publishers, 2003.
2. Sankara Rao K."Introduction to Partial Differential Equation", Prentice Hall of India, 1997.
3. Grewal B.S "Higher Engineering Mathematics", Khanna Publishers, 2005
4. Kapur J.N & Saxena H.C "Mathematical Statistics" S.Chand & Company Limited, New Delhi, 2003.
5. Taha H.A "Operations Research – An introduction" Prentice Hall of India, 2001.
6. Gross. D & Harris C.M. "Fundamentals of queuing Theory", John Wiley & Sons, 1985.

QCC102- INTERNET CONCEPTS AND PROGRAMMING 3 1 0 4

UNIT - I **9**

Internet protocol, Ethernet technology, Fiber distributed data interface, Synchronous transfer mode, ARPANET technology, ANSNET .Application level Interconnection Networks, Internet architecture- Interconnection through IP routers, Primary classes of IP addresses and relevant properties, direct mapping.

UNIT - II **9**

ARP refinements and Implementation , encapsulation and identification, ARP protocol format, Reverse address resolution protocol, timing RARP transactions, Primary and Backup RARP servers.
Subnet and Super-net Extensions: Proxy ARP – Subnet addressing, Flexibility in subnet address assignment, Implementation of subnet, Routing in the presence of subnet – subnet routing algorithm, A unified routing algorithm, Broadcasting to subnets- Super net addressing .

UNIT - III **9**

Java features- difference between Java, C, and C++ - Java and Internet, Java Environment, Java Fundamentals, Programme structure, Multiple Inheritance, Packages, multi threaded programming, errors and exceptions, applet programming, graphics programming and problems in Java.

UNIT - IV **9**

HTML concepts of tags, layout-comments, paragraphs, aligning ,line break, style tags, address, links, formatting , relative and absolute path, images-Graphical link to images, CGI, Introduction to Java script & Perl, Web browsers.

UNIT - V **9**

XML, DHTML, Overview of e-commerce and Internet Security, JSP,ASP, Java Beans, Servlets.

L – 45, T - 15; TOTAL - 60

REFERENCES:

1. Comer De & Stevans Dl: Internetworking with TCP/IP Vol I, 3rd Edition, PHI,1998.
2. E.Balaguruswamy: Programming with Java Primer, TMH, 2nd Edition. 1999.
3. Johnr.Habbard: Programming with Java, Schaum's outline series McGraw Hill, 1999.

QCC104-Internet Concepts and Programming Lab 0 0 4 2

Programming using Java

1.Implementation of Multiple Inheritance

2.Implementation of Exceptions

3.Applet Programming

4.Implementation of Java Beans

5.Implementation of Servlets

6.Implementation of JSP

7.Programming using HTML

8.Programming using Java Script

QCC201 - ADVANCED MICROPROCESSORS AND MICRO CONTROLLERS 3 1 0 4

UNIT- I

MICROPROCESSOR ARCHITECTURE 9

Instruction set – Data formats – Instruction formats – Addressing modes – Memory hierarchy – register file – Cache – Virtual memory and paging – Segmentation – Pipelining – The instruction pipeline – pipeline hazards – Instruction level parallelism – reduced instruction set – Computer principles – RISC versus CISC – RISC properties – RISC evaluation – On-chip register files versus cache evaluation.

UNIT- II

HIGH PERFORMANCE CISC ARCHITECTURE – PENTIUM 9

The software model – functional description – CPU pin descriptions – RISC concepts – bus operations – Super scalar architecture – pipe lining – Branch prediction – The instruction and caches – Floating point unit –protected mode operation – Segmentation – paging – Protection – multitasking – Exception and interrupts – Input /Output – Virtual 8086 model – Interrupt processing -Instruction types – Addressing modes – Processor flags – Instruction set -programming the Pentium processor.

UNIT- III

HIGH PERFORMANCE RISC ARCHITECTURE :ARM 9

The ARM architecture – ARM assembly language program – ARM organization and implementation – The ARM instruction set - The thumb instruction set – ARM CPU cores.

UNIT- IV

MOTOROLA 68HC11 MICROCONTROLLERS 9

Instructions and addressing modes – operating modes – Hardware reset – Interrupt system – Parallel I/O ports – Flags – Real time clock – Programmable timer – pulse accumulator – serial communication interface – A/D converter – hardware expansion – Assembly language Programming

UNIT- V

PIC MICRO CONTROLLER **9**

CPU architecture – Instruction set - Interrupts – Timers – I/O port expansion –I^2C bus for peripheral chip access – A/D converter – UART

L:45; T:15; Total:60

REFERENCES :

1. Daniel Tabak , ‘’ Advanced Microprocessors” McGraw Hill.Inc., 1995
2. James L. Antonakos , “ The Pentium Microprocessor ‘’ Pearson Education , 1997.
3. Steve Furber , ‘’ ARM System –On –Chip architecture “Addison Wesley, 2000.
4. Gene .H.Miller .” Micro Computer Engineering ,” Pearson Education , 2003.
5. John .B.Peatman , “ Design with PIC Microcontroller , Prentice hall, 1997.
6. James L.Antonakos, “An Introduction to the Intel family of Microprocessors”’ Pearson Education 1999.
7. Barry.B.Breg, “The Intel Microprocessors Architecture , Programming and Interfacing” , PHI,2002.
8. Valvano "Embedded Microcomputer Systems" first reprint 2001 Thomson Asia, PVT LTD

QCC202 - DIGITAL COMMUNICATION TECHNIQUES 3 1 0 4

UNIT - I **9**

POWER SPECTRUM AND COMMUNICATION OVER MEMORYLESS CHANNEL:

PSD of a synchronous data pulse stream; M-ary Markov source; Convolutionaly coded modulation; Continuous phase modulation – Scalar and vector communication over memoryless channel – Detection criteria.

UNIT- II **9**

COHERENT AND NON-COHERENT COMMUNICATION:

Coherent receivers – Optimum receivers in WGN – IQ modulation & demodulation – Noncoherent receivers in random phase channels; M-FSK receivers – Rayleigh and Rician channels – Partially coherent receives – DPSK; M-PSK; M-DPSK,-BER Performance Analysis.

UNIT- III **9**

BANDLIMITED CHANNELS AND DIGITAL MODULATIONS

Eye pattern; demodulation in the presence of ISI and AWGN; Equalization techniques – IQ modulations; QPSK; QAM; QBOM; -BER Performance Analysis. – Continuous phase modulation; CPFM; CPFSK; MSK,OFDM.

UNIT- IV **9**

BLOCK CODED DIGITAL COMMUNICATION

Architecture and performance – Binary block codes; Orthogonal; Biorthogonal; Transorthogonal – Shannon's channel coding theorem; Channel capacity; Matched filter; Concepts of Spread spectrum communication – Coded BPSK and DPSK demodulators – Linear block codes; Hammning; Golay; Cyclic; BCH ; Reed – Solomon codes..

UNIT- V **9**

CONVOLUTIONAL CODED DIGITAL COMMUNICATION

Representation of codes using Polynomial, State diagram, Tree diagram, and Trellis diagram – Decoding techniques using Maximum likelihood, Viterbi algorithm, Sequential and Threshold methods – Error probability performance for BPSK and Viterbi algorithm, Turbo Coding.

L – 45, T – 15; Total - 60

REFERENCES:

1. M.K.Simon, S.M.Hinedi and W.C.Lindsey, Digital communication techniques; Signalling and detection, Prentice Hall India, New Delhi. 1995.
2. Simon Haykin, Digital communications, John Wiley and sons, 1998
3. Wayne Tomasi, Advanced electronic communication systems, 4th Edition Pearson Education Asia, 1998
4. B.P.Lathi Modern digital and analog communication systems, 3rd Edition, Oxford University press 1998.

QCC204 - COMPUTER AND COMMUNICATION LAB- I

0 0 4 2

1. Simulation of Modulation and Coding in a AWGN Communication Channel using Simulation Packages.
2. Implementation of Linear and Cyclic Codes
3. Implementation of OFDM .
4. Simulation of QMF using Simulation Packages.
5. Implementation of QPSK and MSK
6. Implementation of REED-SOLOMON codes
7. Implementation of Turbo codes
8. System design using PIC Microcontroller
9. Programming of Timers and Interrupts using PIC Microcontroller.

SEMESTER III

QCC 301- OPTICAL COMMUNICATION SYSTEMS 3 1 0 4

UNIT - I **9**

OPTICAL FIBERS

Geometrical description – wave propagation- Dispersion in single mode (SM) and multimode (MM) fibers – Limitations due to dispersion – Fiber Losses – Non liner optical effects.

UNIT - II **9**

OPTICAL AMPLIFIERS

Concepts- Semiconductor optical Amplifier – Raman and Brillouin amplifier – Fiber amplifiers – Erbium doped amplifiers – System applications

UNIT - III **9**

DISPERSION MANAGEMENT

Need- Precompensation schemes – Postcompensation techniques – Dispersion compensating fibers – Optical filters – Fiber Bragg gratings- Optical Phase Conjugation – Long Haul lightwave systems – High capacity systems.

UNIT - IV **9**

MULTICHANNEL SYSTEMS

WDM lightwave systems- WDM components – System performance issues – Time Division Multiplexing (TDM) - Sub carrier multiplexing – Code Division Multiplexing, DWDM.

UNIT- V **9**

COHERENT LIGHTWAVE SYSTEMS

Concepts – Modulation formats – Demodulation formats – Bit Error Rate (BER) – Sensitivity degradation – System performance.

L – 45, T - 15; Total - 60

REFERENCES:

1. G.P. Agrawal, “Fiber optic communication systems”, 3rd Edition, John Wiley & Sons, New York, 2002.
2. H. Franz & V.K.Jain, “Optical Communication Systems”, Narosa Publications, New Delhi, 1995.
3. G. Keiser, “Optical fiber communication systems”, McGraw-Hill, 3rd Edition, New York, 2000.
4. H. Franz & V.K. Jain, “Optical communication, Components and Systems, Narosa Publications, New Delhi, 2002.

QCC 302 - HIGH PERFORMANCE COMMUNICATION NETWORKS

3 1 0 4

UNIT- I **9**

PACKET SWITCHED NETWORKS

OSI and IP models, Ethernet (IEEE 802.3), Token ring (IEEE 802.5), Wireless LAN (IEEE 802.11) FDDI, DQDB, SMDS: Internetworking with SMDS

UNIT - II **9**

ISDN AND BROADBAND ISDN

ISDN - overview, interfaces and functions, Layers and services - Signaling System 7 - Broadband ISDN architecture and Protocols.

UNIT - III **9**

ATM AND FRAME RELAY

ATM: Main features-addressing, signaling and routing, ATM header structure-adaptation layer, management and control, ATM switching and transmission.
Frame Relay: Protocols and services, Congestion control, Internetworking with ATM, Internet and ATM, Frame relay via ATM.

UNIT - IV **9**

ADVANCED NETWORK ARCHITECTURE

IP forwarding architectures overlay model, Multi Protocol Label Switching (MPLS), integrated services in the Internet, Resource Reservation Protocol (RSVP), Differentiated services

UNIT - V **9**

BLUE TOOTH TECHNOLOGY

The Blue tooth module-Protocol stack Part I: Antennas, Radio interface, Base band, The Link controller, Audio, The Link Manager, The Host controller interface; The Blue tooth module-Protocol stack Part I: Logical link control and adaptation protocol, RFCOMM, Service discovery protocol, Wireless access protocol, Telephony control protocol.

L – 45, T - 15; Total - 60

REFERENCES:

1. William Stallings,"ISDN and Broadband ISDN with Frame Relay and ATM", 4th Edition, Pearson education asia, 2002.
2. Leon Gracia, Widjaja, "Communication networks ", Tata McGraw-Hill, New Delhi, 2000.
3. Jennifer Bray and Charles F.Sturman,"Blue Tooth" Pearson education Asia, 2001.
4. Sumit Kasera, Pankaj Sethi, "ATM Networks ", Tata McGraw-Hill, New Delhi, 2000.
5. Rainer Handel, Manfred N.Huber, Stefan Schroder ,"ATM Networks",3rd Edition, Pearson education asia,2002.
6. Jean Walrand and Pravin varaiya ,"High Performance Communication networks",2nd Edition, Harcourt and Morgan Kauffman,London,2000.
7. William Stallings,"High-speed Networks and Internets", 2nd Edition, Pearson education Asia, 2003.

QCC 304 - COMPUTER AND COMMUNICATION LABORATORY - II

0 0 4 2

1. BER measurements in fiber optic Digital link.
2. Optical Device Modeling using SPICE.
3. Optical link simulation using simulator packages.
4. Simulation of Protocols (ARP/RARP& Sliding window)
5. Simulation of Router/ Routing algorithm(DSR / Adaptive)
6. Simulation of ATM switches.
7. Simulation and Implementation of ATM congestion control algorithm. (using free ATM network simulator software)
8. Network Configuration.
9. Establishment of RF Communication Link

QCC 401 - WIRELESS COMMUNICATION SYSTEMS 3 1 0 4

UNIT- I **9**

INTRODUCTION TO WIRELESS MOBILE COMMUNICATIONS

History and evolution of mobile radio systems. Types of mobile wireless services / systems – Cellular, WLL, Paging, Satellite systems, Standards, Future trends in personal wireless systems.

UNIT- II **9**

CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS

Cellular concept and frequency reuse, Multiple Access Schemes, Channel assignment and handoff, Interference and system capacity, Trunking and Erlang capacity calculations.

UNIT - III **9**

MOBILE RADIO PROPAGATION

Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading and base band impulse response models, Parameters of mobile multipath channels, Antenna systems in mobile radio.

UNIT- IV **9**

MODULATIONS AND SIGNAL PROCESSING

Analog and digital modulation techniques, Performance of various modulation techniques – Spectral efficiency, Error-rate, Power Amplification, Equalization Rake receiver concepts, Diversity and space-time processing, Speech coding and channel coding.

UNIT- V **9**

SYSTEM EXAMPLES AND DESIGN ISSUES

Multiple Access Techniques – FDMA, TDMA and CDMA systems, Operational systems, Wireless networking, design issues in personal wireless systems.

L – 45, T-15; Total - 60

REFERENCES:

1. Feher K., “Wireless digital communications”, PHI, New Delhi, 1995.
2. Rappaport T.S., “Wireless Communications; Principles and Practice”, Prentice Hall, NJ, 1996.
3. Lee W.C.Y., “Mobile Communications Engineering: Theory and Applications”, Second Edition, McGraw-Hill, New York, 1998.
4. Schiller, “Mobile Communications”, Pearson Education Asia Ltd., 2000

QCC 402 - NETWORK SECURITY 3 1 0 4

UNIT - I **9**

SYMMETRIC CIPHERS (TECHNIQUES AND STANDARDS) - I

Introduction – Services, Mechanisms and Attacks, OSI security Architecture, Model for network Security; Classical Encryption Techniques- Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Stegnography; Block Ciphers and Data Encryption Standard- Simplified DES, Block Cipher Principles, Data Encryption Standard, Strength of DES, Differential and Linear Crypt Analysis, Block Cipher Design Principles, Block Cipher Modes of Operation.

UNIT - II **9**

SYMMETRIC CIPHERS (TECHNIQUES AND STANDARDS) – II

Advanced Encryption Standard- Evaluation Criteria for AES, AES Cipher; Contemporary Symmetric Ciphers- Triple DES, Blowfish, RC5, Characteristics of Advanced Symmetric Block Ciphers, RC4 Stream Cipher; Confidentiality using Symmetric Encryption- Placement of Encryption Function, Traffic Confidentiality, Key Distribution, and Random Number Generation.

UNIT - III **9**

PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS

Public Key Cryptography and RSA- Principles of Public Key Cryptosystems, RSA Algorithm; Key Management and other public key cryptosystems- Key Management, Diffie-Hellman Key Exchange, Elliptic Curve arithmetic, Elliptic Curve Cryptography; Message Authentication and Hash Functions- Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions and MACs; Hash Algorithms- MD5 Message Digest Algorithm; Secure Hash Algorithm, RIPEMD 160, HMAC; Digital Signatures and Authentication Protocols- Digital Signatures, Authentication Protocols, Digital Signature Standards.

UNIT - IV **9**

NETWORK SECURITY PRACTICE

Authentication Applications- Kerberos, X.509 Authentication Service; Electronic Mail Security- Pretty Good Privacy, S/MIME; IP Security- IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations; Web Security- Web Security Considerations, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

UNIT- V **9**

SYSTEM SECURITY

Intruders- Intruder Detection, Password Management; Malicious Software- Virus and Related Threats, Virus Counter Measures; Firewalls- Firewall Design Principles, Trusted Systems.

L – 45, T - 15; Total - 60

REFERENCES:

1. William Stallings, “Cryptography and Network Security”, 3ed. Prentice Hall of India, New Delhi, 2004
2. William Stallings, “Network Security Essentials”, 2 ed. Prentice Hall of India, New Delhi, 2004
3. Charlie Kaufman, “Network Security: Private Communication in Public World”, 2 ed. Prentice Hall of India, New Delhi, 2004

QCC404-Network Security Lab 0 0 4 2

1. Implementation of Sniffing
2. Implementation of web Vulnerabilities.-web based password capturing,SQL injection.
3. Implementation of Symmetric encryption scheme-RC4
4. Implementation of Symmetric encryption scheme-S-DES,3 DES
5. Implementation ofAsymmetric encryption scheme- RSA
6. Implementation of Hashing Scheme-MD5
7. Implementation of Block Cipher Modes- ECB,CBC,CFB,OFB

QCC103A - DSP ARCHITECTURE AND APPLICATIONS 3 0 0 3

[Review of discrete-time signals and systems- DFT and FFT, Z-Transform, Digital Filters is recommended]

UNIT- I **9**

DISCRETE RANDOM SIGNAL PROCESSING

Discrete Random Processes- Ensemble averages, stationary processes, Autocorrelation and Auto covariance matrices. Parseval's Theorem, Wiener-Khintchine Relation- Power Spectral Density-Periodogram Spectral Factorization , Filtering random processes. Low Pass Filtering of White Noise. Parameter estimation: Bias and consistency.

UNIT- II **9**

SPECTRUM ESTIMATION

Estimation of spectra from finite duration signals, Non-Parametric Methods-Correlation Method , Periodogram Estimator, Performance Analysis of Estimators -Unbiased, Consistent Estimators- Modified periodogram, Bartlett and Welch methods, Blackman –Tukey method. Parametric Methods - AR, MA, ARMA model based spectral estimation. Parameter Estimation -Yule-Walker equations, solutions using Durbin's algorithm

UNIT - III **9**

LINEAR ESTIMATION AND PREDICTION

Linear prediction- Forward and backward predictions, Solutions of the Normal equations- Levinson-Durbin algorithms. Least mean squared error criterion -Wiener filter for filtering and prediction , FIR Wiener filter and Wiener IIR filters ,Discrete Kalman filter

UNIT - IV **9**

ADAPTIVE FILTERS

FIR adaptive filters -adaptive filter based on steepest descent method-Widrow-Hoff LMS adaptive algorithm, Normalized LMS. Adaptive channel equalization-Adaptive echo cancellation-Adaptive noise cancellation- Adaptive recursive filters (IIR). RLS adaptive filters-Exponentially weighted RLS-sliding window RLS.

UNIT- V **9**

MULTIRATE DIGITAL SIGNAL PROCESSING

Mathematical description of change of sampling rate - Interpolation and Decimation , Decimation by an integer factor - Interpolation by an integer factor, Sampling rate conversion by a rational factor, Filter implementation for sampling rate conversion-direct form FIR structures, Polyphase filter structures, time-variant structures. Multistage implementation of multirate system. Application to sub band coding - Wavelet transform and filter bank implementation of wavelet expansion of signals.

L - 45; Total - 45

REFERENCES:

1. Monson H.Hayes, Statistical Digital Signal Processing and Modeling, John Wiley and Sons, Inc.,Singapore, 2002.
2. John G.Proakis, Dimitris G.Manolakis, Digital Signal Processing Pearson Education, 2002.
3. John G.Proakis et.al.,'Algorithms for Statistical Signal Processing', Pearson Education, 2002.
4. Dimitris G.Manolakis et.al.,'Statistical and adaptive signal Processing', McGraw Hill, Newyork,2000.
5. Rafael C. Gonzalez, Richard E.Woods, 'Digital Image Processing', Pearson Education, Inc., Second Edition, 2004.(For Wavelet Transform Topic)

QCC103B - IMAGE PROCESSING 3 0 0 3

UNIT - I **9**

DIGITAL IMAGE FUNDAMENTALS

Elements of digital image processing systems, Elements of visual perception, psycho visual model, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals –RGB,HIS models, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries.

UNIT- II **9**

IMAGE TRANSFORMS

1D DFT, 2D transforms – DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Wavelet Transform.

UNIT - III **9**

IMAGE ENHANCEMENT AND RESTORATION

Histogram modification and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic and Yp mean filters, Homomorphic filtering, Color image enhancement. Image Restoration – degradation model, Unconstrained and Constrained restoration, Inverse filtering – removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations – spatial transformations, Gray-Level interpolation,

UNIT- IV **9**

IMAGE SEGMENTATION AND RECOGNITION

Edge detection. Image segmentation by region growing, region splitting and merging, edge linking.. Image Recognition – Patterns and pattern classes, Matching by minimum distance classifier, Matching by correlation, Back Propagation Neural Network, Neural Network applications in Image Processing.

UNIT- V **9**

IMAGE COMPRESSION

Need for data compression, Huffman,. Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Block Truncation Coding. Transform Coding – DCT and Wavelet. JPEG ,MPEG. Standards, Concepts of Context based Compression.

L - 45; Total - 45

REFERENCES:

1. Rafael C. Gonzalez, Richard E.Woods, 'Digital Image Processing', Pearson Education, Inc., Second Edition, 2004.
2. Anil K. Jain, 'Fundamentals of Digital Image Processing', Prentice Hall of India, 2002.
3. David Salomon : Data Compression – The Complete Reference, Springer Verlag New York Inc., 2nd Edition, 2001
4. Rafael C. Gonzalez, Richard E.Woods, Steven Eddins, ' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.
5. William K.Pratt, ' Digital Image Processing', John Wiley, NewYork, 2002.
6. Milman Sonka, Vaclav Hlavac, Roger Boyle, 'Image Processing, Analysis, and Machine Vision', Brooks/Cole, Vikas Publishing House, II ed., 1999.
7. Sid Ahmed, M.A., 'Image Processing Theory, Algorithms and Architectures', McGrawHill, 1995.

QCC103C - ADVANCED CONCEPTS IN OPERATING SYSTEMS 3 0 0 3

UNIT- I **9**

CONCEPTS OF OPERATING SYSTEM DESIGN

Operating system and services - CPU scheduling approaches - process structure and PCB - Process synchronization – semaphores – deadlocks – handling deadlocks - multithreading.

UNIT- II **9**

MEMORY MANAGEMENT

Memory management-paging-segmentation-virtual memory-demand paging – paging replacement algorithm

UNIT- III **9**

DISK SCHEDULING APPROACHES

Disk scheduling approaches- - File system- File system design issues-user interface to file system-I/O device management.

UNIT - IV **9**

DISTRIBUTED OPERATING SYSTEM

Distributed operating system – design issues in distributed operating system-distributed file system.

UNIT - V **9**

CASE STUDY (LINUX / WINDOWS)

Case study (Linux / Windows) – design and implementation of OS - process model and structure in OS - memory management - file system - I/O management and device drivers.

L:45; Total: 45

REFERENCES:

1. Abraham Silberschatz and Peter B. Galvin " Operating system concepts", 7th Edition, Addison Wesley Publishing Company, 2005
2. Bach M.J., "Design of the UNIX operating system", Prentice Hall, 1999.
3. Mukesh singhal, and Niranjan Shivratri, "Distributed operating system", TMH, 2001.
4. Leffler, Mukusick, Karcls, and Quarterman, "The design and implementation of 4.3 BSD UNIX operating system," Addison Wesley, 2001.
5. Naji, "Linux OS", Printice Hall of India, 2003.
6. Abraham Siberschetz and Peter B. Galvin, "Windows XP Update", John Wesley, 2003**.**

QCC103D - DATA STRUCTURES AND ALGORITHMS 3 0 0 3

UNIT-1 **9**

INTRODUCTION

Basic concepts of object oriented programming-Abstract Data Types-List-Implementation-Arrays-Cursors,Pointers.

UNIT - II **11**

BASIC DATA STRUCTURES

Stack,Queue-Implementation-Applications,Trees-Traversals-General-Binary-Expression Search Tree-AVL Trees-Splay Trees-B Trees.

UNIT-III **9**

ADVANCED DATA STRUCTURES

Set-Basic operations-Advanced Set representations-Priority Queue-Applications-Graphs-Traversals-Representation.

UNIT-IV **7**

MEMORY MANAGEMENT

Memory management issues-Storage allocation-Dynamic memory allocation,Memory Compaction,Garbage Collection-Buddy Systems.

UNIT V **9**

ALGORITHM ANALYSIS AND DESIGN

Algorithm analysis-sorting-searching-Design techniques-Divide and Conquer-Greedy-Dynamic Programming-BackTracking-Branch and Bound,Knapsack –Travelling Salesman Problem-Graph Colouring-8 Queens Problem

L:45; Total - 45

REFERENCES:

1. AHO, HOPCROFT, ULLMAN:"Data Structure & Algorithms", Addison Wesley pub company,1985.
2. WEISS M.A: "Data Structure & Algorithm Analysis in C++", Benjamin Cummings,1994.
3. SARA BAASE:"Computer Algorithms-Introduction to design and analysis", AW, 1988
4. SAHINI:"Data Structures, Algorithms and applications in Java",McGraw Hill,2000

QCC203A - PARALLEL COMPUTER ARCHITECTURE 3 0 0 3

UNIT- I **9**

PRINCIPLES OF PARALLEL PROCESSING

Multiprocessors and Multicomputers – Multivector and SIMD Computers- PRAM and VLSI Models- Conditions of Parallelism- Program Partitioning and scheduling-program flow mechanisms- parallel processing applications- speed up performance law.

UNIT - II **9**

PROCESSOR AND MEMORY ORGANIZATION

Advanced processor technology – Superscalar and vector processors- Memory hierarchy technology- Virtual memory technology- Cache memory organization- Shared memory organization.

UNIT - III **9**

PIPELINE AND PARALLEL ARCHITECTURE

Linear pipeline processors- Non linear pipeline processors- Instruction pipeline design- Arithmetic pipeline design- Superscalar and super pipeline design- Multiprocessor system interconnects cache coherence and synchronization mechanism- Message passing mechanisms.

UNIT - IV **9**

VECTOR, MULTITHREAD AND DATAFLOW ARCHITECTURE

Vector Processing principle- Multivector Multiprocessors- Compound Vector processing- Principles of multithreading-fine grain multicomputers- scalable and multithread architectures – Dataflow and hybrid architectures.

UNIT - V **9**

PARALLEL PROGRAMMING

Parallel programming models- parallel languages and compilers- parallel programming environments- synchronization and multiprocessing modes- message passing program development- mapping programs onto multicomputers- multiprocessor UNIX design goals- MACH/OS kernel architecture- OSF/1 architecture and applications.

L:45; Total - 45

REFERENCES:

1. Kai Hwang, Advanced Computer Architecture, TMH 2001.
2. William Stallings, Computer Organization and Architecture, McMillan Publishing Company, 1990.
3. M.J. Quinn, Designing efficient Algorithms for parallel computer, McGraw Hill International, 1994.

QCC203B SOFTWARE ENGINEERING 3 0 0 3

UNIT - I **9**

A Generic View Of Processes – Process Maturity – Process Models – Agile Process And Models – Software Cost Estimation –Risk Analysis – Software Project Planning & Scheduling.

UNIT - II **9**

REQUIREMENT ANALYSIS

System Engineering Hierarchy – Requirement Engineering: Tasks, Initiating The Process, Eliciting Requirements, Developing Use Cases – Negotiating Requirements – Validating Requirements – Building The Analysis Models: Concepts – Object Oriented Analysis – Scenario Based Modeling – Data & Control Flow Oriented Model – Class Based Model – Behavioral Model.

UNIT - III **9**

SOFTWARE DESIGN

Design Concepts – Design Models – Pattern Based Design – Architectural Design – Component Level Design – Class Based And Conventional Components Design – Real-time System Design - User Interface : Analysis And Design.

UNIT - IV **9**

SOFTWARE TESTING

Software Testing – Strategies – Issues – Test Strategies For Conventional And Object Oriented Software – Validation And System Testing - Testing Tactics: White Box Testing, Basis Path Testing – Control Structure Testing – Black Box Testing - Object Oriented Testing – Testing GUI – Testing Client/Server – Test Documentation.

UNIT - V **9**

SOFTWARE QUALITY ASSURANCE

Software Quality Concepts – Quality Assurance – Software Technical Reviews – Formal Approach To Software Quality Assurance - Reliability – Quality Standards – Software Quality Assurance Plan – Software Maintenance - Software Configuration Management –Reverse Engineering & Reengineering – Use of CASE Tools

L:45; TOTAL : 45

REFERENCES:

1. Roger S. Pressman., Software Engineering: A Practitioner's Approach, 6th
2. Edition, McGraw Hill, 2005.
3. I.Sommerville, Software Engineering, 5th Edition: Addison Wesley, 1996.
4. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
5. James F Peters and Witold Pedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
6. Fairely, "Software Engineering Concepts", McGraw Hill, 1995

QCC203C EMBEDDED SYSTEMS AND APPLICATIONS 3 0 0 3

UNIT- I **9**

EMBEDDED ARCHITECTURE

Embedded Computers, Characteristics of Embedded Computing Applications, Challenges in Embedded Computing system design, Embedded system design process- Requirements, Specification, Architectural Design, Designing Hardware and Software Components, System Integration, Formalism for System Design- Structural Description, Behavioral Description, Design Example: Model Train Controller

UNIT - II **9**

EMBEDDED PROCESSOR AND COMPUTING PLATFORM

ARM processor- processor and memory organization, Data operations, Flow of Control, SHARC processor- Memory organization, Data operations, Flow of Control, parallelism with instructions, CPU Bus configuration, ARM Bus, SHARC Bus, Memory devices, Input/output devices, Component interfacing, designing with microprocessor development and debugging, Design Example : Alarm Clock.

UNIT- III **9**

NETWORKS

Distributed Embedded Architecture- Hardware and Software Architectures, Networks for embedded systems- I2C, CAN Bus, SHARC link ports, ethernet, Myrinet, Internet, Network-Based design- Communication Analysis, system performance Analysis, Hardware platform design, Allocation and scheduling, Design Example: Elevator Controller**.**

UNIT - IV **9**

REAL-TIME CHARACTERISTICS

Clock driven Approach, weighted round robin Approach, Priority driven Approach, Dynamic Versus Static systems, effective release times and deadlines, Optimality of the Earliest deadline first (EDF) algorithm, challenges in validating timing constraints in priority driven systems, Off-line Versus On-line scheduling.

UNIT - V **9**

SYSTEM DESIGN TECHNIQUES

Design Methodologies, Requirement Analysis, Specification, System Analysis and Architecture Design, Quality Assurance, Design Example: Telephone PBX- System Architecture, Ink jet printer- Hardware Design and Software Design, Personal Digital Assistants, Set-top Boxes.

L:45; Total : 45

REFERENCES:

1. Wayne Wolf, Computers as Components: Principles of Embedded Computing System Design, Morgan Kaufman Publishers, 2001.
2. Jane.W.S. Liu Real-Time systems, Pearson Education Asia, 2000
3. C. M. Krishna and K. G. Shin , Real-Time Systems, ,McGraw-Hill, 1997

Frank Vahid and Tony Givargi, Embedded System Design: A Unified Hardware/Software Introduction, John Wiley & Sons, 2000.

QCC203D - PATTERN RECOGNITION 3 0 0 3

UNIT- I PATTERN RECOGNITION OVERVIEW 7

Pattern recognition, Classification and Description—Patterns and feature Extraction with Examples—Training and Learning in PR systems—Pattern recognition Approaches—Other Approaches to PR.

UNIT - II STATISTICAL PATTERN RECOGNITION 11

Introduction to statistical Pattern Recognition—supervised Learning using Parametric and Non Parametric Approaches.

UNIT- III LINEAR DISCRIMINANT FUNCTIONS AND UNSUPERVISED LEARNING AND CLUSTERING 9

Introduction—Discrete and binary Classification problems—Techniques to directly Obtain linear Classifiers -- Formulation of Unsupervised Learning Problems—Clustering for unsupervised learning and classification.

UNIT - IV SYNTACTIC PATTERN RECOGNITION 9

Overview of Syntactic Pattern Recognition—Syntactic recognition via parsing and other grammars–Graphical Approaches to syntactic pattern recognition—Learning via grammatical inference.

UNIT- V NEURAL PATTERN RECOGNITION 9

Introduction to Neural networks—Feedforward Networks and training by Back Propagation—Content Addressable Memory Approaches and Unsupervised Learning in Neural PR.

L:45; Total - 45

TEXT BOOKS:

1. Robert Schalkoff, “pattern Recognition: statistical , structural and neural approaches, John wiley & sons , Inc,1992.

REFERENCES:

1. Earl Gose, Richard johnsonbaugh, Steve Jost, Pattern Recognition and Image Analysis, Prentice Hall of India,.Pvt Ltd, new Delhi.
2. R.O.Duda, P.E.Hart & D.G Stork, Pattern Classification 2nd Edition, J.Wiley Inc 2001.
3. R.O.Duda & P.E.Hart, Pattern Classification and Scene Analysis, J.wiley Inc, 1973.(Statistical PR)
4. K.S.Fu, Syntactic Pattern Recognition, Academic press Inc,1974.
5. C.M.Bishop, Neural Networks for Pattern Recognition, Oxford University Press,1995.

QCC303A - ADVANCED CONCEPTS IN DATA BASE SYSTEMS

3 0 0 3

UNIT- I **9**

DATA BASE SYSTEM CONCEPT

File systems - Database systems - Database systems architecture - Data models - Relational model – Hierarchical model - Network model - Entity-Relationship model - Data Dictionary - Database Administration and control.

UNIT- II **9**

RELATIONAL DATABASES

Codd's rules - Base tables - Views - Domains and key concept - Integrity rules - Relational Algebra – Relational calculus - Commercial query languages - Embedded SQL - Normalization and database design.

UNIT - III **9**

DATABASE SYSTEM DESIGN

File and storage structures - Indexing and Hashing - Query processing - Database recovery - Concurrency control - Transaction processing - Security and Integrity - Triggers.

UNIT- IV **9**

DISTRIBUTED DATABASES

Centralized versus distributed databases - Fragmentation - Distributed database architecture - Client / Server databases - Distributed transactions - Locking and Commit protocols - Distributed concurrency Control – Security and reliability - Parallel databases.

UNIT - V **9**

ADVANCED DATABASES

The World Wide Web - Object oriented database - Object Relational database - XML, XML/QL - Data Analysis and OLAP - Data mining - Data warehousing.

L:45; Total - 45

REFERENCES:

1. Abraham Silberschatz, Henry. F. Korth, S.Sudharsan, Database System Concepts, 4th Edition, Tata McGraw Hill, 2002.
2. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 3rd Edition, Addison Wesley, 2004.
3. Jim Buyens, Step by Step Web Database Development, PHI, 2001.
4. Stefano Ceri & Giuesppe Pelagatti, Distributed Databases - Principles and Systems, McGraw Hill Book Company, 1987.
5. C.J.Date, “An Introduction to Database system”, Pearson Education, 7th Edition, 2003

QCC303B - NEURAL NETWORKS AND APPLICATIONS 3 0 0 3

UNIT- I **9**

BASIC LEARNING ALGORITHMS

Biological Neuron – Artificial Neural Model - Types of activation functions – Architecture: Feedforward and Feedback – Learning Process: Error Correction Learning –Memory Based Learning – Hebbian Learning – Competitive Learning - Boltzman Learning – Supervised and Unsupervised Learning – Learning Tasks: Pattern Space – Weight Space – Pattern Association – Pattern Recognition – Function Approximation – Control – Filtering - Beamforming – Memory – Adaptation - Statistical Learning Theory – Single Layer Perceptron – Perceptron Learning Algorithm – Perceptron Convergence Theorem – Least Mean Square Learning Algorithm – Multilayer Perceptron – Back Propagation Algorithm – XOR problem – Limitations of Back Propagation Algorithm.

UNIT- II **9**

RADIAL-BASIS FUNCTION NETWORKS AND SUPPORT VECTOR MACHINES

RADIAL BASIS FUNCTION NETWORKS:

Cover's Theorem on the Separability of Patterns - Exact Interpolator – Regularization Theory – Generalized Radial Basis Function Networks - Learning in Radial Basis Function Networks - Applications: XOR Problem – Image Classification.

SUPPORT VECTOR MACHINES

Optimal Hyperplane for Linearly Separable Patterns and Nonseparable Patterns – Support Vector Machine for Pattern Recognition – XOR Problem - $\in$-insensitive Loss Function – Support Vector Machines for Nonlinear Regression

UNIT- III **9**

COMMITTEE MACHINES

Ensemble Averaging - Boosting – Associative Gaussian Mixture Model – Hierarchical Mixture of Experts Model(HME) – Model Selection using a Standard Decision Tree – A Priori and Postpriori Probabilities – Maximum Likelihood Estimation – Learning Strategies for the HME Model - EM Algorithm – Applications of EM Algorithm to HME Model

NEURODYNAMICS SYSTEMS

Dynamical Systems – Attractors and Stability – Non-linear Dynamical Systems- Lyapunov Stability – Neurodynamical Systems – The Cohen-Grossberg Theorem.

UNIT - IV **9**

ATTRACTOR NEURAL NETWORKS:

Associative Learning – Attractor Neural Network Associative Memory – Linear Associative Memory – Hopfield Network – Content Addressable Memory – Strange Attractors and Chaos - Error Performance of Hopfield Networks - Applications of Hopfield Networks – Simulated Annealing – Boltzmann Machine – Bidirectional Associative Memory – BAM Stability Analysis – Error Correction in BAMs - Memory Annihilation of Structured Maps in BAMS – Continuous BAMs – Adaptive BAMs – Applications

ADAPTIVE RESONANCE THEORY

Noise-Saturation Dilemma - Solving Noise-Saturation Dilemma – Recurrent On-center – Off-surround Networks – Building Blocks of Adaptive Resonance – Substrate of Resonance Structural Details of Resonance Model – Adaptive Resonance Theory – Applications

UNIT - V **9**

SELF ORGANISING MAPS

Self-organizing Map – Maximal Eigenvector Filtering – Sanger's Rule – Generalized Learning Law – Competitive Learning - Vector Quantization – Mexican Hat Networks - Self-organizing Feature Maps – Applications

PULSED NEURON MODELS:

Spiking Neuron Model – Integrate-and-Fire Neurons – Conductance Based Models – Computing with Spiking Neurons.

L:45; Total - 45

REFERENCES:

1. Satish Kumar, "Neural Networks: A Classroom Approach", Tata McGraw-Hill Publishing Company Limited, New Delhi, 2004.
2. Simon Haykin, "Neural Networks: A Comprehensive Foundation", 2ed., Addison Wesley Longman (Singapore) Private Limited, Delhi, 2001.
3. Martin T.Hagan, Howard B. Demuth, and Mark Beale, "Neural Network Design", Thomson Learning, New Delhi, 2003.
4. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education (Singapore) Private Limited, Delhi, 2003.

QCC303C- ADHOC NETWORKS 3 0 0 3

UNIT- I **9**

WIRELESS LAN, PAN, WAN AND MAN

Characteristics of wireless channel, Fundamentals of WLANs, IEEE 802.11 standard, HIPERLAN Standard, First-, Second-, and third- generation cellular systems, WLL, Wireless ATM, IEEE 802.16 standard, HIPERACCESS, AdHoc Wireless Internet.

UNIT - II **9**

MAC, ROUTING AND MULTICAST ROUTING PROTOCOLS

MAC Protocols: Design issues, goals and classification, Contention –based protocols with reservation and scheduling mechanisms, Protocols using directional antennas.
Routing protocols: Design issues and classification, Table-driven, On-demand and Hybrid routing protocols, Routing protocols with efficient flooding mechanisms, Hierarchical and power-aware routing protocols.
Multicast Routing Protocols: Design issues and operation, Architecture reference model, classification, Tree-based and Mesh-based protocols, Energy-efficient multicasting.

UNIT - III **9**

TRANSPORT LAYER AND SECURITY PROTOCOLS

Transport layer Protocol: Design issues, goals and classification, TCP over AdHoc wireless Networks, Security, Security requirements, Issues and challenges in security provisioning, Network security attacks, Security routing.
Quality of Service: Issues and challenges in providing QoS, Classification of QoS solutions, MAC layer solutions, Network layer solutions, QoS frameworks.

UNIT - IV **9**

ENERGY MANAGEMENT

Need, classification of battery management schemes, Transmission power management schemes, System power management schemes.
Wireless Sensor Networks: Architecture, Data dissemination, Date gathering, MAC protocols, location discovery, Quality of a sensor network.

UNIT - V **9**

PERFORMANCE ANALYSIS

ABR beaconing, Performance parameters, Route-discovery time, End-to-end delay performance, Communication throughput performance, Packet loss performance, Route reconfiguration/repair time, TCP/IP based applications.

L:45; Total - 45

REFERENCES:

1. C. Siva Ram Murthy and B.S. Manoj, AdHoc Wireless Networks: Architectures and protocols, Prentice Hall PTR, 2004
2. C.-K.Toh, AdHoc Mobile Wireless Networks: Protocols and Systems, Prentice Hall PTR, 2001
3. Mohammad Ilyas, The Handbook of AdHoc Wireless Networks, CRC press, 2002
4. Charles E. Perkins, AdHoc Networking, Addison – Wesley, 2000
5. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, Mobile AdHoc Networking, Wiley – IEEE press, 2004.

QCC303D - XML AND WEB SERVICES 3 0 0 3

UNIT - I **9**

INTRODUCTION

Role Of XML – XML and The Web – XML Language Basics – SOAP – Web Services – Revolutions Of XML – Service Oriented Architecture (SOA).

UNIT - II **9**

XML TECHNOLOGY

XML – Name Spaces – Structuring With Schemas and DTD – Presentation Techniques – Transformation – XML Infrastructure.

UNIT - III **9**

SOAP

Overview Of SOAP – HTTP – XML-RPC – SOAP: Protocol – Message Structure – Intermediaries – Actors – Design Patterns And Faults – SOAP With Attachments.

UNIT - IV **9**

WEB SERVICES

Overview – Architecture – Key Technologies - UDDI – WSDL – ebXML – SOAP And Web Services In E-Com – Overview Of .NET And J2EE.

UNIT - V **9**

XML SECURITY

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Security Overview – Canonicalization – XML Security Framework – XML Encryption – XML Digital Signature – XKMS Structure – Guidelines For Signing XML Documents – XML In Practice.

L:45; Total - 45

REFERENCES:

1. Frank. P. Coyle, XML, Web Services And The Data Revolution, Pearson Education, 2002.
2. Ramesh Nagappan , Robert Skoczylas and Rima Patel Sriganesh, " Developing Java Web Services", Wiley Publishing Inc., 2004.
3. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services", Pearson Education, 2004.
4. McGovern, et al., "Java Web Services Architecture", Morgan Kaufmann Publishers, 2005.

QCC403A - CDMA SYSTEMS AND TECHNIQUES 3 0 0 3

UNIT - I **9**

SPREAD SPECTRUM SYSTEMS AND CDMA STANDARDS

Types of Techniques – Direct sequence spread spectrum – CDMA system – TIA LS – 95 system – CDMA standards – Layers – Call Processing – Service configuration – System and networks identification – Registration – Wideband CDMA

UNIT - II **9**

SYSTEM INTERCONNECTION LAYERS OF CDMA

Physical layer of forward and reverse CDMA channel – channel spacing – power control – modulation parameters – Network and data link layers of forward and reverse CDMA channel – Forward and reverse W-CDMA channel

UNIT- III **9**

SIGNALING AND VOICE APPLICATION IN CDMA

End to end operation of a wireless systems – Basic services – Supplementary services – Handoff – Voice encoding – PCM – ADPCM – Code excited linear predictor.

UNIT- IV **9**

CELLULAR RADIO AND WIRELESS DATA

Radio design for a cellular network – Propagation models – Link budgets – Dual mode CDMA mobiles – CDMA coverage and integrated system

UNIT - V **9**

MANAGEMENT OF CDMA NETWORKS

Telecom Management Networks – Wireless network management – Configuration, Fault and performance management – internetworking issues – dual mode digital /AMPS systems – wireless intelligent networks – multiple beam adaptive array.

L:45; Total - 45

REFERENCES:

1. Vijay K. Garg; Kenneth smolik, Joseph E. Wilkins “Application of CDMA in Wireless/ Personal Communication” , Prentice Hall – 1997
2. Dr. Man Young Rhee “CDMA Cellular Mobile Communication and network Security” Prentice Hall 1998

3.Raymooud Steele: Chin Chn Lee and Peter Gould “GSM, CDMA one and 3 G systems” John Wiley 2001.

QCC403B - OBJECT ORIENTED SYSTEM DESIGN 3 0 0 3

UNIT- I **9**

OBJECT ORIENTED DESIGN FUNDAMENTALS

The Object Model – Classes And Objects - Complexity Of Software – Classification – Notation – Process – Pragmatics – Binary And Entity Relationship – Object Types – Object State – OOSD Life Cycle.

UNIT- II **9**

OBJECT ORIENTED METHODOLOGIES AND UML

Object Oriented Methodology: Rumbaugh, Booch, Jacobson, Shaler/Mellor, Coad/Yardon – Patterns – Frame Works – The Unified Approach – UML

UNIT - III **9**

OBJECT ORIENTED ANALYSIS

Identify Use Cases – Use Case Model – Documentation – Classification – Identifying Classes – Noun Phrases Approach – Common Class Pattern Approach – Use Case Driven Approach – Identifying Object Relationship, Attributes And Models.

UNIT - IV **9**

OBJECT ORIENTED DESIGN

Design Process – Design Axioms – Designing Classes – Access Layer Design – View Layer Design.

UNIT- V **9**

MANAGING OBJECT ORIENTED DEVELOPMENT

Managing Analysis And Design – Evaluation Testing – Coding – Maintenance – Metrics – Case Study: Foundation Class Library – Client/Server Computing.

L:45; Total - 45

REFERENCES:

1. Ali Bahrami, Object Oriented System Development, Mc Graw Hill International Edition, 1999.
2. Larman, Applying UML & Patterns: An Introduction to Object Oriented Analysis and Design, Pearson Education, 2nd Edition, 2003.
3. Bernd Bruegge, Allen H. Dutoit, "Object Oriented Software Engineering using UML, Patterns and Java", Pearson Education 2nd Edition 2004.

QCC403C - SPEECH PROCESSING 3 0 0 3

UNIT - I MECHANICS OF SPEECH 9

Speech production mechanism – Nature of Speech signal – Discrete time modelling of Speech production – Representation of Speech signals – Classification of Speech sounds – Phones – Phonemes – Phonetic and Phonemic alphabets – Articulatory features. Music production – Auditory perception – Anatomical pathways from the ear to the perception of sound – Peripheral auditory system – Psycho acoustics

UNIT – II 9

TIME DOMAIN METHODS FOR SPEECH PROCESSING

Time domain parameters of Speech signal – Methods for extracting the parameters Energy, Average Magnitude – Zero crossing Rate – Silence Discrimination using ZCR and energy – Short Time Auto Correlation Function – Pitch period estimation using Auto Correlation Function

UNIT- III 9

FREQUENCY DOMAIN METHOD FOR SPEECH PROCESSING

Short Time Fourier analysis – Filter bank analysis – Formant extraction – Pitch Extraction – Analysis by Synthesis- Analysis synthesis systems- Phase vocoder— Channel Vocoder. Homomorphic speech analysis: Cepstral analysis of Speech – Formant and Pitch Estimation – Homomorphic Vocoders.

UNIT- IV 9

LINEAR PREDICTIVE ANALYSIS OF SPEECH

Formulation of Linear Prediction problem in Time Domain – Basic Principle – Auto correlation method – Covariance method – Solution of LPC equations – Cholesky method – Durbin's Recursive algorithm – lattice formation and solutions – Comparison of different methods – Application of LPC parameters – Pitch detection using LPC parameters – Formant analysis – VELP – CELP.

UNIT - V 9

APPLICATION OF SPEECH & AUDIO SIGNAL PROCESSING

Algorithms: Spectral Estimation, dynamic time warping, hidden Markov model – Music analysis – Pitch Detection – Feature analysis for recognition – Music synthesis – Automatic Speech Recognition – Feature Extraction for ASR – Deterministic sequence

recognition – Statistical Sequence recognition – ASR systems – Speaker identification and verification – Voice response system – Speech Synthesis: Text to speech, voice over IP.

L:45; Total - 45

REFERENCES:

1. Ben Gold and Nelson Morgan, Speech and Audio Signal Processing, John Wiley and Sons Inc. , Singapore, 2004
2. L.R.Rabiner and R.W.Schaffer – Digital Processing of Speech signals – Prentice Hall –1978
3. Quatieri – Discrete-time Speech Signal Processing – Prentice Hall – 2001.
4. J.L.Flanagan – Speech analysis: Synthesis and Perception – 2nd edition – Berlin – 1972
5. I.H.Witten – – Principles of Computer Speech – Academic Press – 1982

QCC403D - DISTRIBUTED SYSTEMS 3 0 0 3

UNIT- I 9

INTRODUCTION

Characterization of Distributed Systems - Examples - Resource Sharing and the Web - Challenges - System Models - Architectural and Fundamental Models - Networking and Internetworking - Types of Networks - Network Principles - Internet Protocols - Case Studies.

UNIT- II 9

PROCESSES AND DISTRIBUTED OBJECTS

Interprocess Communication - The API for the Internet Protocols - External Data Representation and Marshalling - Client-Server Communication - Group Communication - Case Study - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications - Java RMI - Case Study.

UNIT - III 9

OPERATING SYSTEM ISSUES – I

The OS Layer - Protection - Processes and Threads - Communication and Invocation – OS Architecture - Security - Overview - Cryptographic Algorithms - Digital Signatures - Cryptography Pragmatics - Case Studies - Distributed File Systems - File Service Architecture - Sun Network File System - The Andrew File System.

UNIT- IV 9

OPERATING SYSTEM ISSUES – II

Name Services -Domain Name System - Directory and Discovery Services - Global Name Service - X.500 Directory Service - Clocks, Events and Process States - Synchronizing Physical Clocks - Logical Time And Logical Clocks - Global States - Distributed Debugging - Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems.

UNIT - V **9**

DISTRIBUTED TRANSACTION PROCESSING

Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison - Flat and Nested Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions - Distributed Deadlocks - Transaction Recovery - Overview of Replication And Distributed Multimedia Systems

L:45; Total - 45

REFERENCES:

1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", Pearson Education, 3rd Edition, 2002.
2. Sape Mullender, Distributed Systems, Addison Wesley, 2nd Edition, 1993.
3. Albert Fleishman, Distributes Systems- Software Design and Implementation, Springer-Verlag, 1994
4. M.L.Liu, Distributed Computing Principles and Applications, Pearson Education, 2004.
5. Andrew S Tanenbaum , Maartenvan Steen,Distibuted Systems –Principles and Pardigms,Pearson Education, 2002
6. Mugesh Singhal,Niranjan G Shivaratri,Advanced Concepts in Operating Systems,Tata McGraw Hill Edition, 2001