EIGHTH SEMESTER

SECURITY IN COMPUTING

RT 801 **2+1+0**

Module1

Introduction: Security basics – Aspects of network security – Attacks – Different types – Hackers – Crackers – Common intrusion techniques –Trojan Horse, Virus, Worm – Security services and mechanisms.

Module 2

OS Security – Protection Mechanisms –Authentication & Access control – Discretionary and Mandatory access control – Authentication mechanisms – Official levels of computer security (DoD) - Security breaches – Concept of a hole - Types of a holes – Study of the security features for authentication, access control and remote execution in UNIX, WINDOWS 2000

Module 3

Cryptography: Basic Encryption & Decryption – Transposition & substitution ciphers – Caesar substitution – Polyalphabetic substitutions – Crypt analysis – Symmetric key algorithms – Fiestel Networks – Confusion – Diffusion – DES Algorithm – Strength of DES – Comparison & important features of modern symmetric key algorithms – Public key cryptosystems – The RSA Algorithm – Diffice Hellman key exchange – comparison of RSA & DES – Message Authentication & Hash functions – Digital signature

Module 4

Network & Application Security: Kerberos – X509 Authentication service – IP security Architecture – Secure socket layer – Electronic mail security – Pretty Good privacy – S/MIME – secure Electronic Transactions – Firewalls - Security mechanisms in JAVA platform – Applet security – Security policy and SecurityManager.

Module 5

Database Security: - Security issues – SQL security DAC based on granting & revoking privileges – MAC 4 multilevel security – Statistical database security.

Text Books

Module1, 4

1. Network Security Essentials Applications & Standards - William S., Pearson Education Asia

Module2

1. Modern operating System - Andrew S. Tanenbaum, Pearson Education Asia
2. Using JAVA 2 platform - Joseph L. Weber, Prentice Hall of India

Module3

1. Cryptography and network security principles and practice - William Stallings, Pearson Education Asia
2. Information theory coding and cryptography - Ranjan Bose, TMH

Module 4,5

1. Designing security Architecture Solutions - Jay Ramachandran, Wiley Dreamtech

Module 5

1. Database Security Mechanisms for Computer Network - Sead Muftic, John wiles

References

1. Security in Computing - Charles P. Pfleeger IEEE Computer Science Press
2. Database Security Mechanisms for Computer Network - Sead Muftic, John wiles
3. Designing Security Architecture Solutions – Jay Ramachandran, Wiley dreamtech
4. Firewalls Complete - Marcus Gonsalvus, TMH
5. Networking Technologies - Jaisal, Galgotia Publication
6. Security in Computer Operating System - G.O.Shea, NCC Blackwell Manchester Oxford
7. Mastering JAVA security: Cryptography, Algorithms and Architecture - Rich Helton, Wiley Dreamtech
8. Implementing IPv6 - Mark A. Miller P.E, IDG Books

INFORMATION SYSTEMS AND MANAGEMENT

T 802 **3+1+0**

Module 1

Introduction, Management and Systems, Classical and systems approach to organization, Organizational theory, Management and organizational behaviour, Factors affecting productivity, Leadership Styles, Organizational Effectiveness, Managerial Grid, Tasks and functions of Management, General management system. ERP & Related technologies, MIS, DSS, EIS.

Module 2

The management process and information needs, Data Bank concept, Information systems for decision making, Automation of Decision making, Management science and the Decision rule, Decision assisting Information systems – MIS, DSS, EIS, ERP.

Module 3

Management Information systems, Strategic and Project Planning for MIS, Conceptual system design, detailed system design, Implementation and maintenance. (Brief study only)

Module 4

ERP, Introduction, ERP-modules, benefits, market. Implementation Life cycle, Vendors, Consultants and Users, Future direction in ERP.

Module 5

Decision Support Systems – Managers and decision making, Decision Support Tools, Concept of DSS, Components, Basic concepts of Data Mining, Data Warehousing and Knowledge Management. Knowledge based decision support – Basic concepts only.

References

Module 1,2&3

1. Information Systems for Modern Management - Murdick, Ross & Claggett, PHI.

Module 4

2. Enterprise Resource Planning- Alexis Leon, TMH

Module 5

3. Decision Support Systems And Intelligent systems - Efraim Turban, Jay E. Aronson, Pearson Education.
4. Managing Information Technology- Bhushan Dewan, Vikas Publishing

E-COMMERCE

T803 **2+1+0**

Module1 Introduction to Electronic Commerce

E-Commerce Framework, Anatomy of E-Commerce Applications, E-Commerce Consumer & Organization Applications. E- Commerce and World Wide Web – Internet Service Providers, Architectural Framework for Electronic Commerce.

Module 2 Electronic Payment Systems

Types of Electronic Payment Systems, Digital Token Based Electronic Payment System, Smart Cards, Credit Cards, Credit card based Payment system, Online payment process, Risk in Electronic Payment Systems, Designing Electronic Payment Systems.

Module 3 Electronic Data Interchange

EDI – Architecture, Application in Business, EDI-Legal, Security and Privacy Issues, EDI standardization, EDI Envelope for Message Transport, Internet based EDI, EDI and MIME, Value added Network. EDI Gateways.

Module 4 Intra Organizational E-Commerce

Internal Information System, Work-flow Automation and Coordination, customization and internal Commerce, Supply Chain Management, Document

Library, Types of Digital Documents, Technological Architecture for Internal Commerce, Corporate Data Warehouses, advantages of Data Warehouses.

Module 5 Recent Trends in E-Commerce

Marketing on the Internet, Advertising on the Internet, Multimedia in E-Commerce, Video Conferencing with Digital Videos, Broad Band Telecommunication, Frame & Cell Relays, Switched Multimegabit Data Service (SMDS), Asynchronous Transfer Mode, Mobile Computing and Wireless Computing.

Text Book

1. Frontiers of Electronic Commerce - Ravi Kalakota & Andrew B Whinston/Pearson Education

References

1. Global Electronic Commerce – J Christopher Westland & Theodore H K Clark
2. E- Commerce The cutting edge of Business - Kamlesh K Bajaj & Debjani Nag / Pearson Education

ARTIFICIAL INTELLIGENCE

RT 804 **3+1+0**

Module 1

Introduction – Definitions – AI application areas – Example problems- Problems and problem spaces - Problem characteristics – Problem solving by searching, Searching strategies – Breadth first search, Uniform cost search, DFS, Depth – Limited search, Bi-directional search – Constraint satisfaction search.

Module 2

Informed search, A* algorithm, Heuristic functions – Inventing Heuristic functions - Heuristic for constraint satisfaction problem – Iterative deepening – Hill climbing – Simulated Annealing.

Module 3

Game playing and knowledge structures – Games as search problem – Imperfect decisions – Evaluation functions – Alpha – Beta pruning – state of art game programs, Introduction to frames and semantic nets.

Module 4

Knowledge and Reasoning – Review of representation and reasoning with Logic – Inference in first order logic, Inference rules involving quantifiers, modus ponens, Unification, forward and backward chaining – Resolution.

Module 5

Introduction to Prolog – Representing facts – Recursive search – Abstract data types – Alternative search strategies – Meta predicates, Matching and evaluation, meta interpreters – semantic nets & frames in prolog.

Text Books

Module 1,2,3,4

1. Artificial Intelligence – A modern approach - Stuact Russell – Peter Narang, Pearson Education Asia
2. Artificial Intelligence - Rich E. - McGraw Hill Booq Company

Module 5

3. Artificial Intelligence - George F Luger, Pearson Education Asia

Reference

1. An Introduction to Artificial Intelligence – Eugene Charniak & Drew McDermot, Pearson Education Asia

ELECTIVE - II

T 805 **3+1+0**

List of elective subjects

1. CMELRPTA 805-01 Advanced Mathematics
2. RT 805-02 Client Server Computing
3. T 805-03 High Performance Computing
4. RT 805-04 Analysis and Modeling of Digital Systems
5. RT 805-05 Distributed Computing
6. RT 805-06 User Interface Design
7. T 805-07 Satellite & Mobile Communication
8. T 805-08 Data Compression

Note:

New Elective subjects related to the recent trends in Information Technology can be added to this list. Institutions offering such courses should submit the detailed syllabus and get it approved from the University before offering the course.

ADVANCED MATHEMATICS (ELECTIVE - II)

CMELRTA 805-1 **3+1+0**

Module 1 Green's Function

Heavisides, unit step function – Derivative of unit step function – Dirac delta function – properties of delta function – Derivatives of delta function – testing functions – symbolic function – symbolic derivatives – inverse of differential operator – Green's function – initial value problems – boundary value problems – simple cases only

Module 2 Integral Equations

Definition of Volterra and Fredholm Integral equations – conversion of a linear differential equation into an integral equation – conversion of boundary value problem into an integral equation using Green's function – integral equation with separable Kernels – Integral equations of convolution type – Neumann series solution.

Module 3 Gamma, Beta functions

Gamma function, Beta function – Relation between them – their transformations – use of them in the evaluation certain integrals – Dirichlet's integral – Liouville's extension of Dirichlet's theorem – Elliptic integral – Error function.

Module 4 Power Series solution of differential equation

The power series method – Legendre's Equation – Legendre's polynomial – Rodrigues formula – generating function – Bessel's equation – Bessel's function of the first kind – Orthogonality of Legendre's Polynomials and Bessel's functions.

Module 5 Numerical solution of partial differential equations

Classification of second order equations- Finite difference approximations to partial derivatives – solution of Laplace and Poisson's equations by finite difference method – solution of one dimensional heat equation by Crank – Nicolson method – solution one dimensional wave equation.

References

1. Linear Integral Equation - Ram P.Kanwal, Academic Press, New York
2. A Course on Integral Equations - Allen C.Pipkin, Springer – Verlag
3. Advanced Engg. Mathematics - H.K.Dass, S.Chand
4. Advanced Engg. Mathematics - Michael D.Greenberge, Pearson Edn. Asia
5. Numrical methods in Engg. &Science - B.S.Grewal, Khanna Publishers
6. Generalized functions - R.F. Hoskins, John Wiley and Sons.
7. Principles and Techniques of Applied Mathematics - Bernard Friedman, John Wiley and sons
8. Principles of Applied Mathematics - James P.Keener, Addison Wesley.

9. Numerical methods - P.Kandasamy, K.Thilagavathy, K.Gunavathy, S.Chand & co

CLIENT SERVER COMPUTING (ELECTIVE - II)

RT 805-2 **3+1+0**

Module 1 INTRODUCTION

History - uses - Client Server Computing & Hetrogenous Computing - Cross Platform Computing Distributed Computing - The costs of Client Server Computing - Advantages and Disadvantages - Client Server Databases.

Module 2 DESIGNS

Fundamentals of client server design - Managing the interaction of client and server - Communications Techniques protocols & Client server interaction protocols - Preparing applications for client server - Optimizing applications for client server - Example client server implementations - Request acceptance dispatching - Execution of requests - Client server interaction using message.

Module 3 MULTITASKING

Multi programming vs multitasking - Processor - Advantages and draw backs of multiple processor - Child and parent processor - Case study Novell Netware and Windows NT - Developing server applications - Threads - Server communication model.

Module 4 SYNCHRONIZATION

Scheduling implementations - processing queues - context switching pre emptive systems - critical sections - mutual exclusion - semaphores - semaphore implementations in NT & Netware.

Module 5 COMMUNICATIONS

Network communication - Inter process communication - Building portable client server applications.

References

1. Novell's Guide to Client-Server Application & Architecture - Jeffrey D.Schqnk, Novell Press.
2. Client Server Computing - Dawna Travis Dewire, McGraw Hill.
3. Developing Client Server Applications -W.H.Inman, BPB.
4. Guide to Client Server Databases - Joe Salemi, BPB.
5. Client Server Strategies - David Vaskevitch, Galgotia.

HIGH PERFORMANCE COMPUTING

T 805-3 **3+1+0**

Module1

Introduction to parallel processing - Trends towards parallel processing - Parallelism in uniprocessor - Parallel computer structures-Architecture classification schemes - Indian contribution to parallel processing.

Module 2

Principles of pipelining and vector processing - Linear pipelining - Classification of pipeline processors - General pipelines - Instruction and Arithmetic pipelines – Design of Pipilined instruction unit-Prinnciples of Designing Pipeline Processors-Instruction prefetch and branch handling- Dynamic pipelines - Architecture of Cray-1.

Module 3

Array processors - SIMD array processors - Interconnection networks - Static vs dynamic networks - mesh connected networks - Cube interconnection networks - Parallel algorithms for array processors - SIMD matrix multiplication-Parallel sorting on array processors - Associative array processing - Memory organization.

Module 4

Multiprocessor architectures and Programming - Loosely coupled and Tightly coupled multiprocessors - Interconnection networks - Language features to exploit parallelism - Process synchronisation mechanisms.

Module 5

Dataflow computers - Data driven computing and Languages - Data flow computers architectures - Static data flow computer -Dynamic data flow computer -Data flow design alternatives.

Text Book

1. Computer Architecture & Parallel Processing - Kai Hwang & FayeA.Briggs, McGraw Hill

References

1. Elements of Parallel computing - V. Rajaraman - PHI
2. Super Computers - V. Rajaraman - Wiely arstern
3. Parellel Processing for Super Computers & AI - Kai Hwange & Douglas Degneot
4. Mc Graw Hill
5. Advanced computer Architecture - Sima, Fountain and Kacsuk, Pearson Edn
6. High Performance Computer Architecture - Harold S. Stone, Addison Wesley.
7. Advanced Computing - Vijay P.Bhatkar, Asok V.Joshi, Arirban Basu, Asok K.Sharma.

8. Parallel Computers, Architecture and Programming – Rajaraman & Murthy, PHI

ANALYSIS AND MODELING OF DIGITAL SYSTEMS (ELECTIVE - II)

RT 805-4 **3+1+0**

Module 1

Introduction to VHDL: Digital system design - Role of hardware description language- Modeling digital systems – events, propagation delays and concurrency – waveforms and timing – signal values – shared signals – simulation model – synthesis model – Field Programmable Gate Arrays.

Module 2

Basic language concepts simulation: signals – Entity architecture – concurrent statements – Constructing VHDL models using CSAs – delays.

Synthesis: Interface from declarations, simple CSA statements, conditional signal assignment statements, and selected signal assignment statements.

Module 3

Modeling behavior Simulation: The process construct – programming constructs – the wait statement – attributes – generating clocks and periodic waveforms – using signals – modeling state machines – constructing VHDL models – programming errors.

Synthesis: language directed view – inference from within process – issues – signals vs. variables – latch vs. flip flop – the wait statement – state machine.

Module 4

Modeling structure: Describing structure – structural VHDL model – hierarchy, abstraction and accuracy – generics – component instantiation and synthesis – the generate statement

Subprograms: functions – procedures – sub program and operator overloading – packages and libraries.

Module 5

Basic I/O operations – the package TEXTIO – ASSERT statement – terminology and directory structure – simulation mechanics – synthesis mechanics – identifiers – data objects – data types – operators.

Text Book

1. Introductory VHDL - Sudhakar Yalamanchili, Pearson Education Asia.

Reference s

1. VHDL primer - J Bhaskar, Pearson Education Asia
2. Analysis and modeling of digital systems - Zainalabedin Navabi, McGraw Hill.

DISTRIBUTED COMPUTING (ELECTIVE - II)

RT805-5 **3+1+0**

Module I Introduction

Introduction to Distributed Systems, evolution, characteristics, design issues, user requirements, Network technologies and protocols – overview, MACH, AMOBEA- overview.

Module 2 Distributed file system

File service components, design issues, interfaces, implementation techniques, Sun Network File System – architecture and implementation, other distributed file systems – AFS, CODA. Name services – SNS name service model.

Module 3 Communication in distributed systems

Client server communication, Group communication, Message passing – features, synchronizations, RPC – model, implementation, stub generation, messages, marshalling, Server management. Distributed shared memory – Architecture, design issues, structure of shared memory space, replacement strategy, thrashing. Synchronization – clock synchronization, event ordering, mutual exclusion

Module 4 Resource and Process management

Features of scheduling algorithms, Task assignment approach, load balancing, load sharing, Process migration mechanisms, Threads – scheduling.

Module 5 Consistency maintenance

Transaction recovery – methods- intention lists, Fault tolerance – failures, Byzantine failures. Deadlocks in distributed systems – detection and prevention, centralized and distributed approaches.

References

1. Distributed Systems – Concepts and designing - George Coulouris, Jean Dellimore Tim Kindberg, Pearson Education Asia
2. Distributed Operating Systems - Andrew S. Tenenbaum Pearson Education Asia

3. Distributed Operating Systems - Concepts and designing - Pradeep. K.Sinha, PHI

USER INTERFACE DESIGN (ELECTIVE - II)

RT 805-6 **3+1+0**

Module 1 Introduction

Importance of user interface – definition, importance of good design, brief history – Graphical User Interface – Web User Interface – Principles of User interface design.

Module 2 Design Process

Human Interaction with computers, Importance of Human Characteristics, Human consideration, Human Interaction speeds – Understanding Business function

Module 3 Screen Designing

Design goals - screen meaning and purpose, organizing screen elements- ordering of screen data and content – screen navigation and flow – visually pleasing composition – amount of information – focus and emphasis – presenting information simply and meaningfully – information retrieval on web – Statistical graphics – Technological considerations in Interface Design.

Module 4 Windows and components

Menus and navigation schemes, selection of windows, Selection of device based and screen based controls - text and messages – icons and images – Multimedia – colours- uses, problems, choosing colours.

Module 5 Software tools

Specification methods, interface building tools

Interaction devices: keyboard and function keys - pointing devices- speech recognition, digitization and generation – image and video displays – printers.

Text Books

1. The Essential Guide to User Interface Design – Wilbert O. Galitz, Wiley Dreamtech
2. Designing the User Interface – Ben Shneiderman, Pearson Education Asia

References

1. Human Computer Interaction – John M. Carroll, Pearson Education Asia
2. The Essentials of User Interface Design - Alan Cooper, Wiley Dreamtech

SATELLITE AND MOBILE COMMUNICATION

T 805-7 **3+1+0**

Module 1

Satellite Communication – review of basic concepts - emerging trends in communication satellites- orbits – Geosynchronous and sun synchronous orbits – Kepler laws – power systems and eclipses – station keeping – altitude control and stabilization, Frequency plan and reuse Transponders, relative power levels- Transmission path and path loss – power and link budget calculations – S/N ratio- saturation flux density and noise consideration – EIRP.

Module 2

Multiple access Techniques, Satellite earth station, special purpose communication satellite, satellite launch vehicles.

Module 3

Spread spectrum Communication – Direct Sequence or Pseudo noise, Frequency hopping, Time hopping, Hybrid and Chirp spread spectrum systems. Applications of spread Spectrum.

Module 4

Mobile cellular communications – introduction – basic cellular system- performance criteria – uniqueness of mobile radio environment – operation of cellular systems – elements of cellular radio system design – general description – Frequency reuse – co channel interference reduction factor – desired C/I from a normal case in an omni directional antenna systems – hand off mechanism – cell splitting – consideration of the components of cellular system.

Module 5

Digital cellular systems – multiple access schemes – Global Systems for Mobile (GSM)- TDMA-CDMA-Miscellaneous Mobile systems. Intelligent cell concept, CDMA cellular radio network. Advanced intelligent network (AIN), AIN for mobile communications.

References

1. Electronics Communication 4^{th} ed - Dennis Roody & John Coolen, PHI
2. Mobile Cellular Telecommunication -William C.Y Lee, Mc Graw Hill
3. Satellite Communications - D C Agarwal, Khanna Publishers.
4. Mobile Communications Satellite (Theory and Applications) - Tom Lodgdon, Mc Graw Hill.
5. Mobile and Personal Communication System and Services – Raj Pandya, PHI

DATA COMPRESSION

T 805-8 **3+1+0**

Module 1

Introduction – signal compression - fixed rate Vs variable rate – lossless Vs lossy compression – sources, channels and codes – components of compression system – issues – quantization – optimal and adaptive quantization.

Module 2

Predictive coding – DPCM – linear prediction – adaptive prediction – delta modulation – adaptive delta modulation.

Module 3

Transform coding – orthogonal transformations – bit allocation – performance gain of transform coding – sub band coding – coding based on models of human perception (human auditory system and visual system)

Module 4

Vector quantization – introduction – memoryless vector quantizers – llyod algorithm – vector quantization design – tree structured VQ – multistep VQ – product codes – grain/shape VQ – lattice VQ – feedback vector quantization – vector predictive quantization – vector tree and trellis coders – adaptive VQ – VQ for speech coding – VQ for image coding.

Module 5

Compression standards – CELP standard for speech – JPEG standard for still images – ISO/MPEG standard for audio and video – introduction to fractal image compression – application of wavelet analysis in signal compression – data compression – review of entropy coding – Huffman, runlength, arithmetic and ziv – lempel coding.

References

1. Gersho A, Gray R.M, Vector Quantization and Signal Compression, Kluwer Academic Publishers.
2. Jayant N.S & Noll P., digital Coding of Waveforms – Principle and /applications to Speech and Video. – Prentice Hall.
3. Nelson M. Jean & Loup Gailly, The Data compression book, BPB publications.
4. Solari S.J, Digital Video/Audio Compression, McGrawHill.
5. Kondoz A.M, Digital Speech, John Wiley.
6. Rao R.M & Bopadikar A.S, Wavelet Transforms – Introduction to Theory and Applications, Addison Wesley & Longman Inc.

ELECTIVE - III

T 806 **3+1+0**

List of elective subjects

1. T 806-01 Information Theory and Coding
2. RT 806-02 Embedded Systems
3. RT 806-03 Neural Network
4. RT 806-04 Genetic Algorithm and Applications
5. RT 806-05 Advanced Networking Trends
6. RT 806-06 Data Processing and Analysis Techniques
7. RT 806-07 Bio metrics
8. T 806-08 Fuzzy Systems

Note

New Elective subjects related to the recent trends in Information Technology can be added to this list. Institutions offering such courses should submit the detailed syllabus and get it approved from the University before offering the course.

INFORMATION THEORY AND CODING

T 806-1 **3+1+0**

Module 1

Information Theory: Concept of amount of information, units – entropy, marginal, conditional and joint entropies – relation among entropies – mutual information, information rate, channel capacity – redundancy and efficiency of a channel, symmetric channels – binary symmetric channel (BSC), binary erasure channel (BEC), deterministic and noiseless channels – capacity of band limited Gaussian channels, Shannon – Hartley theorem – band width – SNR trade off – capacity of a channel of infinite bandwidth , optimum modulation systems.

Module 2

Source coding: Instantaneous codes – construction of instantaneous codes – Kraft's inequality, coding efficiency and redundancy, noiseless, coding theorem – construction of basic source codes –Shannon –Fano Algorithm, Huffman Coding. Cryptography: Secret key Cryptography, block and stream ciphers, DES, public key cryptography, Diffie- Hellman Public key distribution – RSA system, digital signatures.

Module 3

Codes for error detection and correction -parity check coding – linear block codes – error detecting and correcting capabilities – generator and parity check matrices – standard array and syndrome decoding – Hamming codes – encoding and decoding.

Module 4

Cyclic codes – description – generator and parity check matrices – encoding of cyclic codes – syndrome computation and error detection, decoding of cyclic

codes, BCH codes- description and decoding, Reed Solomon codes, burst error correction –block and convolutional interleaving.

Module 5

Convolutional codes - encoding – time and frequency domain approaches, state, Tree and Trellis diagrams – Transfer function and minimum free distance – maximum likelihood decoding of convolutional codes – The Viterbi Algorithm, Sequential decoding – Stack Algorithm. ARQ schemes – performance of ARQ – Probability of error and throughput.

References

1. Communication Systems - Simon Haykin, John Wiley & Sons Pvt. Ltd.
2. Principles of Communication Systems - Taub & Schilling, Tata Mc Graw Hill, New Delhi.
3. Principles of Digital Communication - Das, Mullick & Chatterjee. Wiley Eastern Ltd.
4. Information and Coding Theory - Dr. P. S. Sathya Narayana Probability Dynaram Publications, Bangalore.
5. Error Control Coding Fundamental s and Application - Shu Lin & Daniel J.Costello Prentice Hall Inc., Englewood Cliffs, NJ.

EMBEDDED SYSTEMS (ELECTIVE - III)

RT806-2 **3+1+0**

Module1 Overview of Embedded System

Embedded System, Categories of Embedded System, Requirements of Embedded Systems, Challenges and Issues in Embedded Software Development, Applications of Embedded Systems in Consumer Electronics, Control System, Biomedical Systems, Handheld computers, Communication devices.

Module 2 Embedded Hardware & Software Development Environment

Hardware Architecture, Micro-Controller Architecture, Communication Interface Standards, Embedded System Development Process, Embedded Operating systems, Types of Embedded Operating systems.

Module 3 Embedded Communication System

Serial Communication, PC-to-PC Communication, Serial Communication with the 8051 Family of Micro-controllers, Protocol Converter, Voice-over-IP, Embedded Applications over Mobile Network example MP3 Sound Player.

Module 4 Real Time & Database Applications

Real-Time Embedded Software Development, Sending a Message over a Serial Link, Simulation of a Process Control System, Controlling an Appliance from the RTLinux System, Embedded Database Applications using examples like Salary Survey, Energy Meter Readings.

Module 5 Java Applications & Future Trends in Embedded Systems

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

Text Book

1. Programming for Embedded Systems - Dreamtech Software Team, Wiley Dreamtech

Reference

1. Fundamentals of Embedded Software where C and Assembly Meet – Daniel W Lewis.

NEURAL NETWORKS (ELECTIVE -III)

RT806-3 **3+1+0**

Module 1

Introduction - Principles - artificial neuron - activation functions - Single layer & multilayer networks - Training artificial neural networks - Perception - Representation - Linear separability - Learning - Training algorithms.

Module 2

Back Propagation - Training algorithm - Applications - network configurations - Network paralysis - Local minima - temporal instability.

Module 3

Counter Propagation networks: Kebenon layer - Training the cohenen layer - Pre initialising the wright vectors - statistical properties - Training the Grosbery layer - Full counter propagation network - Application.

Module 4

Statistical methods - Boltzmann's Training - Cauche training - Artificial specific heat methods - Applications to general non-linear optimization problems.

Module 5

Hopfield nets - Recurrent networks - stability - Associative memory - applications - Thermo dynamic systems - Statistical Hopfield networks - Bidirectional associative memories - Continous BAM - Adaptive resonance theory - Architecture classification - Implimentation.

Text Book

1. Neural Computing Theory & Practice - Philip D. Wasserman.

References

1. Neural Networks - Simon Haykins
2. Adaptive Pattern Recognition & Neural Networks - Pay Y.H.
3. An Introduction to neural computing - Chapman & Hall

GENETIC ALGORITHMS AND APPLICATIONS (ELECTIVE - III)

RT806-4 **3+1+0**

Module 1 Architecture-Altering Operations

Introduction, Previous Methods of Determining the Architecture of a Multi-Part Program - On the origin of new function- Architecture-Altering operations for Subroutines -Automatically Defined Iterations, Loops, Recursion, Storage. Self-Organization of Hierarchies and Program Architecture - Rotating the Tires on an Automobile – Boolean Parity Problem- Time-Optimal Robot Control Problem - Multi-Agent Problem - Using Architecture Altering Operations for Subroutines. Transmembrane Segment Identification Problem using Architecture-Altering Operations for Iterations-Fibonacci Sequence- Cart Centering.

Module 2 Genetic Programming Problem Solver (GPPS)

Elements of GPPS 1.0-Problems Illustrating GPPS 1.0 - Elements of GPPS 2.0 - Problems Illustrating GPPS 2.0 - Previous Work on Automated Analog Circuit Synthesis.

Module 3 Automated synthesis of analog electrical circuits

Synthesis of a Low-pass Filter and High-pass Filter The Role of Crossover in Genetic Programming.

Module 4 Evolvable Hardware

Evolvable Hardware and Rapidly Re-configurable Field-Programmable Gate Arrays

Discovery of cellular Automata Rules: Discovery of a Cellular Automata Rule for the Majority Classification Problem.

Module 5 Programmatic Motifs for molecular Biology

Automatic Discovery of Protein Motifs –Programmatic Motifs and the Cellular Location Problem.

Parallelization and Implementation Issues: Computer Time- Parallelisation of Genetic Programming –Implementation Issues.

Reference

1. Johin R. Koza, Forrest H Bennett III, David Andre, Martin A. Kean, " Genetic Programming III: Darwinian Invention and Problem Solving", Morgan Kaufmann, 1999.

ADVANCED NETWORKING TRENDS (ELECTIVE – III)

RT806-5 **3+1+0**

Module 1

Ethernet Technology – Frame format – Interface Gap – CSMA/CD – 10 mbps Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless Ethernet – SONET – Sonet multiplexing, Sonet frame structure

Module 2

ISDN - Definition - Protocol architecture - System architecture - Transmission channels - ISDN interface, B-ISDN.

Module 3

ATM – ATM Principles – BISDN reference model – ATM layers – ATM adaption Layer – AAL1, AAL2, AAL3/4, AAL5 – ATM addressing – UNI Signaling – PNNI Signalling

Module 4

SATELLITE COMMUNICATION: Satellite communication principles - Geo stationary satellites - block schematic of satellite earth station - VSAT - VSAT networks - applications in personnel communication. (basic ideas only)

Module 5

Wireless Lan – Infrared Vs Radio transmission – Infrastructure & ad hoc n/w – IEEE 802.11 – Hiper Law – Bluetooth – Physical Layer – MAC layer – Networking - Security

References

Module 1

1. An introduction to Computer Networking - Kenneth C Mansfield, Jr., James L. Antonakos, PHI

Module 1,2,3

1. Communication Networks Fundamental Concepts & Key Architecture - Leon-Garcia – Widjaja, Tata McGraw Hill
2. Mobile Communication - Jochen Schiller, Pearson Education Asia

DATA PROCESSING AND ANALYSIS TECHNIQUES (ELECTIVE - III)

RT806-6 **3+1+0**

Module 1

Introduction to COBOL programming -elements of COBOL divisions, sections and paragraphs -Table writing - complete program in COBOL using various options verbs, statements-conditions and conditional statements.

Module 2

Table Handling – Occur clause – PERFORM verb – SET verb, SEARCH verb – Occurs depending clause – Sorting a Table.

Module 3

Processing of various file structures in COBOL Language – File description – Fixed Length Record – Statements – Sequential File with variable length record – Sorting and merging of files – Direct access files.

Module 4

Data warehousing – Definition – Multidimentional datamodel – OLAP operation – Data warehouse architecture – Warehouse Server – Metadata – OLAP Engine.

Module 5

Data mining – Definitions, KDD Vs Data mining, DBMS Vs DM – DM Techniques, Issues and Challenges in DM – DM application areas.

References

1. COBOL programming - M.K. Roy & D Ghosh Dastidar, Tata McGraw Hill
2. Data mining Techniques - Arun K Pujari (Universal Press)
3. Data mining Concepts and Techniques- Jawei Han & Micheline Kamber (Morgan Kunfmann Pub.)

4. Data Mining - Pieter Adriaans, Dolf Zantinge, Person Education Asia
5. Structured COBOL Programming- E. Rajasekar & S.Selvi (Anuradha Agencies)
6. Structured COBOL - A. S. Philippakis & Leonard, J. Kazmier (Tata McGraw Hill)

BIOMETRICS (ELECTIVE - III)

RT806-7 **3+1+0**

Module 1

Introduction – Benefits of biometric security – verification and identification – basic working of biometric matching – accuracy – false match rate – false nonmatch rate – failure to enroll rate – derived metrics – layered biometric solutions

Module 2

Finger scan – features – components – operation (steps) – competing finger scan technologies – strength and weakness

Facial scan - features – components – operation (steps) – competing facial scan technologies – strength and weakness

Module 3

Iris scan - features – components – operation (steps) – competing iris scan technologies – strength and weakness

Voice scan - features – components – operation (steps) – competing facial scan technologies – strength and weakness

Module 4

Other physiological biometrics-Handscan-retina scan- AFIS (automatic fingerprint Identification systems)-Behavieral Biometrics-Signature scan-Key stroke Scan.

Module 5

Biometrics Application – Biometric Solution Matrix-Bioprivacy-Comparison of privacy factor in different biometrics technologies - Designing privacy sympathetie biometric systems-Biometric standards - (BioAPI, BAPI) - Biometric middleware.

Reference

1. Biometrics -Identify Verification in a Networked World - Samir Nanavati, Michael Thieme, Raj Nanavati- WILEY-dreamtech

FUZZY SYSTEMS

T 806-8 **3+1+0**

Module 1

Introduction to Fuzzy sets and systems. Basics of fuzzy sets membership function, support of a fuzzy set, height – normalized fuzzy set, α – cuts (decomposition of a fuzzy set), set theoretic definitions on fuzzy sets, complement, intersection and union equality.

Module 2

Subsethood – basic definition based on membership functions. The law of the excluded middle and law of contradiction on fuzzy sets. Properties of fuzzy sets operations (logical proof only). Extension of fuzzy sets concepts – type –2 and level 2 fuzzy sets – examples.

Module 3

Operations on fuzzy sets – intersection, algebraic sum – product, bounded sum – product, drastic sum product, t -norms and t -conorms (s-norms) on fuzzy sets, typical parameterized t – norms and s-norms (with simplified proof). Extension principle and its applications.

Module 4

Fuzzy relation. Resolution form of a binary fuzzy relation. Operations on fuzzy relations – projection, max. – min. and min. and max., compositions cylindric extension. Similarity relations – reflexivity, symmetry, transitivity.

Module 5

Further operations on fuzzy sets and proposed by Zadeh – concentration dilation, contrast Intensification, a linguistic hedges, computation of the meaning of values of a linguistic variable, fuzzy algorithms, fuzzy engineering – applications of fuzzy controls, case studies.

References

1. Neural Fuzzy Systems - C.T Lin & C.S George Lee, Prentice Hall.
2. Fuzzy Systems Hand Book - Earl Cox, Associated Press.
3. Fuzzy Sets and Fuzzy Logic- Theory and Applications - Klir and Yuan, Prentice Hall of India.
4. IEEE Trans on Systems, Man & Cybernetics, vol. SMC – 3, No.1, January 1973, pp 28-44
5. Fuzzy Engineering - Bart Kosko, Prentice Hall.
6. Fuzzy Thinking, Bart Kosko - Hooper Collins Publications.

INTERNET LAB

T 807 **0+0+4**

1. Familiarization of Internet Accessing and Trouble shooting
2. Internet Programming with JAVA applets

3. Web development with XML, JAVA script, JAVA beans.
4. Implementation of Search Engine
5. Web Development with JSP and EJB
6. Familiarization to the latest web development tools

(Any experiment according to the syllabus of RT 605 and RT 705 can be substituted)

PROJECT & SEMINAR

T 709 / T808 **0+0+4**

Each student is required to present a technical paper on subject approved by the department. The paper should, in general, reflect the state of the art technology. Report should be submitted to the department.

In addition to the seminar, the students shall undertake a project work (as a team or individually) in the 7^{th} semester itself in consultation with the guide (s). On completion of the project work in the 8^{th} semester, each student shall present the work done before a panel of staff members, and submit a report of the project work to the department.

VIVA VOCE

T 809

A comprehensive viva voce examination will be conducted to assess the student's overall knowledge in the specified field of Engineering. At the time of viva voce, certified report of seminar, mini project and project work are to be presented for evaluation.