

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE – 638 052
(An Autonomous Institution affiliated to Anna University Coimbatore)

M.E. DEGREE IN COMPUTER AND COMMUNICATION ENGINEERING
(FULL TIME)

CURRICULUM

(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER - I

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
11VL101	Applied Mathematics for Electronic Engineers	3	1	0	4	50	50	100
11CN101	Modern Digital Communication Techniques	3	1	0	4	50	50	100
11CN102	High Speed Networks	3	0	0	3	50	50	100
11CN103	System Programming and Operating System	3	0	0	3	50	50	100
11CN104	Network Management	3	0	0	3	50	50	100
11CN105	Database Technologies	3	0	0	3	50	50	100
	PRACTICAL							
11CN106	Data Communication Laboratory	0	0	3	1	100	0	100
11CN107	System Programming and Operating system Laboratory	0	0	3	1	100	0	100
Total					22			

CA - Continuous Assessment, ESE – End Semester Examination

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(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER - II

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
11CN201	Software Engineering Methodologies	3	0	0	3	50	50	100
11CN202	Wireless Networks	3	0	0	3	50	50	100
11CN203	Communication Network Security	3	1	0	4	50	50	100
11CN204	Simulation of Communication Systems and Networks	3	1	0	4	50	50	100
	Elective – I	3	0	0	3	50	50	100
	Elective – II	3	0	0	3	50	50	100
	PRACTICAL							
11CN205	Wireless Networks Laboratory	0	0	3	1	100	0	100
11CN206	Network Security Laboratory	0	0	3	1	100	0	100
Total					22			

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CURRICULUM

(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER – III

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
	Elective – III	3	0	0	3	50	50	100
	Elective - IV	3	0	0	3	50	50	100
	Elective - V	3	0	0	3	50	50	100
	PRACTICAL							
11CN301	Project Work - Phase I	0	0	12	6	50	50	100
Total					15			

CA – Continuous Assessment, ESE – End Semester Examination

SEMESTER - IV

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	PRACTICAL							
11CN401	Project Work - Phase II	0	0	24	12	100	100	200
Total					12			

CA- Continuous Assessment, ESE – End Semester Examination

LIST OF ELECTIVES					
Course Code	Course Title	L	T	P	C
11AE102	Advanced Digital Signal Processing	3	0	0	3
11CN011	Advanced Network Design and Performance Tuning	3	0	0	3
11CN012	Wireless Sensor Networks	3	0	0	3
11CN013	Distributed Computing	3	0	0	3
11CN014	High Speed Switching Architecture	3	0	0	3
11CN015	Java Technologies	3	0	0	3
11CN016	Cloud Computing	3	0	0	3
11CN017	Network Routing Algorithms	3	0	0	3
11CN018	Information Theory and Coding	3	0	0	3
11CN019	Multimedia Compression Techniques	3	0	0	3
11CN020	Special Electives	3	0	0	3
11MS012	Mobile and Pervasive Computing	3	0	0	3
11MS017	Embedded Systems and RTOS	3	0	0	3
11MS018	Software Quality Assurance and Testing	3	0	0	3
11MS019	Ad hoc Networks	3	0	0	3
11MS025	Compiler Design	3	0	0	3
11MS027	Business Intelligence	3	0	0	3
11MS028	Pattern Recognition	3	0	0	3
11MS103	Data structures and Analysis of Algorithms	3	0	0	3
11MS203	Web Technology	3	0	0	3

11VL101 APPLIED MATHEMATICS FOR ELECTRONIC ENGINEERS
(Common to VLSI Design, Communication System & Computer and Communication Engineering
Branches)

3 1 0 4

Objective:

On completion of the course the students are expected

- To understand the numerical techniques of linear algebraic equations and solution of boundary value problem using Laplace Transforms.
- To know the properties and applications of Special functions.
- To understand the basic concepts and properties of random variables and queuing theory.

MODULE – I

15

Numerical Methods: System of equations- Solution by Gauss Elimination, Gauss-Jordan and LU decomposition method- Jacobi, Gauss-Seidal iteration method- Eigen values of a matrix by Jacobi and Power method.

Wave Equation: Solution of initial and boundary value problems- Characteristics- D'Alembert's Solution - Laplace transform solutions for displacement in a long string - a long string under its weight - a bar with prescribed force on one end.

MODULE– II

15

Bessel Functions :Bessel's equation - Bessel Functions- Series Representation of Bessel functions – Recurrence relations of Bessel functions – Generating function – Jacobi series – Orthogonal property for Bessel functions

Legendre Polynomials: Legendre's equation - Legendre polynomials -Rodrigue's formula - Recurrence relations- Generating functions – Orthogonal property for Legendre polynomials – Expansion of an arbitrary function in a series of Legendre polynomials.

MODULE–III

15

Random Variables: One dimensional Random Variable - Moments and MGF – Binomial, Poisson, Geometrical, Normal Distributions- Two dimensional Random Variables – Marginal and Conditional Distributions – Covariance and Correlation Coefficient.

Queuing Theory: Single and Multiple server Markovian queueing models - Steady state system size probabilities – Little's formula – Priority queues – M/G/1 queueing system – P.K. formula.

Lecture: 45, Tutorial: 15, TOTAL: 60

REFERENCE BOOKS

1. Kapur, J.N. and Saxena, H.C., "Mathematical Statistics", S.Chand & Co., New Delhi, 2007.
2. Grewal, B.S. "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 2007.
3. Sankara Rao, K. "Introduction to Partial Differential Equation", Prentice Hall of India, New Delhi, 1995.
4. Taha, H.A., "Operations Research- An Introduction", 6th Edition, Prentice Hall of India, New Delhi, Reprint 2010.
5. Jain, M.K., Iyengar, S.R.K. and Jain, R.K., "Numerical Methods for Scientific and Engineering Computation", New Age International (P) Ltd, Publishers, New Delhi, 2008.

11CN101 MODERN DIGITAL COMMUNICATION TECHNIQUES

3 1 0 4

Objective:

- To learn the basics of coherent, non-coherent communication and digital modulations.
- To explore block coded and convolutional coded digital communication
- To understand the concepts of spread spectrum signals for digital communication

MODULE – I

15

Coherent, non-coherent communication & digital modulations: Digital modulation formats-Coherent Binary modulation techniques-Coherent Quadrature modulation techniques-Noncoherent Binary modulation techniques-Comparison of Binary and Quaternary modulation techniques - M-ary modulation techniques – Power Spectra - Bandwidth Efficiency – Synchronization - Carrier synchronization - Symbol synchronization-Application-voice-grade Modems-Digital Radio-Digital Communications by Satellite.

MODULE– II

15

Block coded and convolutional coded digital communication: Rationale for coding, and Types of codes-Discrete memoryless channels-Linear blocks codes-Cyclic codes-Convolutional codes-Maximum-Likelihood decoding of convolutional codes-Distance properties of convolutional codes-Sequential decoding of convolutional codes-Trellis codes-Applications-coding for White Gaussian Noise Channels-Coding for compound-error channels-Block codes for Error Control in data storage.

MODULE–III

15

Spread spectrum signals for digital communication: Model of spread spectrum-digital communication system-Direct sequence spread spectrum signals- Error rate performance of the coder-Applications of DS spread spectrum signals- Interference on DS spread spectrum systems-Narrowband interference in DS spread spectrum systems-Generation of PN sequences-Frequency-Hopped spread spectrum signals- Performance of FH spread spectrum signals in an AWGN Channel-Performance of FH spread spectrum signals in partial-Band Interference- CDMA System based on FH spread spectrum signals-Time-hopping spread spectrum.

Lecture : 45, Tutorial : 15, TOTAL : 60

REFERENCE BOOKS

1. Simon Haykin, Digital communications, 8th Edition, John Wiley and sons, 1988.
2. John G. Proakis, Digital Communications, 4th Edition, McGraw-Hill, New york, 2001.
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.

11CN102 HIGH SPEED NETWORKS

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To understand the architecture of ATM protocol and high speed LANs.
- To provide basic concepts of congestion control and traffic management in high speed network.
- To introduce the protocols for QoS support.

MODULE – I

15

Introduction to ATM, Congestion and Traffic Management: Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL- High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's: applications, requirements – Architecture of 802.11- Queuing Analysis- Queuing Models – Single Server Queues – Multi server queues-Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

MODULE - II

15

TCP and ATM Congestion Control: TCP Flow control – TCP Congestion Control – Retransmission Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM - Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management

MODULE - III

15

Integrated and Differentiated Services, Protocols for QoS Support: Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services- RSVP – Goals and Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP

TOTAL : 45

REFERENCE BOOKS

1. Stallings William., "High Speed Networks and Internet", Second Edition, Pearson Education, New Delhi, 2002.
2. Walrand and Pravin Varaiya, "High Performance Communication Networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., 2001.
3. Pepelnjak Irvan, Guichard Jim and Apcar Jeff, "MPLS and VPN Architecture", Cisco Press, Volume 1 and 2, 2003
4. <http://pages.cpsc.ucalgary.ca/~carey/CPSC641/archive/Sept2005/>

Objective:

- To learn the basics of instruction level parallelism
- To explore instruction level parallelism with software approaches
- To understand the functionalities of multiprocessors and thread level parallelism

MODULE – I**15**

Language processors & Assemblers: Introduction, Language processing Activities, Fundamentals of language Processing, Data Structures, Search data structures, Allocation data structures, scanning and parsing. Assemblers: Elements of assembly language programming, simple assembly scheme, pass structure of Assemblers, Design of two pass Assemblers. Macros and Macro Processor: Macro definition and call, Macro expansion, nested Macro calls

MODULE– II**15**

Compilers, Linkers & Operating system : Aspects of Compilation, Memory allocation, Compilation of expressions, Compilation of control structures, Code optimization, Relocation and Linking concept, design of a Linker, Self Relocating Programs Introduction to OS: Types of OS, Operating system structures-System Components - OS services -System calls, Process Management-Process concept, CPU Scheduling criteria, algorithms, Multiple processor Scheduling, Real Time Scheduling, Critical Section problem, Synchronization hardware, Semaphores- Deadlock characterization, Prevention, Avoidance, Detection and Recovery.

MODULE–III**15**

Storage Management: Swapping, Memory Allocation – Contiguous and noncontiguous- Paging, Segmentation, Virtual Memory, demand paging, Page replacement, Allocation of frames, Thrashing, File concept, Access methods, File system structure. I/O Systems- I/O hardware, Disk - Structure, Scheduling, Disk Management and swap space management.

TOTAL: 45**REFERENCE BOOKS**

1. Systems Programming and Operating Systems- D.M.Dhamdhare, Second revised Edition, Tata McGraw- Hill Publishing Company limited, New Delhi 2003.
2. Silberschatz Avi, Peter Baer Galvin ,and Greg Gagne., “Operating System Concepts”, Eight Edition, John Wiley & Sons, Singapore, 2008.
3. Tanenbaum Andrew S,Albert S Woodhull ., “Operating Systems Design and Implementation”, Third Edition, Prentice Hall,2006.
4. William stallings, “Operating Systems” , PHI, 2nd Edition ,2008
5. John J Donovan , “System Programming”, Tata McGraw- Hill Publishing Company limited, New Delhi, 2000.

11CN104 NETWORK MANAGEMENT

3 0 0 3

Objective:

- To understand the concepts of networks and know about various networks like ATM networks and Storage area network
- To understand the various network management standards and models
- To learn about various management tools and applications

MODULE – I

15

SNMPv1 and SNMPv2: Network Management Standards- Network Management Model- Organization Model- Information Model- Communication Model- ASN.1- Encoding Structure- Macros- Functional Mode- The History of SNMP Management- Internet Organizations and Standards- The SNMP Model- The Organization Model- System Overview- The Information Model- The SNMP Communication Model- Functional Model- Major Changes in SNMPv2- SNMPv2 System Architecture- SNMPv2 Structure of Management Information- The SNMPv2 Management Information Base- SNMPv2 Protocol- Compatibility with SNMPv1

MODULE - II

15

SNMPv3 and RMON: SNMPv3 Documentation- SNMPv3 Documentation Architecture- Architecture - SNMPv3 Applications- SNMPv3 Management Information Base- Security - SNMPv3 User based Security Model- Access Control- RMON SMI and MIB- RMON1- RMON2- ATM Remote Monitoring- A Case Study of Internet Traffic Using RMON

MODULE- III

15

Network Management Tools and applications : Network Management Tools- Network Statistics Measurement Systems - Network Management Systems- Commercial Network Management Systems- System Management- Enterprise Management Solutions- Configuration Management- Fault Management- Performance Management- Event Correlation Techniques- Security Management- Accounting Management- Report Management- Policy based Management- Service Level Management- NMS with Web Interface and Web based Management- Web Interface to SNMP Management- Embedded Web based Management- Desktop Management Interface- Web based Enterprise Management- WBEM: Windows Management instrumentation- Java Management Extensions- Management of a storage Area Network- The Jiro Platform- Future Directions

TOTAL : 45

REFERENCE BOOKS

1. Mani Subramanian, Network management: Principles and Practice, Addison Wesley, 2000
2. William Stallings, SNMP, SNMPv2, SNMPv3, and RMON1 and 2, Third Edition, Person Education Asia, 2004
3. William Stallings, Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 2000.
4. William Stallings, Network Security Essentials: Applications and Standards, Pearson Education Asia, 2001

Objective:

- To learn the fundamentals of data models, conceptualize and depict a database system using ER diagram
- To make a study of SQL and relational database design
- To understand the concepts of distributed databases, concurrency control and parallel databases.
- To know the concepts of object-oriented and object relational database and have an introduction to data mining and data warehousing.

MODULE – I**15**

Introduction: Introduction to database systems- views- data models-Database languages E-R model- Relational Algebra - Relational model – querying- storage structures

Database design: Relational DB Design: Integrity constraints- Referential Integrity assertions triggers Functional Dependency - Normalization - Programming Relational Databases- Interfacing to Relational databases; Extending the relational model; extending SQL with programming facilities (using PL/SQL); active rules (using Oracle Triggers).

MODULE - II**15**

Object oriented Databases: Object oriented DBs -Object modelling in database systems- Object identity - OODBMS architecture and storage issues - Querying persistent objects- Transactions and concurrency control- clustering- indexing- case study

Web Databases: Web interfaces-overview of XML - structure of XML- Data document schema- Querying XML- data Storage of XML- XML applications - Semi structured data models- compared with relational and object models- Implementation issues - Indexes for text data.

MODULE - III**15**

Multimedia Databases: Nature of multimedia data: multimedia data storage and management- content-based querying and retrieval-meta-data generation – Ontologies – challenges - retrieval from textual databases.

TOTAL : 45**REFERENCE BOOKS**

1. Silberschatz, Abraham., Korth, Henry F. and Sudarshan, S., “Database System Concepts”, Fifth Edition, McGraw-Hill, New York, 2006.
2. D. Jordan, C. Jones, Java Data Objects, O Reilly, 2003.
3. H. Garcia-Molina, J.D. Ullman and J. Widom, Database Systems: The Complete Book, Prentice Hall, 2002.
4. M. Piattini and O. Diaz, Advanced Database Technology and Design, Artech House, 2000.
5. L. Dunckley, Multimedia Databases: An Object Relational Approach, Addison-Wesley, 2003.

11CN106 DATA COMMUNICATION LABORATORY

0 0 3 1

Objective:

- To introduce Network Simulators and to implement the various topologies, protocols and routing Algorithms
- To study the performance of TCP and UDP Protocols

LIST OF EXPERIMENTS

1. Study of Network simulators (NS2 & GloMoSim)
2. Implementation of Various Topologies.
3. Implementation of Sliding Window Protocol.
4. Implementation of OSPF Routing Algorithm
5. Implementation of Link state Routing Algorithm
6. Simulation of Congestion control Algorithms.
7. Performance analysis of TCP
8. Performance analysis of UDP
9. Implementation of ARP and RARP Protocol.
10. Design of Local Area Network.

REFERENCES / MANUALS/SOFTWARE:

C,C++, NS2, GloMoSim

Objective:

- To implement the various system programming concepts
- To implement and simulate operating system concepts

LIST OF EXPERIMENTS

1. Implementation of one-pass assembler
2. Implementation of two-pass assembler
3. Implementation of simple parser
4. Implementation of macros
5. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
6. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
7. Implement the Producer – Consumer problem using semaphores
8. Implement Banker's Algorithm
9. Implement Best-fit, First-fit algorithms for memory management
10. Implement FIFO and LRU page replacement algorithms

REFERENCES / MANUALS/SOFTWARE:

LINUX, C

Objective:

- To introduce the methodologies involved in the development and maintenance of software
- To acquire skills to develop large programs.
- To solve complex programming problems.
- To learn techniques of Specification, design, interfaces development, testing, project management, etc.
- To acquire skills to be a better programmer

MODULE – I**15**

Software Process Models, Requirements Engineering and Modern Design Principles: Computer-based system engineering - Software Process model – Waterfall model – Incremental model – Evolutionary models – Agile models - Requirements Engineering – System models – Software prototyping – Analysis model – Data modeling , Scenario-based modeling – Flow-oriented modeling – Class-Based Modeling – Design concepts – Design model – Pattern based software design – Architectural design – Object oriented design – Real Time Software Design – Design with reuse – UI design.

MODULE– II**15**

Software Construction and Testing: Software Construction – Validation and Verification - Testing Strategies for conventional software and OO software – validation testing – System testing – Debugging – Testing tactics – Black and white box testing – OO testing methods – testing for specialized environments – Testing patterns – Software maintenance.

MODULE–III**15**

Software Project Management and Advanced Concepts: Software Engineering Management - Software Engineering Tools and Methods – Estimation – Project Scheduling – Risk Management – Quality Management – Software Configuration Management – Clean room approach, Component based development – Software change – Reengineering.

TOTAL : 45**REFERENCE BOOKS**

1. Pressman, Roger S., “Software Engineering: A Practitioner’s Approach”, Sixth Edition, McGraw-Hill, New York, 2005.
2. SWEBOK, “Guide to the Software Engineering Body of Knowledge”, A project of the IEEE Computer Society Professional Practices Committee, 2004.
3. Sommerville, I, “Software Engineering”, Seventh Edition, Addison Wesley, New York.
4. Peters, James F and Pedryez, Witold., “Software Engineering: An Engineering Approach”, John Wiley & Sons, New Delhi, 2000.
5. Fairley, Richard E., “Software Engineering Concepts”, McGraw Hill, New York, 1995.

Objective:

- To understand the concepts of wireless medium and multiple access
- To provide basic concepts of wireless network operation & wireless WAN
- To understand the protocols of IEEE802.11, IEEE802.15 and HIPERLANs.

MODULE – I**15**

Wireless medium & wireless medium access: Air Interface Design – Radio propagation mechanism – Path loss modeling and Signal Coverage – Effect of Multi path and Doppler – Channel Measurement and Modelling – Simulation of Radio Channel, Fixed Assignment Access for Voice Networks – Random Access for Data Networks – Integration of Voice and Data Traffic

MODULE– II**15**

Wireless network operation & Wireless WAN: Wireless Network Topologies – Cellular Topology – Cell fundamentals – Signal to Interference Ratio, Capacity Expansion – Mobility Management – Resources and Power Management – Security in Wireless Networks. GSM and TDMA Technology – Mobile Environment – Communication in the Infrastructure – CDMA Technology – IS95 – IMT2000 – Mobile Data Networks – CDPD Networks – GPRS – Mobile Application Protocol.

MODULE–III**15**

Wireless LANs AND HIPERLANs: Introduction to wireless LANs – IEEE 802.11 – WPAN IEEE 802.15 – Mobile AdHoc Networks(MANET)- Principle and operation - Wireless Home Networking – Concepts of Bluetooth Technology – Wireless Geo location.

TOTAL: 45**REFERENCE BOOKS**

1. Kaveth Pahlavan, K.Prasanth Krishnamurthy, “Principles of Wireless Networks”, Pearson Education Asia, 2002
2. Leon Garcia, Widjaja, “Communication Networks”, Tata McGraw Hill, New Delhi, 2000
3. William Stallings, “Wireless Communications and Networks”, Second Edition Prentice Hall, India 2007
4. Jon W Mark and Weihua Zhuang, “Wireless communication and Networking”, Prentice Hall India 2003

Objective:

- To know the methods of conventional encryption.
- To understand the concepts of public key encryption and number theory
- To understand authentication and Hash functions.
- To know the network security tools and applications.
- To understand the system level security used.

MODULE – I**15**

Public Key Cryptography : OSI Security Architecture - Classical Encryption techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality

Key Management - Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography and RSA.

MODULE - II**15**

Authentication and Network Security: Authentication requirements – Authentication functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – MD5 message Digest algorithm - Secure Hash Algorithm – RIPEMD – HMAC- Digital Signatures – Authentication Protocols – Digital Signature Standard - Authentication Applications: Kerberos – X.511 Authentication Service.

MODULE- III**15**

Web Security and System Level Security: Electronic Mail Security – PGP – S/MIME - IP Security – Web Security - Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

Lecture : 45, Tutorial : 15, TOTAL : 60**REFERENCE BOOKS**

1. Stallings, William., “Cryptography And Network Security: Principles and Practices”, Fourth Edition, Prentice Hall of India, New Delhi, 2005.
2. Forouzan, Behrouz A., “Cryptography and Network Security”, Tata McGraw Hill, New Delhi, 2007.
3. Kahate, Atul., “Cryptography and Network Security”, Second Edition, Tata McGraw-Hill, New Delhi, 2003.
4. Schneier, Bruce, “Applied Cryptography”, Second Edition, John Wiley & Sons Inc, New York, 2001.

Objective:

- To understand to model a communication system
- To understand to simulate random variables and random process
- To understand the various performance measures of communication system
- To understand the various Queuing models and network of Queues

MODULE – I**15**

Modelling of communication system: Model of speech and picture signals, Pseudo noise sequences, Non-linear sequences, Analog channel model, Noise and fading, Digital channel model-Gilbert model of bursty channels, HF, Troposcatter and satellite channels, Switched telephone channels, Analog and Digital communication system models, Light wave system models.

Simulation of random variables and random process: Univariate and multivariate models, Transformation of random variables, Bounds and approximation, Random process models-Markov and ARMA Sequences, Sampling rate for simulation, Computer generation and testing of random numbers

MODULE - II**15**

Estimation of performance measures : Quality of an estimator, estimator for SNR, Probability density functions of analog communication system, BER of digital communication systems, Monte Carlo method and Importance of sampling method, estimation of power spectral density

Communication networks :Queuing models, M/M/I and M/M/I/N queues, Little formula, Burke's theorem, M/G/I queue, Embedded Markov chain analysis of TDM systems, Polling, Random access systems

MODULE- III**15**

Network of Queues: Queues in tandem, store and forward communication networks, capacity allocation, Congestion and flow chart, Routing model, Network layout and Reliability

Lecture : 45, Tutorial : 15, TOTAL : 60**REFERENCE BOOKS**

1. M.C.Jeruchim, Philip Balaban and K.Sam Shanmugan, "Simulation of communication systems", Springer, 2nd Edition, 2002
2. A.M.Law and W.David Kelton, "Simulation Modelling and analysis", 3rd Edition, Mc Graw Hill Inc, 1999
3. J.F.Hayes, "Modeling and Analysis of Computer Communication networks (Applications of Communication Theory)", Plenum Press, 1984
4. Jerry Banks and John S.Carson and Barry L. Nelson, "Discrete-Event System Simulation", 4th Edition, Prentice Hall Inc., 2004

Objective:

To study about various wireless protocols , spread spectrum techniques and compression algorithms

LIST OF EXPERIMENTS /EXERCISES

1. Implementation of Distance Vector and AODV routing protocols
2. Implementation of DSR routing protocol
3. Implementation of Zonal Routing Protocol(ZRP)
4. Implementation of Linear and Cyclic Codes
5. Implementation and study of Stop and Wait, Goback-N and Selective Repeat ARQ protocols
6. Simulation of IEEE 802.11 MAC protocol using NS2
7. Ethernet LAN protocol - To create scenario and study the performance of CSMA/CA protocol ethrol simulation
8. Simulation of AdHoc Network using NS2
9. Implementation of audio compression algorithm
10. Implementation of text compression algorithm

REFERENCES / MANUALS/SOFTWARE:

C,C++, NS2 , NetSim Simulation Software

Objective:

- To understand the concepts of security mechanisms.
- To understand various types of attacks.
- To understand and implement various algorithms using Sender and Receiver approach

LIST OF EXPERIMENTS /EXERCISES

1. Implementation of Ceaser cipher with Brute force attack, one time pad, poly alphabetic cipher
2. Implémentation of Permutation and Transposition Techniques
3. Implémentation of Single round DES
4. Implémentation of RSA
5. Implementation of Diffie Hellman key exchange
6. Implementation of Random number generator
7. Implementation of Fermat's theorem, Euler's theorem and Euclidian algorithm
8. Implementation of Extended Euclidian algorithm and CRT
9. Implementation of Miller Rabin Primality test and identifying the weakness of the test
10. Implementation of Hashing technique and Birthday attack
11. Implementation of Elliptic curve cryptography
12. Implementation of signature using DSS and RSA approach
13. Implementation of a simple firewall
14. Study of Kerberos, SSL and PGP

REFERENCES / MANUALS/SOFTWARE:

Linux and C

11AE102 ADVANCED DIGITAL SIGNAL PROCESSING

(Common to M.E. Applied Electronics, Communication Systems, Power Electronics, Control and Instrumentation, Computer and Communication)

3 1 0 4

Objective:

- To introduce the concept of discrete random signal processing.
- To understand the spectrum estimation and analysis using parametric and non-parametric approach.
- To estimate the signal by linear prediction.
- To study the concepts of adaptive filter and various error minimization algorithm.
- To understand the concepts of multirate digital signal processing.

MODULE – I

15

Discrete Random Signal Processing: Discrete time random process – Random process: Ensemble averages- Gaussian process – stationary process – The autocovariance and autocorrelation metrics – ergodicity – white noise the power spectrum. Filtering random process – spectral factorization. Parseval's theorem – Wiener Khintchine relation.

Spectrum Estimation and Analysis: Non parametric methods: Periodogram, performance of periodogram, modified periodogram, Bartlett's method, Welch's method.

MODULE - II

15

Parametric methods: AR model – Yule-Walker method, MA model – ARMA model.

Linear Prediction: Forward and backward linear predictions, Solution of the normal equations – Levinson-Durbin algorithms. Least mean squared error criterion – The FIR Wiener filter – filtering – linear prediction and The IIR Wiener filters – Non causal IIR Wiener filter – the causal IIR Wiener filter.

Adaptive Filter: Concepts of adaptive filter – FIR adaptive filters – LMS algorithm – Applications: Noise cancellation

MODULE -III

15

Adaptive Filter: Adaptive recursive filters– AR lattice structure and ARMA process, lattice – ladder filters.

Multirate Digital Signal Processing: Mathematical description of sampling rate – Interpolation and Decimation by integer factor – Sampling rate conversion by rational factor- Filter design for sampling rate conversion; direct form FIR structures, Polyphase structures, time-variant structures. Multistage implementation of sampling rate conversion. Applications – Subband coding of speech signals.

Lecture : 45, Tutorial : 15, TOTAL : 60

REFERENCE BOOKS

1. Hayes, Monson H. "Statistical Digital Signal processing and Modeling", John Wiley and Sons, Inc., 1996.
2. Proakis, John G. and Manolakis, Dimitris G. "Digital Signal Processing: Principles Algorithms and Applications", PHI, 2006.
3. Ifeachor, Emmanuel C. and Jervis, Barrie N. "Digital Signal Processing: A Practical Approach", Addison-Wesley Publishing Company, 2002.
4. George Box, Gwilym M. Jenkins, Gregory Reinsel, "Time Series Analysis: Forecasting & Control", 3rd Edition,

11CN011 ADVANCED NETWORK DESIGN AND PERFORMANCE TUNING

3 0 0 3

Objectives:

- To introduce the fundamentals of ATM networks.
- To understand the performance and tuning of network

MODULE–

15

I

Advanced Networks Introduction: Switching concepts; Switch forwarding techniques; switch path control - LAN switching; cut through forwarding; store and forward; ATM Switching Switch models - Blocking networks-basic and enhanced banyan networks - sorting networks merge sorting – rearrangeable networks - full and partial connection networks – non blocking networks - construction and comparison of non-blocking network.

Queues and IP Switching: Internal queuing Input, output and shared queuing - multiple queuing networks combined input, output and shared queuing performance analysis of queued switches, Addressing mode - IP switching types-flow driven and topology driven solutions - IP Over ATM-address and next hop resolution multicasting - IPv6 over ATM.

MODULE–

15

II

Network Performance Introduction: Need for performance evaluation- Role of performance evaluation - performance evaluation Methods- Performance Metrics and Evaluation Criteria - CPU and I/O Architectures Distributed and Network Architectures- Secondary Storage Topologies- Computer Architecture - Fundamental Concepts and Performance Measures.

NFS Performance Tuning: NFS server constraints-NFS client improvements-NFS over WANs-Automounter and other tricks.

MODULE– III

15

Network Performance Tuning: Network Performance, Design and Capacity Planning, Locating bottlenecks, Demand management, Media choices and protocols, Network topologies: bridges, switches and routers, Throughput and latency considerations, Modeling resource usage.

TOTAL: 45

REFERENCE BOOKS

1. Ranier Handel, Manfred N Huber, Stefan Schrodder. ATM Networks-concepts, protocols, applications, 3rd Edition, Adisson Wesley, New York, 1999.
2. Achille Patavina, Switching Theory: Architectures and performance in Broadband ATM Networks. John Wiley & Sons Ltd., New York.1998.
3. Christopher Y Metz, Switching protocols & Architectures. McGraw Hill, New York.1998.
4. Thomas G. Robertazzi, Computer Networks and Systems: Queueing theory and Performance Evaluation , Third Edition, Springer, 2000.
5. Domenico Ferrari , Giuseppe Serazzi ,Alexandro Zeijher, Measurement & Tuning of Computer Systems Prentice Hall Inc,1983.

11CN012 WIRELESS SENSOR NETWORKS

(Common to M.E. Control and Instrumentation, Communication Systems)

3 0 0 3

Objective:

- To learn the basics of networking sensors and various IEEE standard
- To explore the knowledge in infrastructure establishment and sensor network database
- To understand the concepts of sensor network platforms and tools

MODULE – I

15

Introduction: Overview of sensor networks- Constraints and challenges – Advantages of sensor networks-Applications- Collaborative processing – Tracking scenario –Problem formulation – Distributed representation and interference of states – Tracking multiple objects – sensor models- Performance comparison and metrics.

Networking sensors: Key assumption - Medium access control – S-MAC protocol – IEEE 802.15.4 standard and ZigBee - General Issues - Geographic, Energy -Aware Routing - Attribute based routing.

MODULE - II

15

Infrastructure establishment: Topology control – Clustering -Time Synchronization – Localization and Localization services-Sensor tasking and control-Task driven sensing – Role of sensor nodes – Information based tasking - Routing and aggregation.

Sensor network database: Sensor Database Challenges – Querying the physical environment – Interfaces-High level database organization- In-network aggregation – Data centric storage – Data indices and range queries – Distributed Hierarchical aggregation – Temporal data.

MODULE- III

15

Sensor network platforms and tools: Sensor Node Hardware – Sensor network programming challenges – Node level software platforms – Operating system - TinyOS – Node level simulators – State centric programming –Applications and future directions

TOTAL : 45

REFERENCE BOOKS

1. Feng Zhao, Leonidas Guibas, “Wireless sensor networks- an information processing approach”, Mogan Kanufmann publishers, 2004
2. C. Sivaram Moorthy, B.S Manoj, “Ad Hoc Wireless Networks: Architectures and Protocols”, Prentice Hall, 2004

11CN013 DISTRIBUTED COMPUTING

3 0 0 3

Objective:

- To learn the basics concepts of distributed computing
- To explore the knowledge in processes and distributed objects
- To understand the various issues in operating system
- To explore the knowledge in distributed transaction processing

MODULE – I

15

Basic concepts: 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

Processes and distributed objects : Inter-process 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

MODULE - II

15

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

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

MODULE- III

15

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

TOTAL : 45

REFERENCE BOOKS

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

11CN014 HIGH SPEED SWITCHING ARCHITECTURE

3 0 0 3

Objective:

- To learn the basics of high speed networks and various types of high speed networks
- To explore the knowledge in ATM switching architecture and Queues in ATM switches
- To understand the concepts of IP switching

MODULE – I

15

High speed network: LAN and WAN network evolution through ISDN to BISDN - Transfer mode and control of BISDN -SDH multiplexing structure - ATM standard; ATM adaptation layers.

LAN switching technology: Switching concepts; Switch forwarding techniques; switch path control - LAN switching; cut through forwarding; store and forward - virtual LANs.

MODULE - II

15

ATM switching architecture: Switch models - Blocking networks – basic and enhanced banyan networks - sorting networks – merge sorting - rearrangeable networks - full and partial connection networks – non blocking networks – recursive network – construction and comparison of non-blocking network - switches with deflection routing – shuffle switch - tandem banyan.

Queues in ATM switches: Internal queuing – Input, output and shared queuing - multiple queuing networks –combined input, output and shared queuing – performance analysis of queued switches.

MODULE- III

15

IP switching: Addressing mode - IP switching types-flow driven and topology driven solutions - IP Over ATM address and next hop resolution – multicasting - IPv6 over ATM

TOTAL : 45

REFERENCE BOOKS

1. Achille Patavina, “Switching Theory: Architectures and performance in Broadband ATM Networks”, John Wiley & Sons Ltd., New York, 1998.
2. Christopher Y Metz, “Switching protocols & Architectures”, McGraw Hill, New York, 1998.
3. Ranier Handel, Manfred N Huber, Stefan Schrodder, “ATM Networks-concepts, protocols, applications”, 3rd Edition, Adisson Wesley, New York,1999
4. John A.Chiong, “Internetworking ATM for the internet and enterprise networks”, McGraw Hill, New York, 1998.

11CN015 JAVA TECHNOLOGIES

3 0 0 3

Objective:

- To explore basic concepts of Java and its technologies
- To learn the concepts of Java streams and networking
- To develop web applications using Java Technologies
- To enable the students for rapid enterprise application development

MODULE – I

15

Overview: Introduction – Java and Internet – Java Virtual Machine - features of Java - Data types, variables and arrays – operators – Control statements- classes – Inner classes – Inheritance - Reserved words- this, super, static and final.

Concepts: Overloading – overriding – abstract classes – interfaces – packages – standard and user defined packages – access control – exceptional handling – Built-in and User defined exceptions – Multithreading – synchronization – Inter-thread communication

MODULE - II

15

IO streams and Networking: IO classes and Interfaces – File – Byte and Character Streams – Serialization – basics of networking – networking classes and interfaces – Internet Address - sockets – URL – Datagrams - Multicasting.

Web Development: Applets- AudioClip interface– HTML tag for Applet - Servlets – cookies – session tracking – Java Server Pages –JSP objects and Tags - Java Beans – Properties of JavaBeans – Jar files - Web Servers - Servlet Engine

MODULE- III

15

Enterprise Technologies: J2EE Architecture - Enterprise Application development – Java Database Connectivity – Java Naming and Directory Interface –Remote Method Invocation- RMI and IIOP – XML – Enterprise JavaBeans - EJB roles and classifications - Java Messaging Service – Java Authorization and Authentication Service

Enterprise Application Development: Session Bean – Entity Bean – Bean and Container Managed Persistence– Message Driven Bean – Programming EJB (Entity and Session Beans) – Application servers - Deployment of EJB – Architectural guidelines in J2EE.

TOTAL : 45

REFERENCE BOOKS

1. Schildt, Herbert, “Java 2: The Complete Reference”, Fifth Edition, Tata McGraw Hill, 2002.
2. Asbury, Stephen and Weiner, Scott R., “Developing Java Enterprise Applications”, Second Edition, Wiley Publications, 2001.
3. Elliotte Rusty Harold, “Java Network Programming”, O’Reilly publishers, 2000.
4. Hortsmann and Cornell, “Core java 2 advanced features, vol II”, Pearson Education, 2002.

11CN016 CLOUD COMPUTING

3 0 0 3

Objectives:

- To introduce the fundamentals of cloud computing
- To understand the performance of Amazon cloud computing
- To understand the security features of cloud computing and disaster recovery

MODULE– I

15

Cloud Computing: The Cloud Versus Grid - Cloud Application Architectures - Cloud Computing components - Cloud Infrastructure Models - An Overview of Amazon Web Services

Amazon Cloud Computing: Amazon S3 - Amazon EC2 - Before the Move into the Cloud - The Shift to a Cloud Cost Model - Service Levels for Cloud Applications - Security –Disaster Recovery

MODULE– II

15

Design in web and Database: Ready for the Cloud - Web Application Design - Machine Image Design - Privacy Design - Database Management

Security: Data Security - Network Security - Host Security - Compromise Response

MODULE– III

15

Disaster Recovery: Disaster Recovery Planning - Disasters in the Cloud - Disaster Management, Scaling a Cloud Infrastructure - Capacity Planning - Cloud Scale

TOTAL: 45

REFERENCE BOOKS

1. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud -Theory in Practice”, O’Reilly publications, 2008
2. David S. Linthicum, “ Cloud computing and SOA Convergence in Your Enterprise”, Pearson Publications, 2010
3. George Reese, “Cloud Application Architectures, building Applications and Infrastructure in the Cloud”, O’Reilly publications, 2011

11CN017 NETWORK ROUTING ALGORITHMS
(Common to M.E. Computer and Communication, Communication Systems)

3 0 0 3

Objective:

- To learn the basics of circuit switching and packet switching networks
- To explore the knowledge in high speed and mobile networks
- To understand the basic and routing concepts of MANET

MODULE – I

15

Circuit switching networks: AT & T's Dynamic Routing Network, Routing in Telephone Network- Dynamic Non Hierarchical Routing- Trunk Status Map Routing-Real Time Network Routing, Dynamic Alternative Routing-Distributed Adaptive Dynamic Routing-Optimized Dynamic Routing
Packet switching networks: Distance vector Routing, Link State Routing, Inter domain Routing- Classless Inter Domain Routing (CIDR), Interior Gateway Routing Protocols (IGRP) - Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Exterior Gateway Routing Protocol (EGRP) - Border Gateway Protocol (BGP), Apple Talk Routing and SNA Routing

MODULE - II

15

High speed networks: Routing in optical networks-The optical layer, Node Designs, Network design and operation, Optical layer cost tradeoffs, Routing and wavelength assignment, Architectural variations, Routing in ATM networks- ATM address structure, ATM Routing, PNNI protocol, PNNI signaling protocol, Routing in the PLANET network and Deflection Routing.

Mobile networks: Routing in Cellular Mobile Radio Communication networks-Mobile Network Architecture, Mobility management in cellular systems, Connectionless Data service for cellular systems, Mobility and Routing in Cellular Digital Packet Data (CDPD) network, Packet Radio Routing-DARPA packet radio network, Routing algorithms for small, medium and large sized packet radio networks.

MODULE- III

15

Mobile Adhoc Networks (MANET): Internet based mobile ad-hoc networking, communication strategies, routing algorithms – Table-driven routing - Destination Sequenced Distance Vector (DSDV), Source initiated on-demand routing- Dynamic Source Routing (DSR), Ad-hoc On- demand Distance Vector (AODV), Hierarchical based routing- Cluster head Gateway Switch Routing (CGSR) and Temporally-Ordered Routing Algorithm (TORA), Quality of Service

TOTAL : 45

REFERENCE BOOKS

1. M. Steen strub, "Routing in Communication networks", Prentice Hall International, New York, 1995.
2. "Internetworking Technologies Handbook", ILSG Cisco Systems Inc, Fourth Edition, 2003.
3. William Stallings, "ISDN and Broadband ISDN with Frame Relay and ATM", PHI, New Delhi, 2004.
4. Behrouz A Forouzan, "Data Communications and Networking (3/e), TMH, 2004
5. William Stallings, "High Speed Networks TCP/IP and ATM Design Principles", Prentice Hall International, New York, 1998.
6. Mohammad Ilyas, "The Handbook of Ad hoc Wireless Networks" CRC Press, 2002.
7. Vijay K.Garg, "Wireless Network Evolution: 2G to 3G", Pearson Education, New Delhi, India, 2003.

Objective:

- To understand the concepts of probability theory and random variables
- To explore in memory-less finite schemes and continuous channels
- To understand the elements of encoding and types of encoding

MODULE – I**15****Introduction:** Probability theory, random variables**Random process:** Classification - Stationarity - Spectral decomposition - Response of linear system to random inputs**MODULE - II****15****Memory-less finite schemes:** Self information measure - Entropy function – Conditional Entropies - Characteristics of Entropy function - Derivation of the noise characteristics of a channel -Mutual information - Redundancy - Efficiency and channel capacity - capacities of channels with symmetric noise structure.**Continuous channels:** Definitions of different entropies - Mutual information - Maximization of the entropy of a continuous random variable - Entropy maximization problems - Channel capacity under the influence of additive white Gaussian Noise.**MODULE- III****15****Elements of encoding:** Separable binary codes - Shannon - Fano encoding - Necessary and sufficient conditions for noiseless coding - Shannon's binary coding - fundamental theorem of discrete noiseless coding - Huffman's code - Gilbert Moore coding - Fundamental theorem of discrete coding in presence of noise - Error-detecting and error-correcting codes - Hamming's single error correcting code.**TOTAL : 45****REFERENCE BOOKS**

1. Viterbei A & Omura J.K, "Principles of Digital Communication and Coding", McGraw Hill, 1979
2. Satyanarayana P.S, "Probability Theory - An Introduction", Dayaram Publications, 1990
3. Mansuripur.M.A, "Introduction to Information Theory" , Prentice Hall Inc. 1990
4. Srinath .M.D and Rajasekaran .P.K, "An Introduction to Statistical Signal Processing with Application, Prentice Hall, 1993
5. Joya Thomas, M.Cover, "Elements of Information theory", John Wiley, 1991
6. Richard.B.wells, "Applied Coding and Information Theory for Engineers", Prentice Hall, 1998

11CN019 MULTIMEDIA COMPRESSION TECHNIQUES
(Common to M.E. Computer and Communication, Communication Systems)

3 0 0 3

Objective:

- To introduce the fundamentals of compression.
- To understand the techniques of text, audio image and video compression

MODULE – I

15

Introduction: Special features of Multimedia – Graphics and Image Data Representations – Fundamental Concepts in Video and Digital Audio – Storage requirements for multimedia applications -Need for Compression - Taxonomy of compression techniques – Overview of source coding, source models, scalar and vector quantization theory – Evaluation techniques – Error analysis and methodologies

Text compression: Compaction techniques – Huffman coding – Adaptive Huffman Coding – Arithmetic coding – Dictionary techniques – LZW family algorithms.

MODULE - II

15

Audio compression: Audio compression techniques - μ - Law and A-Law companding-Frequency domain and filtering – Basic sub-band coding – Application to speech coding – G.722 – Application to audio coding – MPEG audio, progressive encoding for audio – Silence compression, speech compression techniques – Formant and CELP Vocoders

Image compression: Predictive techniques – DM, PCM, DPCM: Optimal Predictors and Optimal Quantization– Transform Coding – JPEG Standard – Sub-band coding algorithms: Design of Filter banks – Wavelet based compression: Implementation using filters – EZW, SPIHT coders – JPEG 2000 standards.

MODULE- III

15

Video compression: Video compression techniques and standards – MPEG Video Coding I: MPEG – 1 and 2 – MPEG Video Coding II: MPEG – 4 and 7 – Motion estimation and compensation techniques – H.261 Standard.

TOTAL : 45

REFERENCE BOOKS

1. Morgan Kauffman, Khalid Sayood, “Introduction to Data Compression”, Harcourt India, 2nd Edition, 2000
2. David Salomon , “ Data Compression – The Complete Reference”, Springer Verlag New York Inc, 2nd Edition, 2001
3. Yun Q.Shi, Huifang Sun, “Image and Video Compression for Multimedia Engineering - Fundamentals, Algorithms & Standards”, CRC press, 2003
4. Peter Symes , “ Digital Video Compression”, McGraw Hill , 2004
5. Mark Nelson , “ Data compression”, BPB Publishers, New Delhi,1998
6. Mark S.Drew, Ze-Nian Li, “Fundamentals of Multimedia”, PHI, 1st Edition, 2003
7. Watkinson,J , “Compression in Video and Audio”, Focal press, London.1995

11MS012 MOBILE AND PERVASIVE COMPUTING

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To learn the basics of wireless and data communication technologies.
- To explore mobile computing and its current trends
- To combine open standard-based applications with everyday activities

MODULE – I

15

Introduction to Wireless Environment: Introduction to wireless communication-Wireless transmission- Medium Access Control- Wireless MAC protocols -Wireless LANs - WAP- Current trends in wireless network-2G,3G, looking ahead 4G concepts - Wireless IEEE standards.

MODULE - II

15

Mobile Communication: GSM - DECT system - Tetra and UMTS - Bluetooth - Mobile network layer-Mobile transport layer - Mobile Ad Hoc Networks - Reactive, proactive and hybrid routing protocols - Cellular networks - Mobility management - Mobile transaction and commerce-protocols for mobile commerce - File system support for mobility support- Mobile execution environments and applications.

MODULE - III

15

Pervasive Communication: Characteristics of pervasive computing environments -Vision and challenges of pervasive computing - Pervasive computing applications and case study - Pervasive computing and web based applications- Voice enabling pervasive computing- PDA in pervasive computing- User interface issues in pervasive computing, Architecture - Smart Card-based Authentication mechanisms - Wearable computing architecture

TOTAL : 45

REFERENCE BOOKS

1. Schiller, Jochen., "Mobile Communications", Pearson education, New Delhi, 2003.
2. Burkhardt Jochen, Henn Horst and Hepper Stefan, Schaec Thomas and Rindtorff Klaus., "Pervasive Computing Technology and Architecture of Mobile Internet Applications", Addison Wesley Reading, 2002.
3. Stallings, William., "Wireless Communications and Networks", Pearson education, New Delhi, 2002.
4. Toh, C. K. "Ad Hoc Mobile Wireless Networks: Protocols and Systems," Prentice Hall, New Delhi, 2002.

11MS017 EMBEDDED SYSTEMS AND RTOS

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To introduce students to the embedded systems, its hardware and software. To introduce devices and buses used for embedded networking.
- To explain programming concepts and embedded programming in C and C++.
- To explain real time operating systems, inter-task communication and an exemplary case of MUCOS – II RTOS

MODULE – I

15

Introduction to Embedded Systems: Overview of Processors and hardware units in an embedded system – Software embedded into the system – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits.

Devices and Buses for Devices Network: I/O Devices - Device I/O Types and Examples – Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices - UART and HDLC - Parallel Port Devices - Sophisticated interfacing features in Devices/Ports- Timer and Counting Devices - ‘12C’, ‘USB’, ‘CAN’ and advanced I/O Serial high speed buses- ISA, PCI, PCI-X, cPCI and advanced buses.

MODULE - II

15

Programming Concepts and Embedded Programming in C, C++ : Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - NULL Pointers - Use of Function Calls – Multiple function calls in a Cyclic Order in the Main Function Pointers – Function Queues and Interrupt Service Routines Queues Pointers – Concepts of EMBEDDED PROGRAMMING in C++ - Objected Oriented Programming – Embedded Programming in C++, ‘C’ Program compilers – Cross compiler – Optimization of memory codes.

Real Time Operating Systems- Introduction: Definitions of process, tasks and threads – Clear cut distinction between functions – ISRs and tasks by their characteristics – Operating System Services- Goals – Structures- Kernel - Process Management – Memory Management – Device Management – File System Organisation and Implementation – I/O Subsystems – Interrupt Routines Handling in RTOS

MODULE - III

15

Real Time Operating Systems -Scheduling: RTOS Task scheduling models - Handling of task scheduling and latency and deadlines as performance metrics – Co-operative Round Robin Scheduling – Cyclic Scheduling with Time Slicing (Rate Monotonics Co-operative Scheduling) – Preemptive Scheduling Model strategy by a Scheduler – Critical Section Service by a Preemptive Scheduler – Fixed (Static) Real time scheduling of tasks - Inter Process Communication and Synchronization – Shared data problem – Use of Semaphore(s) – Priority Inversion Problem and Deadlock Situations – Inter Process Communications using Signals – Semaphore Flag or mutex as Resource key – Message Queues – Mailboxes – Pipes – Virtual (Logical) Sockets – Remote Procedure Calls (RPCs).

Study of Micro C/OS-II: RTOS System Level Functions – Task Service Functions – Time Delay Functions – Memory Allocation Related Functions – Semaphore Related Functions – Mailbox Related Functions – Queue Related Functions – Case Studies of Programming with RTOS – Understanding Case Definition – Multiple Tasks and their functions – Creating a list of tasks – Functions and IPCs – Exemplary Coding Steps.

TOTAL : 45

REFERENCE BOOKS

1. Raj Kamal. “Embedded Systems: Architecture, Programming and Design”, Second Edition, Tata Mcgraw Hill Education,2008
2. Heath Steve, “Embedded Systems Design”, Second Edition, Newnes, 2003
3. Simon, David E., “An Embedded Software Primer”, Pearson Education Asia, 2000.

4. Wolf, Wayne, “Computers as Components; Principles of Embedded Computing System Design”, Harcourt India, Morgan Kaufman Publishers, 2001.
5. Vahid Frank and Givargis Tony, “Embedded Systems Design: A unified Hardware /Software Introduction”, John Wiley, New York, 2002.

11MS018 SOFTWARE QUALITY ASSURANCE AND TESTING
(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To have a clear understanding of the quality tools in software development.
- To understand the various techniques for Metrics and Models used in quality assurance.
- To provide the step-by-step guidelines, checklists, and templates for each testing activity.
- To provide guidelines for testing specialized systems.

MODULE – I

15

Software Quality Assurance Framework, Standards and Metrics: Software Quality Assurance-Components of Software Quality Assurance - Software Quality Assurance Plan: Steps to develop and implement a Software Quality Assurance Plan – Quality Standards: ISO 9000 and Companion ISO Standards-CMM-CMMI-PCMM- Malcom Balridge - 3 Sigma- 6 Sigma - Software Quality Metrics: Product Quality metrics - In-Process Quality Metrics - Metrics for Software Maintenance - Software Quality metrics methodology: Establish quality requirements - Identify Software quality metrics - Implement the software quality metrics - analyze software metrics results - validate the software quality metrics - Software quality indicators - Fundamentals in Measurement theory.

MODULE - II

15

Software Testing Techniques : The Three-Step Process to Becoming a World-Class Testing Organization - Building a Software Testing Environment: Creating an Environment Supportive of Software Testing -Building the Software Testing Process: Software Testing Guidelines - The Seven-Step Testing Process: Overview of the Software Testing Process - Organizing for Testing - Developing the Test Plan - Verification Testing-Validation Testing-Analyzing and Reporting Test Results.

MODULE - III

15

Software Testing Tools and Applications: Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Java Testing Tools, Testing Client/Server – Web applications, Testing off the Shelf Components, Testing Security, Testing a Data Warehouse.

TOTAL : 45

REFERENCE BOOKS

1. Perry William, "Effective Methods for Software Testing", Third Edition, Wiley – India, Reprint 2009.
2. Mordechai BenMenachem / Garry S. Marliss , “Software Quality”, Cengage Learning publication 2008.
3. Kan. Stephen H., “Metrics and Models in Software Quality Engineering”, Second Edition, Pearson Education, 2009.
4. Jenkins, Nick., “A Software Testing Primer”, Online book.
<http://www.nickjenkins.net/prose/testing>.
5. Daniel Galin, Software quality assurance – from theory to implementation , Pearson education, 2009.

11MS019 ADHOC NETWORKS

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To introduce the concepts of Wireless and Adhoc Networks.
- To introduce MAC, Routing, Multicast Routing and Transport Layer Services.
- To learn about the Security requirements and QoS.

MODULE – I

15

Wireless LAN, PAN, WAN AND MAN: Characteristics of wireless channel, Fundamentals of WLANs, IEEE 802.11 standard, HIPERLAN Standard, Cellular Architecture, WLL, Wireless ATM, IEEE 802.16 standard, HIPERACCESS.

Ad hoc Wireless Networks: Introduction, Issues, Ad hoc wireless Internet.

Medium Access Control: MAC Protocols: Design issues, goals and classification, Contention Based Protocols: MACAW, FAMA, BTMA-Contention based protocols with reservation mechanism: DPRMA, FPRP, RTMAC - Contention based protocols with scheduling mechanisms: DPS, DWOP, DLPS, Protocols using directional antennas: MAC protocols using directional antennas, DBTMA, DMAC.

MODULE - II

15

Routing and Multicast Routing Protocols Routing Protocols: Design issues and classification, Table-driven Routing protocols: DSDV, WRP, CGSR- On-demand routing protocols: DSR, AODV, TORA, LAR, ABR- Hybrid routing protocols: CEDAR, ZRP- Routing protocols with efficient flooding mechanisms: OLSR- Hierarchical: FSR- power-aware routing protocols.

Multicast Routing Protocols: Design issues and operation, Architecture reference model, classification, Tree-based: BEMRP, MZRP, MAODV - Mesh-based protocols: ODMRP, DCMP, FGMP Energy-efficient multicasting.

MODULE - III

15

Transport Layer: 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, Secure routing.

Quality of Service: Issues and challenges in providing QoS, Classification of QoS solutions, MAC layer solutions: Cluster TDMA, IEEE 802.11e - Network layer solutions : QoS Routing Protocols, Ticket based QoS routing protocol, PLBQR- QoS frameworks: QoS models, INSIGNIA.

TOTAL : 45

REFERENCE BOOKS

1. Siva Ram Murthy C., “AdHoc Wireless Networks Architectures and Protocols”, Pearson Education, 2004.
2. Toh C.K., “AdHoc Mobile Wireless Networks: Protocols and Systems”, Prentice Hall PTR, 2001.
3. Perkins Charles E., “AdHoc Networking”, Addison – Wesley, 2000
4. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, “Mobile AdHoc Networking”, Wiley – IEEE press, 2004.

11MS025 COMPILER DESIGN

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To understand, design and implement a lexical analyzer.
- To understand, design and implement a parser.
- To understand, design code generation schemes.
- To understand optimization of codes and runtime environment

MODULE – I

15

The phases of Compiler- Compiler construction tools - Lexical Analysis-Expressing tokens by Regular Expression - Finite Automata-Converting regular expression to NFA –Syntax Analysis - Top Down parsing-Recursive Parsing- Problems- Recursive Descent parser- Predictive Parser –Bottom up parsers- shift reduce parser-operator precedence parsers- LR parser -YACC- Design of a syntax analyzer for a sample language

MODULE - II

15

Syntax-directed definitions-Construction of syntax trees-Bottom-up evaluation, L-attributed definitions-Top down translation- Recursive Evaluator Method- Comparison of Translation Method-Syntax directed translation for declaration statements- Assignment statements-Boolean expression-Control flow statements-Procedure calls-Runtime Environment: Source language issues-Storage organization-Storage allocation strategies-Storage allocation in C-Parameter passing.

MODULE - III

15

Code Generation-Issues in the design of a code generator-Basic blocks and flow graph-A simple code generator-Register allocation and Assignment-DAG representation of basic blocks-Generating code form dags-Code Optimisation: Principal sources of Optimization –Optimisation of basic blocks-Global data flow analysis-Code-improving transformations-Data flow analysis of structured flow graph-Efficient data flow algorithms- Symbolic debugging of optimised code-Approaches to compiler development-The C compilers.

TOTAL : 45

REFERENCE BOOKS

1. Aho Alfred V, Ravi Sethi and Ullman Jeffrey D, "Compilers: Principles, Techniques and Tools", Pearson Education, New Delhi, 2007.
2. Louden, Kenneth C., "Compiler Construction Principles and Practice", Vikas Publishing House, New Delhi, 2004.
3. Dick Grone, Henri E Bal, Cerial J H Jacobs and Koen G Langendoen, "Modern Compiler Design", John Wiley & Sons, USA, 2000.
4. Holub, Allen I., "Compiler Design in C", Prentice Hall of India, New Delhi, 2001.

11MS027 BUSINESS INTELLIGENCE

(Common to M.E. Computer Science and Engineering, Computer and Communications)

3 0 0 3

Objective:

- To understand various basic concepts of Data Warehousing, Business Intelligence.
- To know how to build Business Intelligence application using SSIS, SSAS, SSRS.
- To understand the relation between Data Warehousing, Data Mining and Reporting.

MODULE - I

15

Data Warehousing : Data Warehouse Architecture – System Process – Process Architecture – Database Design – Aggregations – Metadata – OLTP - OLAP

Introduction to Business Intelligence : Business Intelligence from the Business Side – Components of Business Intelligence Architecture – Business Intelligence Front-End – Measures of Success – LOFT Effect – Applications of BI

MODULE - II

15

Success of Business Intelligence: Executive Support – Data and Data Quality – The Business-IT Partnership – Relevance – Agile Development – Organizing for Success – Other Secrets to Success – The Future of Business Intelligence – Case Study

SSIS: Introduction to ETL using SSIS – Integration services – Package structure – Package Items – Control flow - Data flow components – Sources, Transformations and Destinations

MODULE - III

15

SSAS : Introduction to Dimensional Modeling using SSAS - Creating Cube - Measures – Dimensions – Managing dimensions – Relating Dimensions to Measure Group – Types of Dimensions – Slowly Changing Dimensions

Enterprise Reporting : Introduction to Reporting Using SSRS – Reporting Service – Report Structure – Report Delivery – Report Serving Architecture – Report Server – Creating Report using Tablix Data Region with Table Template

TOTAL: 45

REFERENCE BOOKS

1. Sam Anahory, Dennis Murray, “Data warehousing in the Real World: A Practical Guide for Building Decision Support Systems”, Pearson Education Limited, New Delhi, 2007
2. Cindi Howson, “Successful Business Intelligence: Secrets to Making BI a Killer App”, Tata McGraw-Hill, New Delhi, 2008
3. Brian Larson, “Delivering Business Intelligence with Microsoft SQL Server 2008”, McGraw-Hill, 2009
4. David Loshin, “Business Intelligence”, Morgan Kaufmann Publishers, San Francisco, Fifth edition, 2007
5. Mike Biere, “Business Intelligence for the Enterprise”, Pearson Education, Tenth edition, 2008
6. Larissa Terpeluk Moss, Shaku Atre, “Business Intelligence Roadmap”, Pearson Education, 2007

11MS028 PATTERN RECOGNITION

(Common to M.E. Computer Science and Engineering, Computer and Communications)

3 0 0 3

Objective:

- To understand various basic concepts of pattern recognition.
- To know the different methods of parameter estimation
- To understand the different statistical methods for classification and clustering

MODULE - I

15

Basics of Pattern Recognition: Machine perception – Pattern recognition system – Design cycle – learning and adaptation - Bayesian decision theory - Classifiers, Discriminant functions, Decision surfaces - Normal density and discriminant functions – Error Probabilities and Integrals – Error bounds – Discrete features – Missing and noisy features – Bayesian Belief Networks.

MODULE - II

15

Parameter Estimation: Parameter estimation methods Maximum-Likelihood estimation - Gaussian mixture models - Expectation-maximization method - Bayesian estimation - Hidden Markov models for sequential pattern classification - Discrete hidden Markov models - Continuous density hidden Markov models - Dimension reduction methods - Fisher discriminant analysis - Principal component analysis - Non-parametric techniques for density estimation - Parzen-window method - K-Nearest Neighbor method

MODULE - III

15

Classification and Clustering

Linear discriminant function based classifiers - Perceptron - Support vector machines - Non-metric methods for pattern classification - Non-numeric data or nominal data - Decision trees - Unsupervised learning and clustering - Criterion functions for clustering - Algorithms for clustering: K-means, Hierarchical and other methods- Cluster validation.

TOTAL: 45

REFERENCE BOOKS

1. Richard O Duda, Peter E Hart and David G Stork, Pattern Classification, Second Edition, John Wiley, 2001
2. S. Theodoridis and K. Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009
3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006

11MS103 DATA STRUCTURES AND ANALYSIS OF ALGORITHMS
(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To know the basic data structures used in software development, along with algorithms for inserting, sorting and accessing data
- To create and use the data structures and learn the best situations for each, depending on the type of data to be stored and the running time (computational complexity) of algorithms for insertion, sorting and retrieval.
- To understand the advanced data structures

MODULE – I

15

Basic Data Structures: The Role of Algorithms in Computing- Growth of Function- Divide and Conquer - Probabilistic Analysis and Randomized Algorithms-Elementary Data Structure-Hash Tables- Binary Search Trees-Red-Black Trees-Augmenting Data Structure B-trees.

MODULE– II

15

Design and Analysis Technique, Graph, Heaps ad Sets : Dynamic Programming- Greedy Algorithms- Amortized Analysis- Elementary Graph Algorithms- Minimum Spanning Trees-Single Source Shortest Paths- All-Pairs Shortest Paths-Maximum Flow- Binomial Heaps-Fibonacci Heaps- Data Structure and Disjoint Sets.

MODULE–III

15

Advanced Topics: Multi threaded Algorithms -Matrix Operations-Linear Programming- Polynomial and the FFT- Number Theoretic Algorithms-String Matching- Computational Geometry- NP-Completeness- Approximation Algorithms.

TOTAL : 45

REFERENCE BOOKS

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein "Introduction to Algorithms ", Third Edition MIT Press, USA, 2009.
2. Levitin, A. "Introduction to The Design and Analysis of Algorithms", Second Edition, Addison Wesley, New York, 2007.
3. Weiss, Mark Allen. "Data Structures and Algorithm Analysis in C++", Third Edition Pearson Education, New Delhi, 2007.
4. Aho, Alfred V. Hopcroft, John E and Ullman, Jeffrey D. "Data Structures and Algorithms", Pearson Education, New Delhi, 2002.

11MS203 WEB TECHNOLOGY

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To understand the basic concepts of networks and web
- To provide the knowledge for developing dynamic web pages.
- To understand the fundamentals of java used in web applications.
- To acquire skills to develop server side programs.

MODULE – I

15

Networking Concepts and Scripting: Introduction – Network concepts – Web concepts – Internet addresses - Retrieving Data with URL – HTML – DHTML with Java Script - Cascading Style Sheets - XML vs. HTML – XML Terminology – DTD – SCHEMA – XSLT – Basics of parsing: SAX, DOM and JAXP - AJAX

MODULE - II

15

Java and Server Side Programming: Java fundamentals - Java Servlets - Servlet container–Session Tracking–Using Servlet context– Servlet Chaining – Apache Struts – Java Server Faces (JSF) – Enterprise Java Beans (EJB) – Java Applets and Life Cycle - Active server pages – Java server pages

MODULE - III

15

Web Services and Middleware: Introduction – application communication incompatibilities – Middleware concepts – Java RMI, CORBA and DCOM – Web Services – Wireless Internet - Web Servers(IIS and Apache) – Database: SQL, MySQL, ADO.NET 2.0 – PHP – ASP.NET 2.0 and ASP.NET Ajax

TOTAL : 45

REFERENCE BOOKS

1. Deitel H.M. and Deitel P.J., “Internet and World Wide Web: How to Program”, Fourth Edition, Pearson Education Asia, New Delhi, 2007.
2. Norton, D and Schildt, H., “Java 2: The complete Reference”, Seventh Edition, Tata McGraw-Hill, New Delhi, 2008
3. Herold, Elliotte Rusty., “Java Network Programming”, Third Edition, Shroff Publishers and Distributors, Mumbai, August 2008
4. Ladd, Eric and O’Donnell, Jim, “Using HTML 4, XML, and JAVA1.2”, Prentice Hall of India, New Delhi, 2003.
5. Godbole. A.S. and Kahate. A., “Web Technologies”, Second Edition, Tata McGraw-Hill, New Delhi, First Reprint, 2008.