COMPUTER ENGINEERING

FINAL YEAR (SEMESTER – VII)

SUBJECT: ADVANCED COMPUTER NETWORKS (ELECTIVE-I)

Lectures : 4 Hrs per week **Practical : 2 Hrs per week**	**Theory : 100 Marks** **Term Work : 25 Marks** **Oral : 25 Marks**

Objectives: In first part, advanced technologies like High speed Devices etc. are to be considered. Second part Network programming is to be studied. Not just SOCKETS but also protocols, Drivers, Simulation Programming. In third part we should study Network Design, Protocols designs and analysis considering deterministic and non-deterministic approach. We expect natural thinking from student. For example he should able to consider different constraints and assume suitable data and solve the problems.

Pre-requisites: Computer networks

DETAILED SYLLABUS

Data Communications: Business Drivers and Networking Directions: Data communication Past and future.

Understanding the standards and their maker: Creating standards: players and Process, Current forums, Standard protocols, Layered reference models: The OSIRM, Standard computer architectures.

Introduction to Transmission Technologies: Hardware selection, in the design process.

Optical Networking: SONET/SDH standards, Dense wavelength division multiplexing (DWDM), Performance and Design considerations.

Physical Layer Protocols and Access Technologies: Physical Layer Protocols and Interfaces, Accessing the Network, Copper access technologies, Cable Access Technologies, Fiber Access Technologies, Air Access Technologies.

Common Protocols and Interfaces in the LAN environment: Data link layers protocols, LLC and MAC sub layer protocol, Ethernet, Token Ring, Token Bus and FDDI, Bridge protocols, Switching in the LAN environment

Frame Relay: FR specification and design, VoFR: Performance and Design considerations, Advantages and disadvantages of FR.

Common WAN Protocol: ATM: Many faces of ATM, ATM protocol operation (ATM cell and Transmission), ATM networking basics, Theory of operation ISDN protocol reference model, PHY layer, A TM layer (Protocol model), AMT layer and cell (Definition), Traffic descriptors and

parameters, Traffic and Congestion control defined, AAL Protocol model, Traffic contract and QoS, User plane overview, Control plane AAL, Management plane, Sub-DS3 ATM, ATM public services.

Common Protocols and Interfaces in the Upper Layers (TCP/IP): Background (Routing protocols), TCP/IP suite, Network layer (Internet work layer), Transport layer, Application layer, Addressing and routing design.

Mature Packet Switched Protocol: ITU Recommendation X.25, User connectivity, Theory of Operation, Network layer functions, X.75 Internetworking protocol, switched multimegabit data service (SMDS), SMDS and IEEE 802.6, Subscriber Interface and Access protocol, Addressing and Traffic control.

Requirements Definition: User requirements, Traffic sizing, Traffic characteristics, Protocols, Time and Delay considerations, Connectivity, Availability, Reliability and Maintainability, Service aspects, Budget constraints.

Traffic Engineering and Capacity planning: Background (Throughput calculations), Traffic engineering basics (Traffic characteristics), Traditional Traffic engineering, Queued data and packet switched traffic modeling, Designing for peaks, Delay or Latency, Availability and reliability, Network performance modeling, Creating the traffic matrix, Capacity planning and Network vision, Design tool, Categories of tools, Classes of design tool, Components of design projects, Types of design projects.

Technology Comparisons: Circuits-message-packet and cell switching methods, Packet switching service aspects, Generic packet switching network characteristics, Private verses public networking, Public network service selection, Business aspects of Packet-Frame and cell switching services, High speed LAN protocols comparisons, Application performance needs.

Access Network Design: Network design layers, Access layer design, Access network capacity, network topology and hardware, completing the access network design.

Backbone Network Design: Backbone requirements, Network capacities, Topologies, Topologies strategies, Tuning the network.

TEXT BOOKS

- Darren L Spohn, "Data Network Design", TMH
- D. Bertsekas, R. Gallager, *"Data Networks',* PHI

REFERENCES

- W.R. Stevens, *"Unix Network Programming",* Vol. 1 , Pearson Education
- J. Walrand, P. Varaiya, "High Performance Communication Networks", Morgan Kaufmann
- Y. Zheng, S. Akhtar, "Networks for Computer Scientists and Engineers", Oxford
- A.S. Tanenbaum, "Computer Networks"

- Peterson & Davie, "Computer Networks", Harcourt Asia.
- James D. McCabe, "Practical Computer Analysis and Design", Harcourt Asia.

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.

COMPUTER ENGINEERING

FINAL YEAR (SEMESTER – VII)

SUBJECT : ADVANCED MICROPROCESSORS

Lectures : 4 Hr per Week **Practicals** : 2 Hr per Week	**Theory** : 100 Marks **Term work** : 25 Marks **Oral** : 25 Marks

Objective: To study microprocessor basics and the fundamental principals of architecture related to advanced microprocessors.

Pre-requisite: Microprocessors

DETAILED SYLLABUS

Overview of new generation of modern microprocessors.

Advanced Intel Microprocessors: Protected Mode operation of x86 Intel Family. Study of Pentium: Super-Scalar architecture & Pipelining, Register set & special Instructions. Memory Management, Cache Organizations, Bus operation, Branch Predication Logic.

Study of Pentium Family of Processors: Pentium I, Pentium II, Pentium III, Pentium IV, Pentium V: Architectural features, Comparative study.

Advanced RISC Microprocessors: Overview of RISC Development and current systems, Alpha AXP Architecture, Alpha AXP Implementations & Applications.

Study of Sun SPARC Family: SPARC Architecture, The Super SPARC, SPARC Implementations & Applications.

Standard for Bus Architecture and Ports: EISA, VESA,PCI, SCSI, PCMCIA Cards & Slots, Ata, ATAPI, LPT, USB, AGP, RAID.

System Architectures for Desktop and Server based systems: Study of memory subsystems and I/O subsystems. Integration issues.

TEXT BOOKS

- Daniel Tabak, “Advanced Microprocessors”, McGraw-Hill
- Barry Brey, “The Intel Microprocessors, Architecture, Programming and Interfacing”
- Tom Shanley, “Pentium Processor System Architecture” , Addison Wesley Press.

REFERENCES

- Ray and Bhurchandi, “Advanced Microprocessors and Peripheral”, TMH
- James Antonakos, “The Pentium Microprocessor”, Pearson Education
- Badri Ram, “Advanced Microprocessors and Interfacing” , TMH Publication.
- Intel Manuals.

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.

ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus.

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER - VII)

SUBJECT: SIMULATION AND MODELLING (ELECTIVE-I)

Lectures : 4 Hrs per week **Practical : 2 Hrs per week**	**Theory : 100 Marks** **Term Work : 25 Marks** **Oral : 25 Marks**

Objective: In the last five decades digital computer simulation has developed from infancy to a full-fledged discipline. The field of modeling and simulation is diverse as of man. The application of simulation continues to expand, both in terms of extent to which simulation is used and the range of applications, course gives a comprehensive and state of art treatment of all the important aspects of a simulation study, including modeling, simulation software, model verification and validation, input modeling.

Pre-Requisite: Probability and Statistics

DETAILED SYLLABUS

Introduction to Simulation: System and System environment, Component system, Type of systems, Type of models, Steps in simulation study, Advantages and Disadvantages of simulation.

Simulation Examples: Simulation of Queueing systems, Other examples simulation.

General Principles: Concepts of discrete event simulation, List processing \

Simulation Software: History of simulation software, Desirable software features, General-purpose simulation packages, Object oriented simulation, Trends in simulation software.

Statistical Models in Simulation: Useful statistical model, Discrete distribution, Continuous distribution, Poisson process, Empirical distribution.

Queueing Models: Characteristics of Queueing systems, Queueing notation. Long run measures of performance of Queueing systems, Steady state behavior of infinite population Markovian models, Steady state behavior finite population model, Network of Queues.

Random Number Generation: Properties of random numbers, Generation of pseudo random numbers, Techniques for generating random numbers, Tests for random numbers.

Random Variate Generation: Inverse transform technique, Convolution method, Acceptance rejection techniques.

Input Modeling: Data Collection, Identifying the Distribution of data, Parameter estimation, Goodness of fit tests, Selection input model without data, Multivariate and Time series input

models.

Verification and Validation of Simulation Model: Model building, Verification, and Validation, Verification of simulation models, Calibration and Validation of models.

Output Analysis for a Single Model: Types of simulations with respect to output analysis, Stochastic nature of output data, Measure of performance and their estimation, Output analysis of terminating simulators, Output analysis for steady state simulation.

Comparison and Evaluation of Alternative System Design: Comparison of two system design, Comparison of several system design, Meta modeling, Optimization via simulation.

Case Studies: Simulation of manufacturing systems, Simulation of computer systems, Simulation of super market, Simulation of pert network

TEXT BOOKS

- Jerry Banks, John Carson, Barry Nelson, David Nicol, *"Discrete Event System Simulatiori'*
- Averill Law, W. David Kelton, *"Simulation Modeling and Analysis",* McGRAW- HILL

REFERENCES

- Geffery Gordon, *"System Simulation",* PHI
- Bernard Zeigler, Herbert Praehofer, Tag Gon Kim, *"Theory of Modeling and Simulatiori",* Academic Press
- Narsing Deo, *"System Simulation with Digital Computer",* PHI
- Donald W. Body, *"System Analysis and Modeling',* Academic Press Harcourt India
- W David Kelton, Randall Sadowski, Deborah Sadowski, *"Simulation with Arena",* McGRAW-HILL

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.

COMPUTER ENGINEERING

FINAL YEAR (SEMESTER – VII)

SUBJECT : DIGITAL SIGNAL PROCESSING

Lectures : 4 Hr per Week **Practicals** : 2 Hr per Week	**Theory** : 100 Marks **Term work** : 25 Marks **Oral** : 25 Marks

Objective: Digital Signal Processing continues to play an increasingly important role in the fields that range literally from A (astronomy) to Z (zeugmatography, or magnetic resonance imaging)and encompass applications such as Compact Disk Player, Speech Recognition, echo Cancellations in communication systems, image Enhancement, Geophysical Exploration and Noninvasive medical Imaging. The course aims to build concepts regarding the fundamental principles and applications of signals, Signal Transforms and Filters.

Pre-requisite: Data structures, Programming Languages and Algorithms

DETAILED SYLLABUS

Artificial Intelligence: An overview, Intelligent Systems: Evolution of the concept**.**

Intelligent Agents: How agent should act, Structure of Intelligent agents, Environments.

Problem Solving : Solving problems by searching, Information search methods, Game playing.

Knowledge and Reasoning: A knowledge based agent, The wumpus world environment, Representation, Reasoning Logic, Proportional Logic, First order logic: Syntax and Sementics, Extensions and Notational variation, UIsing first order logic.

Building a Knowledge Base: Propperties of good and bad knowledge base, Knowledge engineering, General ontology.

Interfacing First Order Logic: Interface rules involving quantifiers, An example proof, Forward and backward chaining, Completeness.

Acting Logically: Planning, Practical planning: Practical Planners, Hierarchical decomposition, Conditional planning.

Uncertain Knowledge and Reasoning: Uncertainty, Representing knowledge in an uncertain domain, The semantics of belief networks, Inference in belief networks.

Learning: Learning from observations: General model of learning agents. Inductive learning, learning decision trees, Learning in neural and belief networks: Introduction to neural networks, Preceptrons, Multilayer feed-forward network, Application on ANN, Reinforcement learning:Passive learning in a known environment, Generalization in reinforcement learning, Genetic algorithms.

Agents that Communicate: Communication as action, Types of Communicating agents, A formal grammar for a subset of English.

Expert System: Introduction to expert system, representing and using domain knowledge, Expert system shells, Explanation, Knowledge acquisition.

Applications: Natural language processing, Perceptionn, Robotics.

TEXT BOOKS

- Struart Russell and Peter Norving, “Artificial Intelligence: A Modern Approach”
- George F. Luger, “Artificial Intelligence: Structures and Strategies for Complex Problem Solving”, Pearson Education.

REFERENCES

- Nils J. Nilson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia
- Elaine Rich and Kevin Knight, “ Artificial Intelligence”, TMH
- Patrick Winston, “Artificial Intelligence” , Pearson Education
- Ivan Brakto, “Prolog Programming for Artificial Intelligence” Pearson Education.
- Efraim Turban Jay E. Aronson, “Decision Support Systems and Intelligent Systems”
- Ed. M. Sasikumar and Others, “Artificial Intelligence: Theory and Practice” Proceedings of the International Conference KBCS-2002, Vikas Publishing House

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.

B.E. COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VII)

SUBJECT: EMBEDDED SYSTEMS
(ELECTIVE - I)

Lectures : 4 Hrs per week **Practical : 2 Hrs per week**	**Theory : 100 Marks** **Term Work : 25 Marks** **Oral : 25 Marks**

Objective: Embedded system tools and products are evolving rapidly. This course deals with various approaches to building embedded systems. It introduces unified view of hardware and software. The aim of this course is to make the students aware of the various applications of embedded systems.

Pre-requisites: Microprocessors and C Programming

DETAILED SYLLABUS

An overview of embedded systems: Introduction to embedded systems, Categories and requirements of embedded systems, Challenges and issues related to embedded software development, Hardware/Software co-design, Introduction to IC technology, Introduction to design technology.

Embedded Software development: Concepts of concurrency, processes, threads, mutual exclusion and inter-process communication, Models and languages for embedded software, Synchronous approach to embedded system design, Scheduling paradigms, Scheduling algorithms, Introduction to RTOS, Basic design using RTOS.

Embedded C Language: Real time methods, Mixing C and Assembly, Standard I/O functions, Preprocessor directives, Study of C compilers and IDE, Programming the target device.

Hardware for embedded systems: Various interface standards, Various methods of interfacing, Parallel I/O interface, Blind counting synchronization and Gadfly Busy waiting, Parallel port interfacing with switches, keypads display units, Memory and high speed interfacing, Interfacing of data acquisition systems, Interfacing of controllers, Serial communication inter Implementation of above concepts using C language.

Study of ATMEL RISC Processor: Architecture, Memory, Reset and interrupt, functions, Parallel I/O ports, Timers/Counters, Serial communication, Analog interfaces, Implementation of above concepts using C language.

Case studies and Applications of embedded systems: Applications to: Communication, Networking, Database, Process Control, Case Studies of : Digital Camera, Network Router, RTLinux

TEXT BOOKS
• Raj Kamal, "Embedded Systems", TMH. • David E. Simon, "An Embedded Software Primer II", Pearson Education. • Muhammad Ali Mazidi and Janice Gillispie Mazidi, "The 8051 Microcontroller and Embedded Systems", Pearson Education
REFERENCES
• Frank Vahid, Tony Givargis, "Embedded System Design: A Unified Hardware/Software Introduction", John Wiley. • Craig Hollabaugh, "Embedded Linux", Pearson Education. • Daniel Lewis, "Fundamentals of Embedded Software", Pearson Education • Barnett, Cox, O'Cull, "Embedded C Programming and the Atmel AVR", Thomson Learning. • Myke Predko, "Programming and Customizing the 8051 Microcontroller", TMH.
TERM WORK
Term work should consist *of* at least 10 practical experiments and two assignments covering the topics *of* the syllabus. • Four experiments on micro controller based systems. • Four experiments using cross C compiler and Linux. • Two experiments using developments tools like logic analyzer, emulator and simulator. • Two experiments on case study of advanced embedded systems.
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus.

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VII)

SU BJ ECT: IMAGE PROCESSING
(ELECTIVE-I)

Lectures : 4 Hrs per week **Practical : 2 Hrs per week**	**Theory : 100 Marks** **Term Work : 25 Marks** **Oral : 25 Marks**

Objective: Digital Image Processing is a rapidly evolving field with growing applications in science and engineering. Image processing holds the possibility of developing the ultimate machine that could perform the visual functions of all living beings. There is *an* abundance of image processing applications that can serve mankind with the available and anticipated technology in the near future.

DETAILED SYLLABUS

Digital Image Processing Systems: Introduction, Structure of human eye, Image formation in the human eye, Brightness adaptation and discrimination, Image sensing and acquisition, Storage, Processing, Communication, Display Image sampling and quantization, Basic relationships between pixels.

Image Transforms (Implementation): Introduction to Fourier transform, DFT and 2_D DFT, Properties of 2-D DFT, FFT, IFFT, Walsh transform, Hadamard transform, Discrete cosine transform, Slant transform, Optimum transform Karhunen - Loeve (Hotelling) transform.

Image Enhancement in the Spatial Domain: Gray level transformations, Histogram processing, Arithmetic and logic operations, Spatial filtering: Introduction, Smoothing and sharpening filters.

Image Enhancement in the Frequency Domain: Frequency domain filters: Smoothing and Sharpening filters, Homomorphic filtering.

Wavelets and Multi resolution Processing: Image pyramids, Subband coding, Haar transform, Series expansion, Scaling functions, Wavelet functions, Discrete wavelet transforms in one dimensions, Fast wavelet transform, Wavelet transforms in two dimensions

Image Data Compression: Fundamentals, Redundancies: Coding, Interpixel, Psycho-visual, Fidelity criteria, Image compression models, Error free compression, Lossy compression, Image compression standards: Binary image and Continuous tone still image compression standards, Video compression standards.

Morphological Image Processing: Introduction, Dilation, Erosion, Opening, Closing, Hit-or-Miss transformation, Morphological algorithm operations on binary images, Morphological algorithm operations on gray-scale images

Image Segmentation: Detection of discontinuities, Edge linking and Boundary detection, Thresholding, Region based segmentation.

Image Representation and Description: Representation schemes, Boundary descriptors, Regional descriptors.

TEXT BOOKS

- R. C. Gonsales R. E. Woods, *"Digital Image Processing',* Second Edition, Pearson Education
- Anil K. Jain, *"Fundamentals of Image Processing',* PHI

REFERENCES

- William Pratt, *"Digital Image Processing',* John Wiley
- Milan Sonka, Vaclav Hlavac, Roger Boyle, *"Image Processing, Analysis and Machine Vision"* Thomson Learning
- N Ahmed & K. R. Rao, *"Orthogonal Transforms for Digital Signal Processing"* Springer
- B. Chanda, D. Dutta Majumder, *"Digital Image Processing and Analysis",* PHI

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

COMPUTER ENGINEERING

FINAL YEAR (SEMESTER – VII)

SUBJECT : INTELLIGENT SYSTEMS

Lectures: 4 Hr per Week **Practicals**: 2 Hr per Week	**Theory** : 100 Marks **Term work** : 25 Marks **Oral** : 25 Marks

Objective: To understand and apply principles, methodologies and techniques in design and implementation of Intelligent System.

Pre-requisite: Data structures, Programming Languages and Algorithms

DETAILED SYLLABUS

Artificial Intelligence: An overview, Intelligent Systems: Evolution of the concept**.**

Intelligent Agents: How agent should act, Structure of Intelligent agents, Environments.

Problem Solving : Solving problems by searching, Information search methods, Game playing.

Knowledge and Reasoning: A knowledge based agent, The wumpus world environment, Representation, Reasoning Logic, Proportional Logic, First order logic: Syntax and Sementics, Extensions and Notational variation, UIsing first order logic.

Building a Knowledge Base: Propperties of good and bad knowledge base, Knowledge engineering, General ontology.

Interfacing First Order Logic: Interface rules involving quantifiers, An example proof, Forward and backward chaining, Completeness.

Acting Logically: Planning, Practical planning: Practical Planners, Hierarchical decomposition, Conditional planning.

Uncertain Knowledge and Reasoning: Uncertainty, Representing knowledge in an uncertain domain, The semantics of belief networks, Inference in belief networks.

Learning: Learning from observations: General model of learning agents. Inductive learning, learning decision trees, Learning in neural and belief networks: Introduction to neural networks, Preceptrons, Multilayer feed-forward network, Application on ANN, Reinforcement learning:Passive learning in a known environment, Generalization in reinforcement learning, Genetic algorithms.

Agents that Communicate: Communication as action, Types of Communicating agents, A formal grammar for a subset of English.

Expert System: Introduction to expert system, representing and using domain

knowledge, Expert system shells, Explanation, Knowledge acquisition.

Applications: Natural language processing, Perceptionn, Robotics.

TEXT BOOKS

- Struart Russell and Peter Norving, “Artificial Intelligence: A Modern Approach”
- George F. Luger, “Artificial Intelligence: Structures and Strategies for Complex Problem Solving”, Pearson Education.

REFERENCES

- Nils J. Nilson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia
- Elaine Rich and Kevin Knight, “ Artificial Intelligence”, TMH
- Patrick Winston, “Artificial Intelligence” , Pearson Education
- Ivan Brakto, “Prolog Programming for Artificial Intelligence” Pearson Education.
- Efraim Turban Jay E. Aronson, “Decision Support Systems and Intelligent Systems”
- Ed. M. Sasikumar and Others, “Artificial Intelligence: Theory and Practice” Proceedings of the International Conference KBCS-2002, Vikas Publishing House

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.

Oral Examination

An oral examination is to be conducted based on the above syllabus.

B.E. COMPUTER ENGINEERING

FINAL YEAR (SEMISTER - VII)

SUBJECT: MOBILE COMPUTING
(ELECTIVE-I)

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory : 100 Marks** **Term Work : 25 Marks** **Oral : 25 Marks**

Objective: Recent developments in portable devices and high-bandwidth, ubiquitous wireless networks has made mobile computing a reality. Indeed, it is widely predicted that within the next few years access to Internet services will be primarily from wireless devices, with desktop browsing the exception. Such predictions are based on the huge growth in the wireless phone market and the success of wireless data services. This course will help in understanding fundamental concepts, current developments in. mobile communication systems and wireless computer networks.

Pre-requisites: Computer Networks.

DETAILED SYLLABUS

Introduction: Applications, A short history of wireless communication.

Wireless Transmission: Frequency for radio transmission, Signals, Antennas, Signal propagation, 'Multiplexing, Modulation, Spread spectrum, Cellular systems.

Medium Access Control: Motivation for a specialized MAC: Hidden and Exposed terminals, Near and Far terminals; SDMA, FDMA, TOMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; COMA: Spread Aloha multiple access.

Telecommunication Systems: GSM: Mobile services, System architecture, Radio interface, Protocols, Localization And Calling, Handover, Security, New data services; DECT: System architecture, Protocol architecture; TETRA, UMTS and IMT-2000: UMTS Basic architecture, UTRA FDD mode, UTRA TDD mode.

Satellite Systems: History, Applications, Basics: GEO, LEO, MEO Routing, Localization, Handover, Examples.

Broadcast Systems: Overview, Cyclic repetition of data, Digital audio broadcasting: Multimedia object transfer protocol; Digital video broadcasting

Wireless LAN: Infrared vs. Radio transmission, Infrastructure and Ad hoc Networks, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, Future development; HIPERLAN: Protocol architecture, Physical layer,

Channel access control. Sub layer, Medium access control Sub layer, Information bases And Networking; Bluetooth: User scenarios, Physical layer, MAC layer, Networking. Security, Link management.

Wireless ATM: Motivation for WATM, Wireless ATM working group, WATM services, Reference model: Example configurations, Generic reference model; Functions: Wireless mobile terminal side, Mobility supporting network side; Radio access layer: Requirements, BRAN; Handover: Handover reference model, Handover requirements, Types of handover, Handover scenarios, Backward handover, Forward handover; Location management: Requirements for location management, procedures and Entities; Addressing, Mobile quality of service, Access point control protocol

Mobile Network Layer: Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol, Ad hoc .networks: Routing Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics

Mobile Transport Layer: Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TOR, Fast retransmit/fast recovery, Transmission time-out freezing, Selective retransmission, Transaction oriented TCP .

Support for Mobility: File systems: Consistency, Examples; World Wide Web : Hypertext transfer protocol, Hypertext markup language, Some approaches the might help wireless access, System architectures; Wireless application protocol Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language, WML script, Wireless telephony L application, Examples Stacks with Wap, Mobile databases, Mobile agents.

TEXT BOOKS

- Jochen Schiller, "Mobile communications", Addison wisely, Pearson Education
- Wiiliam Stallings, "Wireless Communications and Networks”

REFERENCES

- Rappaort, "Wireless Communications Principals and Practices”
- YI Bing Un , "Wireless and Mobile Network Architecture”, John Wiley
- P. Nicopolitidis , "Wireless Networks”, John Wiley
- K Pahlavan, P. Krishnamurthy , "Principles of Wireless Networks”
- M. Richharia , "Mobile Satellite Communication: Principles and Trends”, Pearson Education

TERM WORK
Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus

B.E. COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VII)

SUBJECT: PATTERN RECOGNITION
(ELECTIVE-I)

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory : 100 Marks** **Term work : 25 Marks** **Oral : 25 Marks**

Objective: This course teaches the fundamentals of techniques for classifying multi-dimensional data, to be utilized for problem-solving in a wide variety of applications, such as engineering system design, manufacturing, technical and medical diagnostics, image processing, economics, and psychology.

Pre- requisite: Linear Algebra, Probability & Statistics

DETAILED SYLLABUS

Introduction: Machine perception, Pattern recognition systems, Design cycle, Learning and Adaptation

Bayesian Decision Theory: Bayesian decision theory: Continuous features, Minimum-error rate classification, classification, Classifiers, Discriminant functions and Decision surfaces, Normal density, Discriminant functions for , normal density, Bayes Decision theory: discrete features.

Maximum-Likelihood and Bayesian Parameter Estimation: Maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation: Gaussian case and General theory, Problems of dimensionality, Hidden Markov Model.

Nonparametric Techniques: Density estimation, Parzen windows, k_n-Nearest-Neighbor estimation, Nearest-Neighbor rule, Matrics arid Nearest-Neighbor classification

Linear Discriminants Functions: Linear discriminant functions and decision surfaces, Generalised linear discriminant functions, 2-Category linearly separable case, Minimising the Perceptron criterion function, Relaxation procedure, Non-separable behavior, Minimum squared error procedure, Ho-Kashyap procedures, Multicategory generalizations.

Nonmetric Methods: Decision tree, CART, ID3, C4.5, Grammatical methods, Grammatical interfaces

Algorithm Independent Machine Learning: lack of inherent .superiority of any classifier, Bias and Variance, Resampling for estimating statistic, Resampling for classifier design,

Estimating and comparing classifiers, Combining classifiers

Unsupervised Learning and Clustering: Mixture densities and Identifiability, Maximum-Likelihood estimations, Application to normal mixtures, Unsupervised Bayesian learning, Data description and clustering criterion function for clustering, Hierarchical clustering

Applications of Pattern Recognition

TEXT BOOKS

- Duda, Hart, and Stock, *"Pattern Classification",* John Wiley and Sons.
- Gose, Johnsonbaugh and Jost, *"Pattern Recognition and Image analysis",* PHI

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

COMPUTER ENGINEERING

FINAL YEAR (SEMESTER – VII)

SUBJECT: SOFTWARE ENGINEERING

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory : 100 Marks** **Term Work : 25 Marks** **Oral Exam : 25 Marks**

Objectives of the course: **Apply various software Engineering principles and methodologies while dealing with the various phases of software development.**

Pre-requisite: **Programming concepts.**

DETAILED SYLLABUS

Product: Evolving role of software, Software Characteristics, Software, Applications, Software myths

Process: Software Process, Process Models, Linear sequential model, Prototyping model, RAD model, Evolutionary software models, Component based development, Formal methods model, Fourth generation techniques, Process technology, Product and process

Project Management: Management spectrum, People, Product, Process, Project, WSHH principle.

Software Process and Project Metrics: Measures-Metrics-Indicators, Metrics in the process and project domains, Software measurement, Metrics for I software quality, Integrating metrics within the software engineering process, I Statistical quality control, Metrics for small organizations, Establishing a software metrics program

Software Project Planning: Objectives, Software scope, Resources, Software project estimation, Decomposition techniques, Empirical estimation models, I Make/Buy decision, Automated estimation tools.

Risk Analysis and Management: Reactive versus proactive risk strategies, Software risks, Risk identification, Risk projection, RISK refinement, Risk, mitigation-monitoring-management, Safety risks and hazards, RMMM plan

Project Scheduling and Tracking: Basic concepts, Relationship between people and effort, Defining a task set *for* the software project, Selecting software Engineering tasks, Retirement of major tasks, Defining a task network, Scheduling, Earned value network, Error tracking, Project plan.

Software Quality Assurance: Quality concepts, Quality Movement, Software quality assurance, Software reviews, Formal technical reviews, Formal approaches to SQA, Statistical software quality assurance, Software reliability Mistake-proofing for software, ISO 9000 quality standards, SQA plan

Software Configuration Management: Introduction, SCM process, Identification of objects in the software configuration, Version control, Change control, Configuration audit, Status reporting, SCM standards.

System Engineering: Computer-based systems, System engineering hierarchy, Business process engineering, product engineering, Requirement engineering, System modeling.

Analysis Concepts and Principles: Requirement Analysis, Requirement elicitation for software, Analysis principles, Software prototyping, Specification.

Analysis Modeling: Introduction, Elements of analysis model, Data modeling, Functional modeling and information flow, Behavioral modeling, Mechanics of structured analysis, Data dictionary, Other classical analysis methods

Design Concepts and Principles: Software design and software engineering, Design process, Design principles, Design concepts, Effective modular design, Design heuristics for effective modularity, Design model, Design Documentation

Architectural Design: Software architecture, Data design, Architectural styles, analyzing alternative architectural designs, Mapping requirements into software architecture, Transform mapping, Transaction mapping, Refining architectural design

User Interface Design: The golden rules, User interface design, Task analysis and modeling, Interface design activities, Implementation tools, Design evaluation.

Component-Level Design: Structured programming, Comparison of design notation

Software Testing Techniques: Software testing fundamentals, Test case design, White-box testing, Basis path testing, Control structure testing, Black box testing, testing for specialized environments, architectures and applications

Software Testing Strategies: Strategic approach to software testing, Strategic issues, Unit testing, Integration testing, Validation testing, System testing, Art of debugging

Technical Metrics for Software: Software quality, framework for technical software metrics, Metrics for the analysis model, Metrics for the design model, Metrics for source code, Metrics for testing, Metrics for maintenance.

TEXT BOOKS

- Roger Pressman, "*Software Engineering',* McGraw Hill, Fifth Edition
- James Peter, *"Software Engineering An Engineering Approach",* John Wiley
- Ian Sommerville, *"Software Engineering',* Pearson Education

REFERENCES
• W. S. Jawadekar, "Software *Engineering",* TMH. • Pankaj Jalote, *"An Integrated Approach To Software Engineering* ", Narosa • R. Mall, *"Fundamentals of Software Engineering",* Prentice Hall of India • Behferooz & F. J. Hudson, *"Software Engineering Fundamentals",* Oxford University Press • S. L. Pfleeger, *"Software Engineering Theory and Practice",* Pearson Education
TERM WORK
Term Work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VII)

SUBJECT: PROJECT - A

Tutorial: 2 Hrs per week	**Term Work :** 25 Marks **Oral :** 25 Marks

GUIDELINES

- Project - A exam be conducted by two examiners appointed by university. Students have to give seminar on the project-A for the term work marks.' All the students of the class must attend all the seminars. Seminars should be conducted continuously for couple of days.

- Project-A should preferably contain abstract, existing system, problem definition, scope, proposed system, its design, introduction to programming tools, hardware and software platforms requirements etc.

- Out of the total projects 35 percent may be allowed as to be industry projects. 65 percent projects must be in-house. Head of dept and senior staff in the department will take decision regarding projects.

- Every student must prepare hand written synopsis in the normal journal format.

- Internal guide has to interact at least once in fortnight and maintain the progress and attendance report during both the terms.

- Two research projects may be allowed only for outstanding students with research aptitude.

- In case of industry projects, visit by internal guide will be preferred. Industry project will attract demos either at site or in college. 8. Make sure that external project guides are BE graduates.

- Number of students for a project should be preferably 2 to 4. Only one student should be avoided and up to 6 may be allowed only for exceptional and complex projects.

SEMISTER VIII

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VIII)

SUBJECT: DATA WAREHOUSING AND MINING (ELECTIVE – II)

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory : 100 Marks** **Term work : 25 Marks** **Oral : 25 Marks**

Objective of the course: The Data Warehousing part of module aims to give students a good overview of the ideas and techniques which are behind recent development in the data warehousing and online analytical processing (OLAP) fields, in terms of data models, query language, conceptual design methodologies, and storage techniques. Data mining part of the model aims to motivate, define and characterize data mining application.

DETAILED SYLLABUS

DATA WAREHOUSING

Overview And Concepts: Need for data warehousing, basic elements of data warehousing, Trends in data warehousing.

Planning And Requirements: Project planning and management, collecting the requirements.

Architecture And Infrastructure: Architectural components, Infrastructure and metadata.

Data Design And Data Representation: Principles of dimensional modeling. Dimensional modeling advanced topics, data extraction, transformation and loading, data quality.

Information Access And Delivery: Matching information to classes of users, OLAP in data warehouse, Data warehousing and web.

Implementation and Maintenance: Physical design process, data warehouse deployment, growth and maintenance.

DATA MINING

Introduction: Basics of data mining, related concepts, Data mining techniques.

Data mining algorithms: Classification, Clustering, Association rules.

Knowledge Discovery: KDD process.

Web mining: Web content mining, Web structure mining and Web usage mining.

Advanced topics: Spatial mining, temporal mining.

Visualization: Data generalization and summarization based characterization. Analytical characterization, analysis of attribute relevance, Mining class comparisons, Discriminating between different classes, Mining descriptive statistical measures in large databases.

Data mining Primitives, Languages, and System Architecture: Data mining primitives, query language, designing GUI based on a data mining query language, architectures of data mining systems.

Applications and Trends in data mining: Applications, systems products and research prototypes, Additional themes in data mining, Trend in data mining.

TEXT BOOKS

- Paulraj Ponnian, “Data Warehousing Fundamentals” John Wiley.
- M.H. Dunham, “Data Mining Introductory and advanced Topics” Pearson education.
- Han, Kamber, “Data mining concepts and techniques”

REFERENCES

- Ralph Kimball, “The Data Warehouse Lifecycle Toolkit”, John Wiley.
- M Barry and G. Linoff, “Mastering Data Mining”, John Wiley.
- W. H. Inmon, “Building the Data warehouses”, Wiley Dreamtech.
- R. Kimball, “The Data Warehouse Toolkit”, John Wiley.
- E.G. Mallach, “Decision Support and Data warehouse systems”, TMH.

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VII)

SUBJECT: DISTRIBUTED COMPUTING

Lectures: 4 Hrs per week **Practical:** 2 Hrs per week	**Theory :** 100 Marks **Term work :** 25 Marks **Oral :** 25 Marks

Objective Of the course: This course aims to build concepts regarding the fundamental principles of distributed system. The design issues and distributed Operating system concept are covered.

Pre-requisites: Operating system , computer network

DETAILED SYLLABUS

Introduction to Distributed system: Goals, Hardware concept, software Concept, and client server Model, Examples of distributed system.

Communication: Layered protocol, Remote procedure call, remote object Invocation, Message oriented communication, stream oriented communication

Processes: Threads, Clients, Servers, Code migration, Software agent.

Naming: Naming entities, Locating Mobile entities, Removing up Referenced entities.

Synchronization : Clock Synchronization, Logical clock, global state Election algorithms, Mutual exclusion, Distributed transactions

Consistency and Replication: Introduction, Data centric consistency Model, client centric consistency models, Distribution protocols Consistency protocols.

Fault tolerance: Introduction, process resilience, Reliable client Server communication, Reliable group communication, Distributed Commit, recovery.

Security: Introduction, Secure channel, Access control, security management.

Distributed file system: Sun network file system, CODA files system.

Case Study: CORBA, Distributed COM , Globe, comparison of CORBA, DCOM and Globe

TEXT BOOKS

- Taunenbaum, ” Distributed system : Principles and paradigms”
- G. Couloris, J. Dollimore and T. Kindberg, ” Distributed System :Concept and designs”, Pearson Education

References:

- M. Singhal, N. Shivaratri, ” Advanced concept in operating system”

TERM WORK
Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VIII)

SUBJECT: MULTIMEDIA SYSTEM

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory : 100 Marks** **Term work : 25 Marks** **Oral : 25 Marks**

Objective Of the course: This course teaches students to collect and intelligently Integrate multiple media on the computer .Student learn the issues involved in Capturing, compressing, processing, manipulating, searching, indexing, storing and retrieving various kind of continuous media in the text section

Pre-requisites: Operating system, computer network.

DETAILED SYLLABUS

Multimedia system introduction: Multimedia applications, Multimedia system architecture, Evolving technologies for multimedia system, defining object for multimedia system, multimedia data interface standards.

Compression and Decompression: Types of compression, Binary image, compression schemes, color, gray scale, still video image compression, Video image compression, Audio compression, Fractal Compression, Data and file format standard: Rich text format, TIFF, RIFF, MIDI, JPEG, AVI, MPEG

Multimedia Input/Output technologies: Key technologies issues, Pen input, Video and Image display system, Printout technology, Image scanner, digital voice and audio, full motion video.

Storage and retrieval Technologies: Magnetic media technology, Optical media, Hierarchical storage management, Cache management for storage system, Image and video database: indexing and Retrieval

Architecture and Telecommunication consideration: Specialized computational processors, Memory system, Multimedia board system, LAN/WAN connectivity, Multimedia transport across ATM network, Multimedia across wireless, Distributed object model.

Multimedia Networking: Multimedia networking application, Streaming stored audio and video, RTP, Scheduling and policing mechanisms, Integrated services, RSVP.

Multimedia application Design : Multimedia application classes, Types of multimedia system, Virtual reality design, components of multimedia system, Organizing multimedia database, application workflow design issues, Distributed Application design issues, Application like interactive, Television, Video conferencing, Video on demand, educational application and authoring, Industrial application, Multimedia archives and digital libraries.

Multimedia Authoring and user Interface: Multimedia authoring system, Hypermedia

application and design consideration, User interface design, Information access, Object display/playback issues.

Hypermedia messaging: Mobile messaging, Hypermedia message components, Hypermedia linking and embedding, creating hypermedia messages, integrated hypermedia message standard, integrated documents managements, The world wide web, open hypermedia system, content based navigation

Distributed multimedia system: Components of distributed multimedia system, Distributed client server operation, Multimedia object server, Multimedia server network topologies, Distributed multimedia database, Managing distributed object.

Multimedia system design: Methodology and consideration, Multimedia system design examples.

TEXT BOOKS

Prabhat K. Andheigh, Kiran Thakrar, "Multimedia System Design " PHI
Koegal Buford, "Multimedia system ", Pearson Education

REFERENCES

- Free Harshell, " Multimedia communication " , Pearson Education
- R. Steimnetz, K. Nahrstedt," Multimedia computing, communication and Application ", Pearson Education.
- K. R. Rao, D. Milovanovic, "Multimedia communication system: Techniques Standard and Networks "
- Subramaniam, "Multimedia database system "
- J. D. Gibson," Multimedia communication: Direction and Innovation ", Academic Press Hardcourt India.
- J.F. Kurose, K. W. Ross , " Computer Networking ", Pearson Education

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

COMPUTER ENGINEERING

FINAL YEAR (SEMESTER – VIII)

SUBJECT : SYSTEM SECURITY

Lectures : 4 Hrs Per Week **Practical : 2 Hrs Per Week**	**Theory : 100 Marks** **Term Work : 25 Marks** **Oral : 25 Marks**

Objectives of the course: Learn about the threats in computer security.
Understand what puts you at a risk and how to control it. Controlling a risk is not eliminating the risk but to bring it to a tolerable Level.

Pre-requisites: Computer Networks, Operating system.

DETAILED SYLLABUS

Introduction: Security, Attacks, Computer criminals, Method of defense.

Cryptography: Basic Cryptography: Classical Cryptosystems, Public key Cryptography and Cryptographic checksum, Key Management: Key exchange, Key generation, Cryptographic key infrastructure, Storing and revoking keys, Hash algorithm, Digital signature, Cipher Techniques: Problems, Stream and block ciphers: AES, DES and RC4.

Program Security: Secure programs, Non-malicious program errors, Viruses and other malicious code, Targeted malicious code, Controls against program threats

Operating System Security: Protected objects and methods of protection, Memory address protection, Control of access to general objects, File protection mechanism, Authentication: Authentication basics, Password, Challenge-response, Biometrics

Database Security: Security requirements, Reliability and integrity, Sensitive data, Interface, Multilevel database, Proposals for multilevel security.

Security in Networks: Threats in networks, Network security control, Firewalls, Intrusion detection systems, Secure e-mail, Networks and cryptography, Example protocols: PEM, SSL, IPsec

Administrating Security: Security planning, Risk analysis, Organizational security policies, Physical security.

Legal, Privacy, and Ethical Issues in Computer Security: Protecting programs and data, Information and law, Rights of employees and employers, Software failures, Computer crime, Privacy, Ethical issues in computer society Case studies of ethics

TEXT BOOKS
• Stallings, "*Cryptography And Network Security: Principles and practice"* • C. P. Pfleeger and S. L. Pfleeger, *"Security in Computing",* Pearson Education. • Matt Bishop, *"Computer Security : Art and Science",* Pearson Education
REFERENCES
• Kaufman, Perlman, Speciner, *"Network Security"* • Eric Maiwald, *"Network Security:* A *Beginner's Guide",* TMH • Bruce Schneier, *"Applied Cryptograph"",* John Wiley. • Macro Pistoia, *"Java network security",* Pearson Education • Whitman, Mattord, *"Principles of information security",* Thomson
TERM WORK
Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VII)

SUBJECT: COMPUTER VISION (ELECTIVE-II)

Lectures : 4 Hrs per week **Practical** : 2 Hrs per week	**Theory** : 100 Marks **Term work** : 25 Marks **Oral** : 25 Marks

Objective: To introduce the student to computer vision algorithms, methods and concepts which will enable the student to implement computer vision systems with emphasis on applications and problem solving.

Pre-requisite: Introduction to Image Processing

DETAILED SYLLABUS

Recognition Methodology: Conditioning, labeling, grouping, extracting, matching, edge detection, gradient based operators, morphological operators, spatial operators for edge detection.
Thinning, region growing, region shrinking, labeling of connected components.

Binary Machine Vision: Thresholding, segmentation, connected component labeling, hierarchical segmentation, spatial clustering, split & merge, rule-based segmentation, motion-based segmentation.

Area Extraction: concepts, data-structures, edge, line-linking, Hough transform. Line fitting curve, fitting (least-squares fitting).

Region Analysis: region properties, external points, spatial moments, mixed spatial gray-level moments. Boundary analysis: signature properties, shape numbers.

Facet Model Recognition: labeling lines, understanding line drawings. Classification of shapes by labeling of edges. Recognition of shapes. Consistent labeling problem, backtracking.
Perspective projective geometry, inverse perspective projection. Photogrammetry - from 2D to 3D.
Image matching: intensity matching of 1D signals, matching of 2D images. Hierarchical Image matching.

Object Models and Matching: 2D representation, global Vs local features.

General Frame Works for Matching: distance-relational approach, ordered-structural matching, view class matching, models database organization.

General Frame Works: distance-relational approach, ordered-structural matching, view class matching, models database organization.

Knowledge Based Vision: knowledge representation, control-strategies. Information integration.
TEXT BOOKS
• David A. Forsyth, Jean Ponce, “Computer Vision: A Modern Approach” • R. Jain, R. Kasturi, and B.G. Schunk, “Machine vision”, McGraw- Hill
REFERENCES
• Milan Sonka, Vaclav Hlavac, Roger Boyle, “ Image processing, Analysis, and Machine Vision” Thomson Learning • Robert Haralick and Linda Shapiro, Computer and Robot Vision, Vol I, II, Addison-Wesley 1993.
TERM WORK
Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VII)

SUBJECT: NEURAL NETWORKS & FUZZY SYSTEMS
(ELECTIVE-II)

Lectures : 4 Hrs per week **Practical : 2 Hrs per week**	**Theory : 100 Marks** **Term work : 25 Marks** **Oral : 25 Marks**

Objective Of the course: This course covers basic concepts of artificial neural networks, fuzzy logic systems and their applications. Its focus will be on the introduction of basic theory, algorithm formulation and ways to apply these techniques to solve real world problems.

Pre-requisite: Knowledge of calculus, and basic probability and statistics a required. Background in the following subjects desirable: numerical analysis (including optimization). Programming skills in one of the following would be desirable: Matlab, MathCad, C, Java, C++

DETAILED SYLLABUS

Introduction: Biological neurons, McCulloch and Pitts models *of* neuron, Types of activation function, Network architectures, Knowledge representation Learning process: Error-correction learning, Supervised learning, Unsupervised learning, Learning Rules.

Single Layer Perceptron: Perceptron convergence theorem, Method steepest descent - least mean square algorithms.

Multilayer Perceptron: Derivation of the back-propagation algorithm, Learning Factors.

Radial Basis and Recurrent Neural Networks: RBF network structure theorem and the reparability of patterns, RBF learning strategies, K-means and LMS algorithms, comparison of RBF and MLP networks, Hopfield networks: energy function, spurious states, error performance.

Simulated Annealing: The Boltzmann machine, Boltzmann learning rule Bidirectional Associative Memory.

Fuzzy logic: Fuzzy sets, Properties, Operations on fuzzy sets, Fuzzy relation Operations on fuzzy relations, The extension principle, Fuzzy mea Membership functions, Fuzzification and defuzzification methods, Fuzzy controllers.

TEXT BOOKS

- Simon Haykin, *"Neural Network* a - *Comprehensive Foundation",* Pearson Education
- Zurada J.M., *"Introduction to Artificial Neural Systems,* Jaico publishers
- Thimothv J. Ross, "Fuzz *V Logic with Engineering Applications",* McGraw
- Ahmad Ibrahim, *"Introduction to Applied Fuzzy Electronics',* PHI

REFERENCES

- Yegnanarayana B., *"Artificial Neural Networks",* PHI
- Driankov D., Hellendoorn H. & Reinfrank M., *"An Introduction to Fuzzy Control',* Norosa

Publishing House • Berkan R.C., and Trubatch S.L, *"Fuzzy Systems Design Principles',* IEEE press
TERM WORK
Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VII)

SUBJECT: PARALLEL PROCESSING
(ELECTIVE-II)

Lectures : 4 Hrs per week **Practical : 2 Hrs per week**	**Theory : 100 Marks** **Term work : 25 Marks** **Oral : 25 Marks**

Objective Of the course : Upon completion of this course students will be able to understand and employ the fundamental concepts and mechanisms which form the basis of the design of parallel computation models and algorithms, recognize problems and limitations to parallel systems; as well as possible solutions

Pre-requisite: Computer architecture, Data structures

DETAILED SYLLABUS

Introduction: Parallel Processing Architectures: Parallelism in sequential machines, Abstract model of parallel computer, Multiprocessor architecture, Pipelining, Array processors.

Programmability Issues: An overview, Operating system support, Types of operating systems, Parallel programming models, Software tools.

Data Dependency Analysis: Types of dependencies loop and dependences, Loop dependence analysis, Solving Diophantine equation. Program transformations.

Shared Memory Programming: General model of shared memory programming, process model under UNIX.

Algorithms for Parallel Machines: Speedup, Complexity and cost, Histogram computation, Parallel reduction, Quadrature problem, Matrix multiplication, Parallel sorting algorithms, Solving linear systems, Probabilistic algorithms.

Message Passing Programming: Introduction, Model, Interface, circuit satisfiability, Introducing collective, Benchmarking parallel performance.

Parallel Programming languages: Fortran90, nCUBE C, Occam, C-Linda

Debugging Parallel Programs: Debugging techniques, Debugging message passing parallel programs, Debugging shared memory parallel programs.

Memory and I/O Subsystems: Hierarchical memory structure, Virtual system, Memory allocation and management, Cache allocation and management, Cache memories and

management, Input output subsystems.

Other Parallelism Paradigms: Data flow computing, Systolic architecture Functional and logic paradigms, Distributed shared memory

Performance of Parallel Processors: Speedup and efficiency, Amdahl's law, Gustafson-Barsis's law, Karf-Flatt metric, Isoefficiency metric

TEXT BOOKS

- Hawang Kai and Briggs F.A. "Computer Architecture and Parallel Processing ", McGraw Hill
- Jorden H. F and Alaghaband G.,"Fundamentals of Parallel Processing".
- M.J. Quinn, "Parelle Programming", TMH.

REFERENCES

- Shashikumar M., " Introduction to parallel processing ",PHI
- Wilson G. V., Practical parallel programming", PHI
- D.E. Culler, J.P. Singh, A Gupta, "Parellel computer Architecture", Morgan Kaufman.

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VII)

SUBJECT: ROBOTICS (Elective - II)

Lectures : 4 Hrs per week **Practical** : 2 Hrs per week	**Theory** : 100 Marks **Term work** : 25 Marks **Oral** : 25 marks

Rationale: This course familiarizes students with the concepts and techniques in robots in engineering systems.

DETAILED SYLLABUS

Robotic Manipulation: Automation and robotics, classification, applications, specifications, notations.

Direct Kinematics: Dot and cross products, co-ordinate frames, rotations, homogeneous co-ordinates, link co-ordination, arm equation, (Five axes robot, four axes robot, six axes robot).

Inverse Kinematics: General properties of solutions Tool configuration, five-axes, three-four-axes, six axes robots (inverse kinematics).
Workspace analysis and trajectory planning work envelopes and examples, workspace fixtures, pick and place operations, continuous path motion, and interpolated motion, straight-line motion.

Robot Vision: Image representation, template matching, polyhedral objects, plane analysis, segmentation (Thresholding, region labeling, shrink operators, Swell operators, Euler number, perspective transformations, structured illumination, camera calibration).

Task Planning: Task level programming, uncertainty, and configuration space, gross motion, source and goal scenes, task planner simulation.

Moments of inertia.

Principles of NC and CNC machines.

TEXT BOOKS

- Fundamentals of Robotics-analysis and control, Robert Schilling (PHI).
- Robotics: Fu, Gonzales and Lee, McGraw Hill
- Introduction to Robotics, Graig J. J., Pearson Education.

REFERENCES

- Staughard, Robotics and AI , Prentice Hall of India
- Grover, Wiess, Nagel, Oderey, “Industrial Robotics “, McGraw Hill.
- Walfram Stdder, Robotics and Mechatronics.
- Niku, Introduction to Robotics, Pearson education.
- Klafter, Chmielewski, Negin, Robot Engineering, Prentice Hall of India.

• Mittal, Nagrath, Robotics and Control, Tata McGraw Hill publications.
TERM WORK
Term work should consist of at least 10 practical experiments and assignments covering the topics of the syllabus. A term work test shall be conducted with a weightage of 20 marks.
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus.

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VII)

SUBJECT: SOFTWARE TESTING

Lectures : 4 Hrs per week Practical : 2 Hrs per week	**Theory : 100 Marks** **Term work : 25 Marks** **Oral : 25 Marks**

Objective Of the course: To improve your understanding of software testing – its purpose and nature – and raise your awareness of issues and constraints around testing .To provide a professional qualification widely recognized by employers, customers and peers. To learn standard terminology. Discover good sources of information. To provide a complete picture of the test activities and processes from requirements review to system implementation.

DETAILED SYLLABUS

Introduction : Defect, Defect Vs. Failures, Process problems and defect rates, The business perspective for testing

Building a Software Testing Strategy: Computer system strategic risk, Economics of testing, common computer problems, Economics of SDLC testing, Testing – an organizational issue, Establishing a testing policy, Structured approach to testing, Test strategy, Testing methodology.

Establishing a Software Testing Methodology: Introduction, Verification and validation, Functional and structural testing, Workbench concept, Considerations in developing testing methodologies

Determining Software Testing Techniques: Testing techniques /tool selection process, Selecting techniques/tools ,Structural system testing techniques, Functional system testing techniques, Unit testing techniques, Functional testing and analysis.

Selecting and Installing Software Testing tools: Testing tools-hammers of testing, Selecting and using the test tools, Appointing managers for testing tools

Software Testing Process: Cost of Computer testing, Life cycle testing concept, Verification and validation in the software development process, Software testing process, Workbench skills

Software Testing Process: Access Project Management Development Estimate and status, Test Plan, Requirement Phase Testing, Design Phase Testing ,Program Phase Testing, Execute Test and record results, Acceptance Test ,Report Test results, Testing Software Installation, Test Software Change, Evaluate Test Effectiveness

Testing Specialized Systems and Application: Client/Server Systems, RAD, System Documentation, Web based systems, Off-the self Software ,Multi platform environment,

Security, Data Warehouse

Building Test Document: Uses, types, Responsibility, Storage, Test plan documentation, Test analysis report documentation.

TEXT BOOKS

- W. E. PERRY," Effective Methods For Software Testing", John Wiley
- KANER C., NGUYEN H.,FALK J.," Testing computer Software", John Wiley

REFERENCES

- Boris Beizer, " Software Testing Techniques", Dreamtech
- Louise Tamres, " Introducing Software Testing", Pearson Education

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

COMPUTER ENGINEERING

FINAL YEAR (SEMISTER – VIII)

SUBJECT: PROJECT - B

Tutorial: 6 Hrs per week	**Term Work : 25 Marks** **Oral : 25 Marks**

GUIDELINES

Project-B exam be conducted by two examiners appointed by university. Students have to give demonstration and seminar on the project-B for the term work marks. All the students of the class must attend all the seminars. Seminars should be conducted continuously for couple of days.

Project -B should contain:

- Introduction and motivation, problem statement, requirement analysis, Project design, Implementation details, Technologies used, Test cases, Project time line, Task distribution, References, and Appendix consisting of user's manual, technical reference manual.
- CD containing: Project documentation, Implementation code, required utilities, Software's and Manuals.
- Every student must prepare well formatted, printed and hard bound report.

Internal guide has to interact at least once in fortnight and maintain the progress and attendance report during the term.

Make sure that external project guides are BE graduates.

Convener should make sure that external examiners are appointed from the list as per appropriate technical area.