77CT-1 OPERATING SYSTEMS

Unit-I:
Introduction basic h/w support necessary for modem operating system- Services provided by OS, system programs and system call- brief discussions of evolution of OS – real time and distributed systems: a brief overview of issues.

Unit- II:
File system, user interface – disk space management and space allocation strategies – examples from UNIX, DOS, Windows etc – directory structures – disk caching – file system consistency and logs- disk arm scheduling strategies. Disk and Drum scheduling, physical characteristics, FCFS scheduling, SSTF scheduling, SCAN, CSCAN, Selecting a disk scheduling algorithm, sector queuing.

Unit III:
Processors and 3 levels of scheduling- process control block and context switch- goals of scheduling and different scheduling algorithms – threads: user level and kernel level.
Process cooperation and synchronization, mutual exclusion and implementation, semaphores, conditional critical regions and monitors- classical inter – process communication problems – message passing.

Unit IV:
CPU Scheduling : Review of multiprogramming, concepts, scheduling concepts, scheduling algorithms, algorithm evaluation, multiple processor scheduling.

Unit V:
Memory management techniques- contiguous and non-contiguous- paging and segmentation-translation look aside buffers (TLB) and overheads- virtual memory and demand paging page faults and instruction restart – problems of large address spaces – page replacement algorithms and working sets- miscellaneous issues.

Unit VI:
Deadlocks and strategies for handling them – protection and security issues – access lists, capabilities and cryptographic techniques – introduction to distributed systems.
Protection and Security : Goal of Protection, Mechanism and policies, domain of protection, access matrix, implementation of access matrix, dynamic protection structures, revocation, existing systems, language based protection, protection problems security.

Text Books:

1. Modern Operating System by Tanenbaum, Pearson Edn, 2nd Edition.
2. Operating System Concepts by Siberchatz & Galvin, Addision Weslay, 2nd Edition.
3. Operating System Concepts & Design by Milan Milenkovic (TMH)

77CT-2 DATABASE MANAGEMENT SYSTEMS

Unit I:

Drawback of a general file processing system, data Processing through COBOL, Basic concepts of a Database system, Architecture of a database system, Data structures and corresponding operators. The Hierarchical Approach to DBMS to IMS,. IMS data structure, External level to IMS, IMS, Data manipulation, defining PCB, DL/1, Operations, Construction SSA and SSA Command Codes.

The Network Approach to DBMS : Architecture to DBTG Systems, DBTG data structures, Hierarchical and Network Set Constructs, Singular Sets, Membership Classes and set selections.

Unit II:

Entity-Relationship Model: Entities and Entity Sets, Relationships and Relationship Sets, Attributes, Mapping Constraints, Keys, Entity Relationship Diagram, Reducing E-R Diagram to Tables, Generalization, Aggregation, Design of an E-R Database Scheme.

Relation Model: Structure of Relational Databases, The Relational Algebra, The Tuple Relational Calculus, The domain Relational Calculus, Modifying the database, Views.

Unit III:

Relational Commercial Languages: SQL, Query-by-Example, QUEL, Symmary, Integrity constraints: Domain Constraints, Referential Integrity, Function Dependies, Assertions and Triggers.

Unit-IV:

Relational Database Design : Pitfalls in Relational Database Design, Normalisation using Functional Dependencies, Normalisation using Multivalued Dependencies, Normalisation Using Join Dependencies, Domain-Key Normal Form, Alternative Approaches to Database design.

Indexing and Hashing: Basic Concepts, Indexing, b+ Tree Index Files, B-Index Files,. Static Hash Functions, Comparison of Indexing and Hashing Index Definition in SQL, Multiple-key Access.

Unit V:

Query Processing : Query Interpretation, Equivalence of Expressions, Estimation of Query Processing Cost, Estimation of Cost of Access using Indices, Join Strategies, Join Strategies for Parallel Processors, Structure of a Query Optimiser. Crash Recovery: Failure Classification, The Storage Hierarchy, Transaction Model, Log Based Recovery, Buffer Management, Checkpoints, Shadow Paging, Failure With Loss of non-volatile Storage, Stable Storage Implementation.

Concurrency Control : Schedules, Testing of Serializability, Lock-based Protocols, Time Stamp Based Protocols, Validation Techniques, Multiple Granularity, Multiversion Schemes, Insert and Delete Operations.

Unit VI:

Database System Architectures and Distributed Databases: Centralized Systems, Client/Server Systems, Parallel Systems, Distributed data strorage, Network transparency, Distributed query processing, Distributed transaction model, Comimit Protocols, Concurrency controls, Deadlock handling, Multidatabase Systems.

Text Books:

1. Database System Concepts : Korth, Silberschatz : Mcgraw-Hill
2. Database Management System : Majumdar & Bhattacharya
3. Principles of Databases : Jeffrey D. Ullman
4. An Introduction To Database Systems : C.J.Date (Adison Wesley- Nerosa)

77CT-3 COMPUTER NETWORKS

Unit I :

Introduction: The use of Computer Network-Network Goals, LANs, WANs, Wireless network, Internetworks, Network software, Protocols Hierarchies, Design issues for layers, Interfaces & Services, CO & CL services, service primitives, relationship of services to protocol, OSI Reference Model, TCP/IP reference mode, Example networks-Novell Netware, Internet, X.25.

Unit II :

The Physical Layer: The theoretical basis of data communication-Fourier Analysis, Bandwidth-limited signals. The maximum data rate of a channel. Transmission Media-magnetic media, Twisted-pair, Baseband Coaxial Cable, Broad-band coaxial cable, fibre optics. Line of Sight transmission, Communication satellites. Analog Transmission, tree Telephone System, Modems, RS-232C & RS-449.

The Medium Access Sublayer: Local and Metropolitan Area's Networks Static Channel allocation in LAN's and MAN'S Dynamic channel allocation in LAN's and MAN'S Network Protocols-persistent and Non Persistent CSMA, CSMA with collision detection. Collision free protocol. BRAP- Broadcast Recognition with alternating priorities. MLMA-The Multi-level Multi-access protocol, binary countdown. Limited-connection protocol. The adaptive tree walk protocol. IEEE standard 802 for local area network-IEEE standard 802.3 and Ethernet, IEEE standard 802.4 token bus, IEEE standard 802.5t token ring, comparison of local area networks, FDDI, Wireless LAN-802.11.

Unit III :

The Data Link Layer :data link layer issues-services provided to the network Layer, Framing Error Control, Flow Control, Link Management, error detection and Correction-Error-Correcting Codes, error-detecting codes. Elementary data link protocols-An Unrestricted simplex. Protocol, A simple stop and wait protocol, A simplex protocol for a noisy channel, Sliding window protocols- A one bit sliding window protocol, A protocol using Go Back N, A protocol using selective repeat Protocol performance-performance of the sop and wait protocol. Performance of the sliding window protocol. Example of the data link layer- the data layer in public networks-the data link layer in the Internet.

Unit IV :

The Network Layer: Network Layer design issues-services provided to the transport layer, Internal organization of the network layer, Routing Congestion, Internetworking, Routing Algorithms, Congestion-Control algorithms, Preallocation of buffers. Packet discarding, Isarithmic, Congestion control, flow control, Choke packets, deadlocks. Examples of the network layer- The network layer in public networks, The network layer in the Internet.

Unit V :

The Transport Layer: Transport layer design issues-services provided to the session layer, quality of services, the OSI transport service primitives, transport protocol, elements of transport protocols, addressing, establishing connection, releasing connection, flow control and buffering, multiplexing, crash recovery, examples of transport layer, transmission Control Protocol TCP).

Unit VI:

The Presentation Layer: Presentation layer design issues-Data representation, text Compression, Network security and privacy. The OSI presentation. Service primitives. Substitution Ciphers, Transposition Ciphers, Public Key Encryption, Secrecy and Digital Signature with Public Key encryption.

Text Books:

1. Computer Networks – Second & Third Edition by Andrw Tananbaum (PHI)
2. Data & Computer Communication – Sixth Edition by William Stallings (PHI)

77CT-4 (ELECTIVE-I) ADVANCED COMPUTER ARCHITECTURE

Unit-I :

INTRODUCTION TO PARALLEL PROCESSING: Evolution of Computer System, generations of Computer System, Trends towards Parallel Processing, in Uniprocessor System, Basic Uniprocessor Architecture, Balancing of Subsystem Bandwidth, Multiprogramming and Time sharing, Parallel Computer Structures, Pipeline Computers, Array Computers, Multiprocessor systems, Performance of Parallel Computers.

Unit-II:

INTRODUCTION TO DATA & INFORMATION:-

Dataflow and New concepts, Architecture classification schemes. Multiplicity of Instruction-Data streams, Serial versus Parallel Processing, Parallelism versus Pipelining, Parallel Processing Applications. Predictive Modeling and Simulations, Engineering Design and Automation, Energy Simulations, Engineering Design and Automation, Energy Resources Exploration, Medical, Military, and Basic Research.

Unit-III:

MEMORY : Hierarchical Memory Structures, Memory Hierarchy, optimization of Memory Hierarchy, Addressing Schemes for Main Memory, Virtual Memory system, The concept of virtual memory, paged. memory system, segmented memory system, memory with page , memory allocation and managements, classification of memory policies, optimal load control, memory management policies, cache memories and management, characteristics of cache memories, cache memory organization, fetch and main memory update policies, block replacement policies.

INPUT-OUTPUT SUBSYSTEMS: input- output subsystem characteristics, I/O subsystem, interrupt mechanisms and special hardware, I/O processors and I/O channels.

Unit V:

PRINCIPLES of PIPELINING AND VECTOR PROCESSING : Pipelining, An overlapped Parallelism, Principles of Linear Pipelining, Classification of Pipeline Processors, General Pipelines and Reservation Tables, Interleaved Memory, Organizations, Instruction and arithmetic pipelines, design of pipelined mulitifunction and array pipelines.

PIPELINE COMPUTERS AND VECTORIZATION METHOD: The space of pipelined computers, vector supercomputers, scientific attached processors, early vector processors, architectures of star-100 and TI-ASC vector processing in streaming mode, recent chaining and vector loops, the architecture of cyber-205. vector processing in cyver-205 and CDC-NASF, Fujitsue VP-200 special features.

Unit VI:

STRUCTURES AND ALGORITHMS FOR ARRAY PROCESSORS:

SIMD array processors SIMD computer organization masking and data routing mechanisms, Interprocessor. communications, SIMD inter connection Illiac network.Static versus dynamic networks, Mesh-connected Illiac networks, cub inter connection network, Barrel shiftier and data manipulator, shuffle-exchange and omega networks parallel algorithms for array processors, SIM matrix multiplication , parallel sorting on array processing, SIMD fast fourier transform, connection Issues for SIMS processing, associative array processing, associative memory organization, associative processors (and STARAN)

Unit VI:

MULTIPROCESSOR ARCHITECTURE AND PROGRAMMING: Functional Structures, Loosely coupled multiprocessors. processor characteristics for multiprocessing, interconnection networks, time shared or common buses, crossbar switch and multiport memories, multistage networks for multiprocessors, parallel memory organization, interleaved memory configurations, multicache problems and solutions. Multiprocessor operating systems. Classification of multiprocessor operating systems. Operating system, requirements, exploiting concurrency for multiprocessing language features to exploit parallelism, detection of parallelism in programs.

Text Books:

1. Computer Architecture & Parallel processing by Hwang & Briggs.

77CT-4 (ELECTIVE-I) EMBEDDED SYSTEMS

Unit – I:
Introduction: Definitions of embedded system, Real time operating Systems and embedded computing platform. Applications of embedded system. Debugging tools: Use of assemblers, debugger kernels. Difference between compiler, interpreters & macros.

Unit-II:
Study and use of simulators, Embedded system design: Hardware and software design, co-design, I/O interface co-design for distributed systems. EPROM emulator: A mucro controller architecture.

Unit-III
Real Time Environment : Real time I/O, R/T Multitasking and multithreading, processes, O/S, real time scheduling policies, Events, Memory management.

Unit-IV:
Embedded software development tools & debugging technologies, Host & Target machines, Linker/Loader for embedded software, getting embedded software into target systems.

UNIT-V:
Architecture of micro controller 8051: Introduction, architecture , memory organization, Pin definition and functions, timing, parallel, ports, Timers/Counter, serial port interrupt systems.

Unit VI
Interfacing 8051 with analog circuits, digital circuits and personal computer, Instruction set & programming 8051. Networking : Routing interfacing with OS. Wireless Communication Protocols, Queuing model for networking traffic management, Routing methodologies.

Text Books:

1. An Embedded Software Primer by David E. Simon (Person Edu. Asia)
2. Embedded system design with 8051 micro controller" by Zdravko Karakehayov & Winther
3. "Computers as Components: Principles Embedded Computing System Design " By W.Wolf.

Reference Books:

1. "Real-time systems: Design principles for Distributed Embedded Applications " by H.Kopetz.
2. "Embedded System design " by Krishna & Shinn.

77CT-4 (ELECTIVE-I) DIGITAL SIGNAL PROCESSING

Unit- I:
Discrete time signals and systems, linearity, time-variance, causality, stability properties of LTI casual system, response of LTI systems to various inputs, convolution, sampling theorem.

Unit –II:
Frequency domain description of signals & Systems. Fourier transform of discrete time signals, properties of DFT, DFTs of typical discrete time signals.

Unit-III:
the Z-transform, properties ROC's relation with fourier transform, system function, inverse Z-transform, solution of difference equation using unilateral Z-transform.

Unit IV:
Digital filter design techniques: design of FIR filters based on windows, design of IIR digital filters from analog filters.

Unit V:
The discrete Fourier transforms: It's properties and computation, properties of the DFT, Efficient computation of the DFT.

Unit VI:
Introduction of FFT algorithms: decimation in time – FFT algorithms, Decimation in frequency – FFT algorithms, DCT.

Text Books:

1. Digital Signal Processing: Alen V. Oppenheim W. Schaffer (PHI)
2. Digital Signal Processing: Proskies and Monalkies (PHI)

Reference Books:

1. Theory and Applications of Signal Processing by Rabiner * Gold (PHI)
2. Digital Filer Design and Analysis by Andreas Antoniou, Tata McGraw Hill.

77CT-5 (ELECTIVE-II) ARTIFICIAL INTELLIGENCE

Unit I:

Introduction to AI : definition of AI, early work in AI, the importance of AI, AI and related fields, task domains of AI, physical symbol system and it's hypothesis, AI technique, Turing test, Knowledge and knowledge based systems.

Unit II:

Problems, problem spaces and search: defining the problem on a state space search, production systems and control strategies, depth first and breadth first search, backtracking, problem characteristics, issues in the design of search programs. Heuristic search techniques: generate and test, hill climbing, best-first search, problem reduction, constraint satisfaction, means-ends analysis.

Unit III:

Knowledge Representation : Issues, representation and mapping approaches, introduction to proposition logic, knowledge representation using predicate logic, unification and resolution. Representing knowledge using rules, procedural Vs declarative knowledge, logic programming, forward Vs backward reasoning, matching, control knowledge.

Unit IV:

Knowledge representation using semantic nets, frames, conceptual dependency and scripts.

Statistical reasoning : Probability and Bayes' theorem, certainty factors and rule-based systems, introduction to fuzzy logic.

Unit V:

Learning : General learning model, types of learning, rote learning learning by taking advice, learning by analogy, induction learning, learning by observation and discovery.

Expert Systems: Rule based system architectures, non-production system architecture, expert system shell, knowledge acquisitions and validation, knowledge system building tools.

Unit VI :

Natural Language Processing : Overview of linguistics, syntactic processing, semantic analysis, discourse and pragmatic processing.

Game Playing: the minimax search procedure, adding alpha-beta cutoffs.

Text Book:

1. Artificial Intelligence by E.Rich & K. Knight (Tata McGraw Hill)
2. Introduction to Artificial Intelligence & Expert System by D.W. Patterson (PHI)
3. Principles of Artificial Intelligence by N.J. Nilsson (Narosa)

77CT- 5 (ELECTIVE-II) NEURAL NETWORKS AND FUZZY SYSTEM

Unit I :
Fundamental Concepts and Models of Artificial Neural Systems : Bilogical Neurons and Their Artificial Models, Models of Artificial Neural Networks, Learning and Adaptation, Neural Network Learning Rules, Overview of Neural Networks.

Unit II:
Single-Layer Perceptron Classifiers: Discriminant Functions, Linear Machine and Minimum Distance Classification, Training and Classification using the Discrete Perceptron: Algorithm and Example, Single Layer Continuous Perceptron Networks for Linearly Separable Classifications.

Unit III:
Multiplayer Feedback Networks: Linearly Non-separable Pattern Classification, Delta Learning Rule, Feedforward Recall and error Back-Propagation Training, Learning factors, Classifying and expert Layered Networks, Functional Link Networks.

Unit IV:
From Classical (CRISP) Sets to Fuzzy sets: Introduction, Crisp Sets: An overview, Fuzzy sets: Basic Types, Fuzzy sets: Basic Concepts, characteristics and significant of the Paradigm shift.
Fuzzy sets versus Crisp sets: Additional properties of $\propto$ - cuts, Representation of Fuzzy sets, Extension Principles for Fuzzy sets.

Unit V:
Operations of Fuzzy sets: Types of Operations, Fuzzy complements, Fuzzy Intersections: t-norms, Fuzzy Unions: t-Conorms, Combinations of operations, Aggregation Operations.

Unit VI:
Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic, Operations on Intervals and Arithmetic Operations on Fuzzy Numbers, Lattice Fuzzy Numbers and Fuzzy Equations.

Text Books:

1. Introduction to Artificial Neural Systems by J.M. Zurada, Jaico Publishing House, India
2. Fuzzy Sets and Fuzzy Logic, Theory and application by George J. Klir and Bo Yuan , PHI

77CT-5 (ELECTIVE-II) DIGITAL IMAGE PROCESSING

Unit – I:
Introduction :- Digital Image Processing : Problems and Applications, Image Representation and Modelling, Image Enhancement, Image Restoration.

Unit II:
Image Perception :- Light Luminance, Brightness and Contrast, Simultaneous Contrast, Mach Bands, The visibility function, Monochrome Vision Models, Color representation, Color Vision Model, Temporal Properties of Vision.

Unit III:
Image Sampling and Quantisation :- Introduction, Two – Dimensional Sampling Theory, Practical Limitations in Sampling and Reconstruction, Image Quantisation.

Unit IV:
Image Transforms :- Two – Dimensional Orthogonal and Unitary Transforms, Properties of Unitary transforms, The One Dimensional DFT. The Cosine Transform, The Sine Transform, The Handamard Transform.

Unit V:
Image Enhancement :- Point Operation, Histogram Modeling, Spatial Operations, Transform Operation, Multispectral Image Enhancement, False Color and Pseudocolor, Color Image Enhancement.

Unit VI:
Image Filtering and Restoration :- Image observation Models, Inverse and Wiener Filtering, Finite Impulse Response (FIR) Wiener Filters, Other Fourier Domain Filters, Filtering Using Image transforms.

Text Books :-

1. Fundamentals of Digital Image Processing, by Anil K. Jain, Prentice Hall of India Pvt. Ltd. – 1989
2. Digital Image Processing by R.C. Gonzalez, R.E. Woods (Addison Wesley Pub.)

Reference books:

1. Fundamental of Electronics Image Processing by A.R. Weeks