

Detailed Syllabus-Sem: 1st & 2nd Common Papers
Interactive Computer Graphics
Code: MT 11
UNIT 1: INTRODUCTION

Definition, Application areas of Computer graphics, Graphical user interface, Cathod ray tubes.

RANDOM & RASTER DISPLAYS

Random scan displays, Raster scan displays (with introduction to flickering, interlacing, American standard video etc),

HARDWARE

Color CRT monitors, Flat panel displays (Plasma Panels, Liquid crystal displays, Electroluminescent displays), Graphics software (GKS, PHIGS), Color Models (RGB, CMYK, HSV, Lookup tables etc.)

UNIT 2: RASTER GRAPHICS ALGORITHMS

Raster Graphics Algorithms: Line drawing algorithms (DDA, Bresenham's algo), Circle and Ellipse drawing algorithms

2-D TRANSFORMATIONS

2-D Transformations and Projections: Transformations (Rotation, Reflection, shearing, scaling), Homogeneous coordinate representation, Translation.

UNIT 3: 3-D TRANSFORMATIONS

3-D Transformations: Transformations (Rotation, Reflection, shearing, scaling), Homogeneous coordinate representation, Translation.

3-D PROJECTIONS

Projection classification, Parallel projections, Perspective projections (One point, Two).

UNIT 4: CLIPPING

Two dimensional Clipping, Viewing pipeline, window and viewport, Sutherland Cohen sub division algorithm, Cyrus-beck algorithm,

VISIBLE SURFACE DETECTION METHODS

Classification of visible surface detection algorithm, Backface algorithm,, Depth sorting method, Area subdivision method etc.

SUGGESTED READINGS :

1. Donald Hearn and M. Pauline Baker : Computer Graphics, PHI Publications.
2. Plastock : Theory & Problem of Computer Gaphics, Schaum Series.
3. Foley & Van Dam : Fundamentals of Interactive Computer Graphics, Addison-Wesley.
4. Newman : Principles of Interactive Computer Graphics, McGraw Hill.
5. Tosijas, L.K. : Computer Graphics, Springer-Verle

Subject: Advanced Computer Architecture
Code: MT 12
SECTION A
Overview: Register and bus organized computers and instruction execution. Output, input memory and control organization. Hard-wired and Micro- programmed control.

Processor Organization: General structure of CPU-registers, stacks, ALU and control units, Instruction types, formats, sets and addressing modes. Basic mathematical operations- fixed-point addition, subtraction, multiplication and division. Implementation of fixed-point operations and ALU design. F. P. operations & their implementation. H.W. fast addition, multiplication and division. Principles of array and pipelined processors.

SECTION B
Design of Controller: Principles of instruction decoding and implementation, Hard-wired and micro instruction based control units. Horizontal & vertical classes of micro instructions, Nano-program control. Identifying micro instructions, minimizing micro instruction size, parallelism in micro instructions.Organizati on of Micro-program based control unit. Concepts of RISC & CISC processors.

SECTION C
Memory Organization: Types of memories-serial access, random access and semi-random access, core, semiconductor and bubble memories, memory device characteristics-density, speed, access time, costs, destructive non-destructive read out, static memories, dynamic memories and memory refresh. Word length and size of memory, memory expansion. Fixed &

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variable length word organization of Memories. Main memory, memory hierarchy, memory references, address mapping, relocation mechanism, concepts of memory compaction, principles of virtual memory, segmentation and paging.

SECTION D

Interleaved memories and principles of address interleaving. Associative memories- word organized associative memory, masking. Hardware protection features in multi-programmed systems.

System Organisation: Communication: Introduction, Bus control, Computer Networks.

Input-Output systems: Programmed I/O, DMA, Interrupt control, I/O processors.

Operating Systems : Introduction, concurrency control, system management.

Parallel Processing: Introduction types of parallel processors, performance considerations, pipelined.

References:

1. John.P.Hayes, Computer Architecture & Organization, McGrawHill Publisher
2. M.Morris Mano, Computer System Architecture, Prentice Hall of India.
3. Tauenbaum, Computer Organization & Architecture, Prentice Hall of India
4. Rafiquzzman-clandra, Modern Computer Architecture.
5. William Stalings, "Computer Organisation & Architecture", Addison Wesley.
6. Vincent P. Hevling, "Computer System Design & Architecture", Addison Wesley.
7. Hwang, K & F.A. Briggs, "Computer Architecture & Parallel Processing", Mhill
8. Patterson D.A & J.L. Hennessy, "Computer Architecture: A Quantative Approach" Morgan Kanfmann Publishers 1990.

Subject: Algorithm Analysis and Design
Code: MT 13
UNIT 1: TREES

Search Trees, AVL trees, threading:

STORAGE MANAGEMENT:

Run time storage management, garbage collection and compaction.

SORTING TECHNIQUES

Insertion sort, quick sort, merge sort, heap sort selection sort, radix sort, external sort; lower bound for sorting by compression of keys.

UNIT 2: SHORTEST SPANNING TECHNIQUES

Selection and adversely argument Traversal: minimum spanning tree.

SHORTEST PATH

Shortest path, graph component algorithms, String Matching KMP and Boyer Moore algorithms

UNIT 3: GREEDY ALGORITHMS:

Greedy Algorithms: Activity selection, Huffman coding, and task scheduling problem.

DYNAMIC PROGRAMMING

Matrix multiplication and optional binary search tree algorithms.

UNIT 4: NP COMPLETE PROBLEM

Complexity classes P and NP; examples of problems in the NP class.

PARALLEL ALGORITHMS

Parallelism, PRAM and other models, Parallel algorithms finding, maximum element in a list, merging and sorting.

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Subject: Advanced DBMS
Code: MT 14
Unit1 Introduction

Introduction, History, Database models, Flat Model, Hierarchical Model, Network Model, Relational Model, Relational Operations, Normal Forms, First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form, Fourth Normal Form, Domain/Key Normal Form, Dimensional Model, Object Database Models, Post-relational Database Models, Database Internals, Indexing, Transactions and Concurrency, Replication.

Query Processing

Introduction, Query Optimizer, Query Plan, Implementation, Heuristics of Query Optimizations, Equivalence of Expressions, Selection Operation, Projection Operation, Natural Join Operation, Join Ordering, Query Planning for Nested SQL queries, Cost Estimation, Measuring Index Selectivity, Index Selectivity, How to Measure Index Selectivity?, Manually measure index selectivity, How to choose Composite Indexes?, Guidelines for choosing columns for composite indexes, Join Strategies for Parallel Processors, Parallel-Join, Pipelined Multi-way Join, Physical Organization, Database Tuning, Efficient SELECT statements, Optimizing SQL Query Processing, Introduction, Query Processing, Query Optimizing, Indexes, Selectivity, Uniformity, Disjunctive Clauses, Join Selectivity, Views.

Advanced Data Management Systems

Introduction, Data Collection, Data Management Functions, Database Design & Creation, Information & Data Retrieval, The Evolution of Data Management Systems, Administrative Database Management Systems, Text-based Information Retrieval Systems, Image Retrieval Systems, Multiple Media Information Retrieval Systems, MIRS, Management of Web Databases, W-DBM.

Unit 2 Advanced Data Modeling

Introduction, A Brief History, Concepts & Components, Methodology, Graphic vs. Declarative Data Models, Model Types: Relational, Entity-Relationship, Object-Oriented, A Structural Semantic Data Model - SSM, SSM Concepts, Entity Types, Relationship Types, Attribute Types, Domain Specification, Cardinality Specifications, Data Value Constraints, SSM Syntax, Translation to Relational Constructs, Modeling Multiple Media Data Collections Metadata, Metadata for Multimedia, Semantic Metadata, Context Metadata, Structural Metadata, Standards for Metadata Specification, Dublin Core, MPEG-7, CIDOC-CRM, Multiple Media Documents, Characteristics of Text Documents, Characteristics of Images, Modeling Multimedia Collections in SSM.

SQL 3 – Querying Complex Objects

Introduction, Database Query Language, New Features in SQL3, Accessing Hierarchies, Accessing Multi-Valued s, Utilizing User Defined Data Types (UDT), Accessing Large Objects, Result Presentation, An example SQL3 query, Query Optimization, Text Retrieval Using SQL3/TextRetrieval, Text Document Retrieval, Retrieval using Context Metadata, Text Retrieval by Semantic Content, Result Presentation, Ordering Query Results – Ranking, Measuring Retrieval Quality - Recall and Precision, Image Retrieval, Using Extended SQL3 for Image Retrieval, Attribute-Based Image Retrieval Text-Based Image Retrieval, Query by Image Content, CBIR Using Content Descriptors; Color And Texture, Identifying Shapes - Image Objects, Streamed Image Retrieval – Video, Improving Result Quality.

Unit 3 Object Oriented Databases

Introduction, Query Processing in Object-Oriented Database Systems, Type System Encapsulation, Complex Objects and Inheritance, Object Models, Query Processing Architecture, Query Processing Methodology, Object - Relational Database Implementation, DB Components, DB Design, From Requirement Analysis to DB Specification, Schema Architecture, SQL3 DB specification, Complex s, Hierarchical s Relationships, Large Objects, LOBs, Storage of LOBs.

Data Warehouse & Data Mining

Introduction, History of Data Warehousing, Data Warehouse Architecture, Data Storage Methods, Advantages of using Data Warehouse, Introduction to Data Mining, Data dredging, Data Mining Functions, Classification, Associations, Sequential/Temporal patterns, Clustering/Segmentation, IBM - Market Basket Analysis example, Data Mining

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Techniques, Cluster Analysis, Induction, Decision Trees, Rule Induction, Neural Networks, On-line Analytical Processing, OLAP Example, Comparison of OLAP and OLTP, Data Visualization.

Unit 4 Fuzzy Dimension to Databases

Introduction, Uncertainty: A Modern Outlook, Fuzzy Sets: Basic Concepts, Introduction, Definition, Fuzzy Set Operators and Fuzzy Logic, Fuzzy Databases, Need for Fuzzy Databases, Techniques for implementation of Fuzziness in Databases, Classification of Data, Fuzz Querying to Relational Databases, The proposed model, Meta Knowledge Implementation, Realization of Fuzzy SQL.

Distributed Database Systems and Data Replication

Introduction, Clients, Servers and Nodes, Direct and Indirect Connections, Site Autonomy, Schema Objects and Naming in a Distributed Database, Database Links, Statements and Transactions in a Distributed Database, Remote and Distributed Statements, Remote and Distributed Transactions, Transparency in a Distributed Database System, Heterogeneous Distributed Database Systems, The Mechanics of a Heterogeneous Distributed Database, Data Replication, Availability Performance, Disconnected Computing, Network Load Reduction, Mass Deployment, Applications That Use Replication, Replication Objects, Groups, and Sites, Replication Objects, Replication Groups, Replication Sites, Types of Replication Environments, Multi - Master Replication, Materialized View Replication, Multi-Master and Materialized, View Hybrid Configurations, Other Options for Multi-Master Replication, Synchronous Replication, Procedural Replication, Conflict Detection and Procedural Replication.

Transaction Management in Distributed Database Management

Introduction Features of Distributed vs. Centralized Databases or Differences in Distributed & Centralized Databases, Centralized Control vs. Decentralized Control, Data Independence, Reduction of Redundancy, Complex Physical s and Efficient Access Integrity, Recovery and Concurrency Control, Privacy and Security, Distributed Query Processing, Distributed Directory (Catalog) Management, Relative Advantages of Distributed Databases over Centralized Databases: Organizational and Economic Reasons, Incremental Growth, Reduced Communication Overhead, Performance Considerations, Reliability and Availability, Management of Distributed Data with Different Levels of Transparency, Distribution or Network Transparency, Replication Transparency, Problem Areas of Distributed Databases of Distributed Database Management Systems, Transaction Processing Framework, Models of Failure, Two-Phase Commit Protocol, Recovery in Two-Phase Commit Protocol, Site Failures, Failure of Coordinator, Elimination of Prepare Message, Increasing Efficiency by Using Defaults, Remote Recovery Information Problem, Three-Phase Commit Protocol, Recovery in Three-Phase Commit Protocol, Site Failures, Failure of the Coordinator: Coordinator Failure Protocol Classification of Concurrency Control Techniques, Two-Phase Locking Algorithm, Concurrency Control (Serializability), Locking Protocols for Concurrency Control in Distributed Databases, Single-Lock-Manager Approach, Multiple Coordinators, Majority Protocol, Biased Protocol, Primary Copy, Concurrency Control Techniques, Timestamp-Based Algorithms, Conservative Timestamp Ordering Algorithm, Optimistic Algorithm, Deadlock Handling, Deadlock Prevention, Deadlock Detection, Centralized Deadlock Detection, Hierarchical Deadlock Detection, Distributed Deadlock Detection, False Deadlock.

Detailed Syllabus-Sem: 1st & 2nd Common Papers**Subject: OO Software Engineering with UML****Code: MT 21****SECTION A**

Software Project Planning: Problems, goals and requirements of software development and the case for engineered software, measures of productivity, software development cost factors and cost estimates. Planning software development-resource estimation and planning.

Specifications of Software: Specification drafting phase and the process of refinement, specification formats and specification depths, specification recording methods specially in relation to updating.

SECTION B

Software Design Techniques and Tools: Top down, bottom up design, data flow oriented, data structure oriented, object oriented and real time design.

Software Development Methodology and Tools: CASE concepts, CASE methodology and CASE tools. Other software development tools

Software Testing: Types of tests-module testing, integration testing, top down versus bottom up testing, mixed testing, statistical testing, comparisons of test methods, graph model, debugging techniques. Choice of test data, generation.

SECTION C

Software Complexity: Complexity measurement – Heuristic measurement of complexity, instruction count, statistical measurement, graph theoretic complexity measurement. Complexity versus number of errors and development time. Memory requirements and processing time.

Software Reliability: Concepts of software reliability – Probabilistic and deterministic models, failure model.

SECTION D

Management of Software Development Project: Monitoring the project, effective communication between the development teams, prototype development and intermediate review.

Software Evaluation.

UML:- Introduction to UML, Classes, Relationships, Common mechanism, Diagrams and class diagrams.

References:

1. Richard Fairley, Software Engineering Concepts, Tata McGraw Hill.
2. Pressman, Software Engineering – A Practitioner's Approach.
3. C.Easteal and G.Davis, Software Engineering Analysis and Design, Tata McGraw Hill.
4. Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publication.
5. Ian Sommeriele, "Software Engineering", Addison Wesley.
6. Carlo Gheji, Mehdi Jazayeri, " Fundamentals of Software Engineering" PHI
7. Rajib Mall, " Fundamentals of Software Engineering", PHI
8. Stephan R. Schach, "Object Oriented and Classical Software Engineering", TMH

Subject: AI and Neural Networks**Code: MT 22****Section A**

1. Introduction to Artificial Intelligence : Overview of AI ~ Definition of AI ~ Relationships between AI Systems and other computing systems ~ comparison between AI Programming and other conventional programming ~ AI and related fields ~ key issues in AI Research ~ AI Problems ~ Examples ~ Problem spaces ~ production systems and characteristics ~ knowledge - General concepts

Section B

2. Knowledge Representation : Approaches to knowledge representation ~ Issues in knowledge representation ~ Formal systems ~ basic concepts ~ Symbolic logics ~ syntax and semantics of FOPL ~ properties of wff clausal forms ~ resolution principle ~ Examples of Resolution ~ Structural knowledge ~ graphs ~ frames ~ CD's and Scripts ~ Probability reasoning ~ Bayesean Networks ~ Dampster Shafer theory ~ Non Monotonics Reasoning ~ TMS, Model and Temporal Logics ~ Fuzzy sets & Fuzzy Logics

Section C

3. Knowledge organisation and Manipulation : Search and control strategies ~ Examples of research problems ~ uninformed search techniques ~ Informed and Heuristics search techniques ~ Matching techniques ~ Structures used in Matching ~ Measures of matching ~ partial matching ~ Fuzzy Matching Algorithms and RETE Matching Algorithm

Section D

4. AI Languages : LISP ~ Basic Limit manipulation functions ~ predicates ~ conditionals ~ Inputs ~ Output and Local variables ~ Iteration and Recursion in LISP ~ Property lists and arrays ~ Prolog ~ Introduction ~ Facts - questions - variables - conjunctions - syntax of character - Operators - Equality - matching - arithmetic expressions - Goals - Back tracking - cut predicates - Input and Output Operations