

B.E. Sem.VII – [CMPN]
Advanced Microprocessors

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

- 1. Overview of new generation of modern microprocessors.**
- 2. 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 Prediction Logic
- 3. Study of Pentium Family of Processors :**
Pentium I, Pentium II, Pentium III, Pentium IV, Pentium V: Architectural features, Comparative study
- 4. Advanced RISC Microprocessors :**
Overview of RISC Development and current systems, Alpha AXP Architecture, Alpha AXP Implementations & Applications.
- 5. Study of Sun SPARC Family :**
SPARC Architecture, The Super SPARC, SPARC Implementations & Applications.
- 6. Standard for Bus Architecture and Ports :**
EISA, VESA, PCI, SCSI, PCMCIA Cards & Slots, ATA, ATAPI, LPT, USB, AGP, RAID.
- 7. System Architectures for Desktop and Server based systems :**
Study of memory subsystems and I/O subsystems. Integration issues



B.E. Sem.VII [CMPN/INFT]
Computer Simulation and Modeling

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

1. **Introduction to Simulation:** System and System environment, Components of system, Type of systems, Type of models, Steps in simulation study, Advantages and Disadvantages of simulation.
2. **Simulation Examples:** Simulation of Queueing systems, Other examples of simulation.
3. **General Principles:** Concepts of discrete event simulation, List processing,
4. **Simulation Software:** History of simulation software, Desirable software features, General-purpose simulation packages, Object oriented simulation, Trends in simulation software.
5. **Statistical Models in Simulation:** Useful statistical model, Discrete distribution, Continuous distribution, Poisson process, Empirical distribution.
6. **Queueing Models:** Characteristics of Queueing systems, Queueing notations, 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.
7. **Random Number Generation:** Properties of random numbers, Generation of pseudo random numbers, Techniques for generating random numbers, Tests for random numbers.
8. **Random Variate Generation:** Inverse transform technique, Convolution method, Acceptance rejection techniques
9. **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.
10. **Verification and Validation of Simulation Model:** Model building, Verification, and Validation, Verification of simulation models, Calibration and Validation of models.
11. **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.
12. **Comparison and Evaluation of Alternative System Design:** Comparison of two system design, Comparison of several system design, Meta modeling, Optimization via simulation.
13. **Case Studies:** Simulation of manufacturing systems, Simulation of computer systems, Simulation of super market, Simulation of pert network.



B.E. Sem.VII – [CMPN]
Digital Signal Processing

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

- 1. Discrete Time Signals & System:** Discrete-time signals, Discrete-time systems, Analysis of discrete-time LTI systems, Discrete-time systems described by differential equations, Implementation of discrete-time systems, Correlation of discrete-time systems
- 2. Z-Transform :** Definition and Properties of Z-transform, Rational Z-transforms, Inverse Z-transform, one-sided Z-transform, Analysis of LTI systems in Z-domain
- 3. Frequency Analysis of Signals and Systems :** Frequency analysis: Continuous time signals and Discrete-time signals, Properties of the Fourier transform for discrete-time signals, Frequency domain characteristics of LTI systems, LTI system as a frequency selective filter, Inverse systems and deconvolution.
- 4. Discrete Fourier Transform :** Frequency domain sampling, Properties of DFT, Linear filtering method based on DFT, Frequency analysis of signals using DFT, FFT algorithm, Applications of FFT, Goertzel algorithm, Quantisation effects in the computation of DFT
- 5. Implementation of Discrete Time Systems:** Structure of FIR systems, Structure of IIR systems, quantization of filter coefficients, round-off effects in digital filters
- 6. Design of Digital Filters:** Design of FIR filters, Design of IIR filters from analog filters, frequency transformations, Design of digital filters based on least-squares method digital filters from analogue filters, Properties of FIR digital filters, Design of FIR filters using windows, Comparison of IIR and FIR filters, and Linear phase filters.
- 7. Introduction to DSP Co-processors :** TMS 320C40/50, Analog Devices.
- 8. Applications :** Image processing, Control, Speech, Audio, Telecommunication



B.E. Sem.VII – [CMPN/INFT]
Embedded Systems

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

- 1. 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.
- 2. 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.
- 3. 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.
- 4. Hardware for embedded systems:** Various interface standards, Various methods of interfacing, Parallel I/O interface, Blind counting synchronization and Gadget Busy waiting, Parallel port interfacing with switches, keypads and display units, Memory and high speed interfacing, Interfacing of data acquisition systems, Interfacing of controllers, Serial communication interface, Implementation of above concepts using C language.
- 5. 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, Implementation of above concepts using C language.
- 6. Case studies and Applications of embedded systems:** Applications to: Communication, Networking, Database, Process Control, Case Studies of: Digital Camera, Network Router, RTLinux.



B.E. Sem.VII – [CMPN]
Image Processing

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
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Oral : 25 Marks

1. **Introduction to Computer Graphics:** Geometry and line generation, Graphics primitives, Transformations
2. **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
3. **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.
4. **Image Enhancement in the Spatial Domain:** Gray level transformations, Histogram processing, Arithmetic and logic operations, Spatial filtering: Introduction, Smoothing and sharpening filters
5. **Image Enhancement in the Frequency Domain:** Frequency domain filters: Smoothing and Sharpening filters, Homomorphic filtering
6. **Wavelets and Multiresolution 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
7. **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.
8. **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
9. **Image Segmentation:** Detection of discontinuities, Edge linking and Boundary detection, Thresholding, Region based segmentation
10. **Image Representation and Description:** Representation schemes, Boundary descriptors, Regional descriptors



B.E. Sem.VII – [CMPN]
Intelligent Systems

SYLLABUS

Time : 3 Hrs.

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- 1. Artificial Intelligence:** An overview, Intelligent Systems: Evolution of the concept.
- 2. Intelligent Agents:** How agent should act, Structure of intelligent agents, Environments.
- 3. Problem Solving:** Solving problems by searching, Informed search methods, Game playing.
- 4. Knowledge and Reasoning:** A knowledge based agent, The wumpus world environment, Representation, Reasoning, Logic, Proportional logic, First order logic: Syntax and Semantics, Extensions and Notational variation, Using first order logic
- 5. Building a Knowledge Base:** Properties of good and bad knowledge base, Knowledge engineering, General ontology
- 6. Interfacing First Order Logic:** Interface rules involving quantifiers, An example proof, Forward and backward chaining, Completeness.
- 7. Acting Logically:** Planning, Practical planning: Practical planners, Hierarchical decomposition, Conditional planning
- 8. Uncertain Knowledge and Reasoning:** Uncertainty, Representing knowledge in an uncertain domain, The semantics of belief networks, Inference in belief networks
- 9. Learning:** Learning from observations: General model of learning agents, Inductive learning, learning decision trees, Learning in neural and belief networks: Introduction to neural networks, Perceptrons, Multilayer feed-forward network, Application of ANN, Reinforcement learning: Passive learning in a known environment, Generalization in reinforcement learning, Genetic algorithms.
- 10. Agents that Communicate:** Communication as action, Types of communicating agents, A formal grammar for a subset of English.
- 11. Expert system:** Introduction to expert system, Representing and using domain knowledge, Expert system shells, Explanation, Knowledge acquisition.
- 12. Applications:** Natural language processing, Perception, Robotics.



B.E. Sem.VII [CMPN/INFT]
Mobile Computing

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- 1. Introduction:** Applications, A short history of wireless communication
- 2. Wireless Transmission:** Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems.
- 3. Medium Access Control:** Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SDMA, FDMA, TDMA: 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; CDMA: Spread Aloha multiple access.
- 4. 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
- 5. Satellite Systems:** History, Applications, Basics: GEO, LEO, MEO; Routing, Localization, Handover, Examples
- 6. Broadcast Systems:** Overview, Cyclic repetition of data, Digital audio broadcasting: Multimedia object transfer protocol; Digital video broadcasting
- 7. 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. Sublayer, Medium access control Sublayer, Information bases And Networking; Bluetooth: User scenarios, Physical layer, MAC layer, Networking. Security, Link management.
- 8. 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
- 9. 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
- 10. Mobile Transport Layer:** Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP
- 11. Support for Mobility:** File systems: Consistency, Examples; World Wide Web: Hypertext transfer protocol, Hypertext markup language, Some approaches that 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 application, Examples Stacks with Wap, Mobile databases, Mobile agents.



BE. Sem.VII [CMPN]
Software Engineering

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
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Oral : 25 Marks

1. **Product:** Evolving role of software, Software Characteristics, Software Applications, Software myths.
2. **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.
3. **Project Management:** Management spectrum, People, Product, Process, Project, W⁵HH principle.
4. **Software Process and Project Metrics:** Measures-Metrics-Indicators, Metrics in the process and project domains, Software measurement, Metrics for software quality, Integrating metrics within the software engineering process, Statistical quality control, Metrics for small organizations, Establishing a software metrics program.
5. **Software Project Planning:** Objectives, Software scope, Resources, Software project estimation, Decomposition techniques, Empirical estimation models, Make/Buy decision, Automated estimation tools.
6. **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.
7. **Project Scheduling and Tracking:** Basic concepts, Relationship between people and effort, Defining a task set for the software project, Selecting software Engineering tasks, Refinement of major tasks, Defining a task network, Scheduling, Earned value network, Error tracking, Project plan.
8. **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.
9. **Software Configuration Management:** Introduction, SCM process, Identification of objects in the software configuration, Version control, Change control, Configuration audit, Status reporting, SCM standards.
10. **System Engineering:** Computer-based systems, System engineering hierarchy, Business process engineering, product engineering, Requirements engineering, System modeling.
11. **Analysis Concepts and Principles:** Requirement Analysis, Requirement elicitation for software, Analysis principles, Software prototyping, Specification.
12. **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.
13. **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.
14. **Architectural Design:** Software architecture, Data design, Architectural styles, Analyzing alternative architectural designs, Mapping requirements into a software architecture, Transform mapping, Transaction mapping, Refining architectural design.
15. **User Interface Design:** The golden rules, User interface design, Task analysis and modeling, Interface design activities, Implementation tools, Design evaluation.
16. **Component-Level Design:** Structured programming, Comparison of design notation.
17. **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.
18. **Software Testing Strategies:** Strategic approach to software testing, Strategic issues, Unit testing, Integration testing, Validation testing, System testing, Art of debugging.
19. **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.

