OLOGY in COMPUTER SCIENCE

ch. (Computer Science)

First Semester

		Periods per Week	Max Marks (Theory)	Continual Internal Assessment	Exam Duration Hours
MT-101	Computer Architecture & Parallel Processing	4	75	25	3
MT-102	Computer Networks	4	75	25	3
MT-103	Computer Oriented Optimization Method	4	75	25	3
MT-104	Data Structure & Algorithm Analysis in C	4	75	25	3
MT-105	Operating System & Case Studies	4	75	25	3
MT-106	Practical on MT-103	6	50	50	3
MT-107	Practical on MT-104	6	50	50	3

Second Semester

Paper No.	Title	Periods per Week	Max Marks (Theory)	Continual Internal Assessment	Exam Duration Hours
MT-201	Object Oriented Programming with JAVA	4	75	25	3
MT-202	Software Engineering	4	75	25	3
MT-203	Distributed Data base Management system	4	75	25	3
MT-204	Artificial Intelligence & Expert System	4	75	25	3
MT-205	Data Warehousing	4	75	25	3
MT-206	Practical on MT-201	6	50	50	3
MT-207	Practical on MT-203	6	50	50	3

Third Semester

Paper No.	Title	Periods per Week	Max Marks (Theory)	Continual Internal Assessment	Exam Duration Hours
MT-301	Computer Graphics	4	75	25	3
	Elective	4	75	25	3
MT-302	Seminar		100		
MT-303	Minor Project		200		

Fourth Semester

MT-401 Dissertation

List of Electives

MT-E01 Numerical Computing
MT-E02 Automata Theory and Compiler Design
MT-E03 Graph Theory
MT-E04 Cyber Law
MT-E05 Research Methodology

re & Parallel Processing

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e state of computing, Multiprocessors and multicomputers, Multivector and SIMD Computers, PRAM and VLSI models, Architectural development tracks.

Program and Network Properties: Conditions of Parallelism, Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures.

Principles of Scalable Performance: Performance metrics and measures, Parallel processing applications, Speedup Performance laws, scalability analysis and approaches.

Processor and Memory Hierarchy: Advanced processor technology, Superscalar and vector processors, Memory hierarchy technology, Virtual memory technology.

Bus, Cache and Shared Memory: Backplane bus systems, cache memory organizations, Shared memory Organizations, Sequential and weak consistency models.

Pipelining and Superscalar Techniques: Linear pipeline processors, nonlinear pipeline processors, Instruction Pipeline design, Superscalar and superpipeline design.

PART-B

Multiprocessors and Multicomputers: Multiprocessor system interconnects, Cache coherence and synchronization mechanisms, Three generations of multicomputers, Message passing mechanisms.

Multivector and SIMD Computers: Vector processing principles, multivector multiprocessors, compound vector processing, SIMD computer organizations.

Scalable Multithreaded and Dataflow Architectures: Latency hiding techniques, principles of multithreading, Fine grain multicomputers, Scalable and multithreaded architectures, Dataflow and hybrid architectures.

Parallel Models, Languages and Compilers: Parallel programming models, Parallel languages and compilers, Dependence analysis of data arrays, Code optimization and scheduling, Loop parallelization and pipelining.

Parallel Program Development and Environments: Parallel programming environments, synchronization and multiprocessing modes, shared variable program structures, Message passing program development, Mapping programs onto multicomputers.

TEXT:

1. Kai Hwang, ñAdvanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw Hill, 1993

REFRENCES:

1. Kai Hwang and Faye A. Briggs, ñComputer Architecture and Parallel Processing. McGraw Hill, 1985.

Note:

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ETWORKS

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s, Application, Network Hardware, Network Software, Design Issues For The Layer, The O.S.I. Reference Model, Services, Example Networks - ARPANET, Novell Netware, NSFNET, The Internet, Gigabit Testbeds, Examples Data Communication Services ï SMDS, X.25 Networks, Frame Relay, Broadband ISDN and ATM, Comparison of Services.

Physical Layer: Theoretical Basis For The Data Communication, The Maximum Data Rate Of A Channel, Transmission Media - Magnetic Media, Twisted Pair, Base-band Coaxial Cable, Fiber Optics, Wireless Transmission ï Radio Transmission, Microwave Transmission, Infrared and Millimeter Waves, Light-wave Transmission, The Telephone System ï Structure of the Telephone System, The Local Loop, Trunks and Multiplexing, Switching, Narrow-band ISDN ï ISDN Services, ISDN System Architecture, The ISDN Interface, Perspective on N-ISDN, Broad-band ISDN and ATM ï Virtual Circuits versus Circuit Switching, Transmission in ATM Networks, ATM Switches, Cellular Radio ï Paging System , Cordless Telephones, Analog Cellular Telephones, Digital Cellular Telephones, Personal Communications, Communications Satellites ï Geosynchronous Satellites, Low- Orbit Satellites, Satellites versus Fiber.

Data Link Layer: Design Issuesï Services Provided to Network Layer, Framing, Error Control, Flow Control, Error Detecting Code and Error Correcting Codes, Elementary Data Link Protocols ï An Unrestricted Simplex Protocol, A Simplex Stop And Wait Protocol, A Simplex Protocol For A Noisy Channel, Sliding Window Protocol ï A One Bit Sliding Window Protocol, A Protocol Using Go Back n , A Protocol Using Selective Repeat, Protocol Specification And Verification ï Finite State Machine Models, Petri Net Models.

PART-B

Medium Access Layer: Static Channel Allocation in LANôs and MANôs, Dynamic Channel Allocation in LANôs and MANôs, Multiple Access Protocols- ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Limited Contention Protocols, Wavelength Division Multiple Access Protocols, Wireless LAN Protocols, Digital Cellular Radio, IEEE Standard 802 For LANôS and MANôS - IEEE Standard 802.3 and Ethernet, IEEE Standard 802.4 : Token Bus, IEEE Standard 802.5: Token Ring, Comparison of 802.3, 802.4, 802.5, IEEE Standard 802.6: Distributed Queue Dual Bus, IEEE Standard 802.2 :Logical Link control, Bridges: Bridges from 802.x to 802.y, Transparent Bridges, Source Routing Bridges, Comparison of 802 Bridges , Remote Bridges, High Speed LANS ï FDDI, Fast Ethernet, HIPPI, Fiber Channel, Satellite Networks ï Polling, ALOHA, FDM, TDM CDMA.

Network Layer: Design Issues, Routing Algorithmsï Shortest Path Routing, Isolated Routing, Flooding, Distributed Routing, Optimal Routing, Flow Based Routing, Broadcast Routing, Congestion Control Algorithmsï General Principals of Congestion Control, Congestion Prevention Policies, Traffic Shaping, Flow Specification, Load Shedding, Jitter Control, Internetworking ï Connectionless Internetworking, Tunneling, Internetwork Routing, Fragmentation, Firewalls.

Transport Layer: Design Issues, Connection Managementï Addressing, Establishing a Connection, Releasing a Connection, Timeï Based Connection Management, Flow Control And Buffering, Multiplexing, Crash Recovery.

rk Security ï Traditional Cryptography, Fundamental y Algorithms, Public-key Algorithms, Authentication Domain Name System)-The DNS Name Space, Resource le Network Management Protocol)- The SNMP Model, The SNMP Protocol, Multimedia, Audio, Video, Data Compression.

TEXT :

1. A.S. Tanenbaum, Computer Networks, PHI.

REFERENCES :

1. Uyless D. Black, Data Communication and Distributed Networks, PH International.
2. Cannon and Luccke, Understanding Communication Systems, Texas Instruments.
3. James Martin, Computer Networks and Distributed Processing, PHI.

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NTED OPTIMIZATION METHODS

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3 1

Introduction to O.R.: Definition, Uses and Limitations of Optimization method.

The Linear Programming Problem: Introduction, Formulation Of LPP, Graphical Solution And Some Exceptional Cases, Canonical And Standard Form Of LPP.

The Simplex Method: Solution of LPP By Simplex Method, Exceptional Cases, Artificial Variable Techniques (Big M), Two Phase Of Simplex Method, Problem of Degeneracy.

The Dual Simplex Method: Dual And Primal Problem, Duality And Simplex Method, Revised Simplex Method, Solution Of LPP Using Revised Simplex Method.

PART-B

The Transportation Problem: Introduction, Basic Feasibility Solution, Standard Transportation Problem, Balanced Transportation Problem, Multicommodity Transportation Problem, Row Minimum, Column Minimum, Matrix Minimum Method, Vogel Approximation Method (VAM), Optimality In Transportation Problem, Degeneracy In Transportation Problem, Assignment And Routing Problem.

Networking Scheduling By PERT/CPM: Introduction, Basic Concepts, Constraints In Network, Construction Of The Network, Time Calculation In Networks, Critical Path Method (CPM), PERT, PERT Calculation, Advantage Of Network (PERT/CPM).

Inventory Control: Introduction, Inventory Control, Selective Control Techniques, ABC Analysis Procedure, Economics Lot Size Problems, Problem Of EQQ With shortage, Inventory Control Techniques Uncertain Demand, Stochastic Problems.

TEXT:

1. Kanti Syrup, P.K. Gupta And Manmohan , ñOperations Research.ò Sultan Chand & Sons.

REFERENCE :

1. H.A. Taha, ñ Operation Research- An Introduction.ò Macmillan Publication.
2. S.D. Sharma, ñOperation Research.ò Kedar Nath Ram Nath & Company.

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rithm Analysis In C

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3 1

ot & notation, common operation on data structures, algorithm complexity, time-space trade off between algorithm, physical & logical representation of different data structures.

Arrays: Arrays defined, representing arrays in memory, Various operation (traversal, insertion, deletion), Multidimensional arrays, Sequential allocation, Address calculation, Sparse arrays.

List: Simple Array Implementation Of Lists, Linked Lists, Doubly Linked Lists, Circularly Linked list.

Stack: Stack Model, Implementation Of Stacks, Applications Of Stacks.

Queue: Queue Model, Array Implementation Of Queues, Applications of Queues.

Trees: Implementation Of Trees, Tree Traversal with an application, Binary Trees- Implementation, Expression trees, Binary Search Tree, Binary Search Trees, Various Operations On BST- MakeEmpty, Find, FindMin and FindMax, Insert, Delete, Average-Case Analysis, AVL Trees- Single Rotation , Double Rotation, B-trees.

Hashing: Definition, Hash Fuction, Separate Chaining, Open Addressing- Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

PART-B

Priority Queues: Model, Simple Implementation, Binary Heap-Structure Property, Heap Order Property, Basic Heap Operation, Application Of Priority Queues- The Selection Problem, Event Simulation, d-Heaps.

Sorting: Preliminaries, Insertion Sort- Algorithm, Analysis Of Insertion Sort, Shellsort- Analysis Of Shellsort, Heapsort- Analysis Of Heapsort, Mergesort- Analysis Of Mergesort, Quicksort- Picking the Pivot, Partitioning Strategy, Small Arrays, Analysis Of Quicksort , Bucket Sort.

Graphs: Definitions, Representation Of Graphs, Topological Sort, Shortest-Path Algorithms- Unweighted Shortest Paths, Dijkstraôs Algorithm, Graph With Negative Edge Costs, Acyclic Graphs, All- Pairs Shortest, Minimal Spanning Tree- Primôs Algorithm, Kruskalôs Algorithm, Application Of Depth-First Search- Undirected Graphs, Biconnectivity, Euler Circuits, Directed Graphs.

Algorithm Design Techniques: Greedy Algorithms- A Simple Scheduling Problem, Huffman Codes, Divide And Conquer- Running Time Of Divide and Conquer Algorithms, Closets-Points Problem, The Selection Problem, Dynamic Programming- Using A Table Instead Of Recursion, Ordering Matrix Multiplications, Optimal Binary Search Tree, All-Pairs Shortest Path, Backtracking Algorithms- the Turnpike Reconstruction Problem.

...ublications
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3. Gottfried B.: Programming in C: Tata McGraw Hill
4. Jean Paul Tremblay & Paul G. Sorenson: An Introduction to Data Structures with Applications: Tata McGraw Hill.
5. Robert L. Kruse: Data Structures & Program Design: PHI.

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G SYSTEM & CASE STUDY

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3 1

ne Operating System, Functions Of An Operating System, Different Types Of Systems - Simple Batch System, Multi-Programmed Batched System, Time Sharing System, Personal Computer Systems, Parallel Systems, Distributed Systems, Real Time Systems.

Process Management: Process- Process Concept, Process Scheduling, Operation On Processes, Cooperating Processes, Threads, Inter-Process Communication, CPU Schedulingï scheduling criteria, scheduling algorithms ï FCFS, SJF, priority scheduling, round robin scheduling, multilevel queue scheduling, multilevel feedback queue scheduling, multiple processor scheduling, real time scheduling.

Process Synchronization: The Critical Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions.

Deadlocks: Deadlock Characterization, Methods For Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery From Deadlock.

Memory Management: Logical & physical address space, Swapping, Continuous Allocation (single partition, multiple partition), internal , external fragmentation, Paging, Segmentation, Segmentation With Paging, Virtual Memory, Demand Paging, Performance Of Demand Paging, Page Replacement, Page Replacement Algorithmsï FIFO, optimal, LRU, LRU approximation algorithms, counting algorithms Thrashing, Demand Segmentation.

PART-B

File System Interface: File Concept, Access Methodsï sequential, direct, index, Directory Structureï single-level, twoï level, tree-structured, acyclic-graph, general graph.

File System Implementation: File System Structure, Allocation Methods-contiguous allocation, linked allocation, indexed allocation, Free Space Management-bit vector, linked list, grouping, counting, Directory Implementationï linear list, hash table, Efficiency And Performance, Recovery ï consistency checking, backup and restore.

Secondary Storage Structure: Disk Structure, Disk Scheduling, FCFS, SSTF, SCAN, C-SCAN, Look Scheduling, Selection of A Scheduling Algorithm, Disk Management-disk formatting, boot block, bad blocks.

Security: problem, authenticationï passwords, program threats, system threats- worms, viruses, threat monitoring, encryption.

Case Study: UNIX system: Design principles, Programmer interface (File manipulation, Process control, Signals, Process groups, Information Manipulation), Process management (Process control block, CPU scheduling), Memory management (Swapping, Paging), file system (Blocks & fragments, Inodes, Directories), I/O/ system (Block buffer cache, Raw device interface, C-lists).

Case study: Windows NT: Design principles, System components (H/w abstraction layer, Kernel, Executive), File system (Internal layout, Recovery, Security, Volume management & fault tolerance, Compression), Networking (Protocols, Distributed-processing mechanism, Domains), Programmer interface (Access to kernel objects, Process management, Inter-process communication, Memory management).

Case Study: MS-DOS: Userôs view of MS-DOS, Systemôs view of MS-DOS, Programmerôs view of MS-DOS system calls.

ystem Conceptsò, Addison Wesley Publishing Company,

1. William Stallings, ñOperating Systemsò, Macmillan Publishing Company.
2. Deitel H.M., ñAn Introduction To Operating Systemò, Addison Wesley Publishing Company, 1984.
3. Tanenbaum, A.S., ñModern Operating Systemò, Prentice Hall of India Pvt. Ltd. 1995.

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gramming with JAVA

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3 1

ented Programming: Data Abstraction, Encapsulation, Inheritance (Public, Protected And Private), Polymorphism, Information Hiding.

Java Elements: Data Types, Literal and Variables, Operatorsï Arithmetic, Bit-wise, Relational, Boolean Logical, Assignment, The ó?ô Operator, Operator Precedence, Control Statementsï Selection (if, switch), Iteration Statements (while, do-while, for) Jump Statements (break, continue, return), Arrays (One-dimensional, Multi-Dimensional).

Introducing Classes: Class Fundamentals, Declaring Objects, Methods, Constructors, óThisô Keyword, Over loading Methods.

Inheritance: Inheritance Basics, Protected Members, Method Overriding, Multiple Inheritance, Template Classes and Functions.

PART-B

Exception Handling: Fundamental, Exception Types, Uncaught Exceptions, Try And Catch, Dealing With Exceptions (try, throw, throws, finally).

Java Applets: Applet Basics, The Applet Class, Applet Architecture, An Applet Skeleton, Applet Display Methods, Handling Events.

Advanced Java Programming: Multithreadingï Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Thread Priorities, Synchronization, Inter-thread Communication, Multithreading.

Abstract Window Toolkit: Working With Windows, Graphics, and Text ï The AWT Classes, Window Fundamentals, Working with Frame Windows, Working with Graphics ï Drawing Lines, Drawing Rectangles, Drawing Ellipses and Circles, Drawing Arcs, Drawing Polygons, Sizing Graphics, Working with Color , Working with Fonts.

Using AWT Controls, Layout Manager, and Menus: Control Fundamentals, Labels, Using Buttons, Applying Check Boxes, Using Lists, Managing Scroll Bars, Layout Manager ï FlowLayout, BorderLayout, GridLayout, CardLayout, Using Menu Bars and Menus.

TEXT:

1. Patrick Naughten & Herbert Schildt, ñ The Complete Reference Java .ò Tata McGraw Hill.

REFERENCES:

1. Gilbert, Stephan D. and William B. Hccarthy, ñ Object Oriented Programming In Java ñ, 1997, The Waite Group Press.
2. Mary Compoine and Kathy Walrath,ò The Java Turtorial ñ, Addison-Wesley, 1996.
3. Horstmann, Cay S. and Gary Cornell, ñCore Java 1.1: Fundamentals.ò Addisonï Wesley, 1997.

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EERING

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3 1

Definition of Software Engineering, Software life cycle models, Characteristics of a Software Process, Software Development Process, Software Configuration Management Process, Project Management Process, Capability Maturity Model, ISO9000.

Software Requirements Analysis and Specification: Software Requirements, Problem Analysis, Requirement Specifications, Validation.

Software Metrics: What & why, Size Metrics, Data Structure Metrics, Information Flow Metrics, Metrics Analysis.

Planning A Software Project: Cost Estimation, Project Scheduling, Staffing And Personnel Planning, Software Configuration, Management Plans, Quality Assurance Plans, Project Monitoring Plans, Risk Management

Function Oriented Design: Design Principles, Module-Level Concepts, Design Notation and Specifications, Structured Design Methodology, Verification, Metrics.

PART-B

Detailed Design: Module Specification, Detailed Designï PDL, Logic/Algorithm Design, Verification-Design walkthrough, Critical Design Review, Consistency Checkers Metricsï Cyclomatic Complexity, Data Bindings, Cohesion Metric.

Coding: Programming Practiceï Top-Down and Bottom-Up, Structured Programming, Information Hiding, Verification-Code Reading, Static Analysis, Symbolic Execution, Metrics-Size Measures, Complexity Metrics, Style Metrics.

Testing: Fundamentals, Functional Testingï Equivalence Class Partitioning, Boundary Value Analysis, Cause Effect Graphing, Structural Testingï Control Flowï based Criteria, Data Flow ï Based Testing, Testing Process, Metrics Reliability Estimation.

Software Reliability: Importance, Software Reliability Vs Hardware Reliability, Failures & Faults, Reliability Concepts, Reliability Models.

Software Maintenance: What is Software Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Re-engineering, Estimation of Maintenance Costs, Documentation.

TEXT:

1. Pankaj Jalote, ñAn Integrated Approach To Software Engineering.ò Narosa Publishing House, 1991.
2. K.K. Aggarwal and Yogesh Singh, ñSoftware Engineering: Programs, Documentation & Operating procedures, New Age International Publishers, 2001.

REFERENCES:

1. Pressman, R.S., ñ Software Engineering ï A Practitioner's Approachò. Third Edition, McGraw Hills.
2. Bezier B, ñSoftware Testing Techniquesò ó Second Edition. Van Nostrand Reinhold, New York, 1990.

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25 for internal assessment).

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ASE MANAGEMENT SYSTEM

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Distributed Data Processing: Introduction, Fundamentals of Distributed Data Base Management System (Transparent management of distributed & replicated data, Reliability, Improved performance, System expansion), Disadvantages of Distributed Data Base Management System (Complexity, Cost, Distribution of control, Security, Distributed database design, Query processing, Directory Mgmt, concurrency control, Deadlock Mgmt, Reliability, OS support, Heterogeneous databases, Relationship).

Relational Data Base Management System: Basic Concepts, Data Modeling for a Database, Records and Files, Abstraction and Data Integration, The Three-Level Architecture Proposal for DBMS, Components of a DBMS, Advantages and Disadvantages of a DBMS. Data Models, Data Associations, Data Models Classification, Entity Relationship Model, Relational Data Model. Normalization: Dependency structures, Normal forms.

Distributed Data Base Management System Architecture: Architectural models for distributed DBMS (Autonomy, Distribution, Heterogeneity, Architectural alternatives), Client/server systems, Peer-to-peer Distributed Systems.

Distributed Database Design: Design Strategies (Top-Down Design & Bottom-Up design process), Design issues (reasons for fragmentation, alternatives, Degree & Correctness rules of fragmentation, Allocation alternatives, Information requirement. Fragmentation: Horizontal, Vertical, Hybrid Fragmentation. Allocation: Problem, Information requirement, Allocation model, Solution methods.

PART-B

Query Processing: Problem, objectives, Complexity of Relational Algebra operations, Characterization of query processing (Language, Types of Optimization, Optimization timing, Statistics, Decision sites, Exploitation of network topology & Replicated fragments, Use of semijoins), Layers of Query processing (Query decomposition, Data localization, Global & Local query optimizations).

Distributed Concurrency Control: Serializability theory, Taxonomy of concurrency control mechanism, Locking based concurrency control algorithm (centralized 2pl, primary copy 2pl, distributed 2pl), Timestamp based concurrency control algorithm (conservative & multiversion TO algorithm), Optimistic concurrency control algorithm, Deadlock management, prevention, avoidance, detection & resolution.

Distributed DBMS Reliability: Reliability concepts & measures (system, state & failures, reliability & availability, mean time between failures/repair), Failures & fault tolerance in distributed system (reason for failures, fault tolerance approaches & techniques), Failures in Distributed DBMS (transaction, system, media & communication failure), Local reliability protocols (architectural considerations, recovery, information execution of LRM commands, checkpointing, handling media failure), Distributed Reliability Protocols (Components, Two-Phase commit protocol, Variation of 2PC).

TEXT:

1. M. Tamer Ozsu & Patrick Valduriez, ñPrinciples of Distributed Database Systemsò, Pearson Education Asia.
2. Desai, B., ñAn Introduction To Database Concepts.ò Galgotia Publications, New Delhi.

abase Systemsò, Narosa Publishing House, New Delhi.
tals of Database Systemsò, Addison Wesley, New York.
se Systemsò, Galgotia Publications, New Delhi.

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NCE and EXPERT SYSTEMS

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3 1

Of AI, The Importance Of AI, Previous Works In The History Of AI, AI And Related Fields, Problems, Problem Spaces And Search.

Knowledge: General Concepts ï Definition And Importance of Knowledge, Knowledge-Based Systems, Representation Of Knowledge, Knowledge Organization, Knowledge Manipulation, Acquisition Of Knowledge.

Formalized Symbolic Logics ï Syntax And Semantics For Propositional Logic, Properties Of Wffs , Conversion To Clausal Form, Inference Rules, Resolution.

Dealing With Inconsistencies - Truth Maintenance Systems, Symbolic Reasoning Under Uncertainty, Statistical Reasoning.

Structured Knowledge: Graph, Frames and Related Structures- Introduction, Associative Network, Frame Structure, Conceptual Dependencies And Scripts.

PART-B

Knowledge Organization And Manipulation: Search And Control Strategies- Introduction, Examples Of Search Problems, Uniformed or Blind Search, Informed Search, Searching And-Or Graphs, Matching Techniques- Introduction, Structures Used in Matching, Measures for Matching, Matching Like Patterns, Partial Matching, Fuzzy Matching Algorithms.

Natural Language Processing: Overview of Linguistics, Grammer and Languages, Syntactic Processing, Semantic Analysis, Morphological, Discourse and Pragmatic Processing, Natural Language Generation, Natural Language Systems.

Pattern Recognition: Introduction, Recognition and Classification Process, Learning Classification Pattern, Recognizing and Understanding Speech.

Visual Image Understanding: Introduction, Image Transformation and Low-Level Processing, Intermediate- Level Image Processing, Describing and Labeling Objects, Vision System Architectures.

Expert Systems: Definition, Rule Based System Architecture, Non-Production System Architecture, Basic Components of E.S.

TEXT :

1. Dan W. Patterson, ñ Introduction To Artificial Intelligence And Expert Systems.ò Prentice-Hall, India.

REFERENCES :

1. A.Rich And K. Knight ,ò Artificial Intelligence ñ,Tata McGraw Hill.
2. E. Charnaik And D.Mcdermott, ñ Introduction To Artificial Intelligenceò , Addison-Wesly Publishing Company .

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Introduction: Role of middleware, technologies, dangers of data warehousing, data access to the enterprise, an architectural perspective.

Data warehouse concepts: What is a data warehouse, benefits, need, structure, functions, data mining, operational warehouse.

Types of data warehouse solutions: how to choose a data warehouse, types of data warehouses, host-based data warehouses, host-based single-stage data warehouses, LAN-based workgroup data warehouses, multistage data warehouses, stationary data warehouses, distributed data warehouses, virtual data warehouses.

Data warehouse architecture: Why architecture, architectural components, architectural model, implementation options, decision-support architecture.

Data warehouse technologies: Defining technical architecture, DSS topologies, multidimensional databases, relational OLAP, intranet systems.

Metadata: What is metadata, importance, role, components, repository, model for metadata.

PART-B

Data warehouse modeling: Why data modeling, what is a data model, what is the enterprise data model, what is the data warehouse model, data modeling concepts and terms, overall structure and planning process, multidimensional Vs relational model, building a data model, data models for warehouse applications, data model implementation and administration.

OLAP in data warehouse environment: What is OLAP, why OLAP, evolution, concepts, relational OLAP, multidimensional databases, OLAP components, OLAP Vs OLTP, data analysis tools and applications.

Data warehouse tools and products: Corporate data analysis, tools, vendors, products, criteria for selecting systems and database vendors.

Building a practical data warehouse: Prerequisite to success, planning a data warehouse, core components of a data warehouse, enterprise data model, building, using, maintaining a data warehouse, exploiting the data ware house architecture, creating the data warehouse, implementing the data warehouse, factors for success.

Managing the growing data warehouse: Implementation and maintenance, establishing the right environment, key issues in managing a data warehouse, managing the data warehouse.

TEXT:

1. Singh H., ñData Warehousing: Concepts, Technologies, Implementations and Managementò, Prentice Hall Ptr, New Jursey.

REFERENCES:

1. Inmon, W. H. ñBuilding the Data Warehousingò, John Wiley & Sons.
2. Inmon, W. H. ñManaging the Data Warehousingò, John Wiley & Sons.

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R GRAPHICS L T P

3 1 6

Computer Graphics And Its Applications, Video Display Devices- Raster-Scan Displays, Random-Scan Displays, Color CRT Monitors, Direct View Storage Tubes, Flat Panel Displays Input Devices: Keyboard, Mouse, Trackball and Spaceball, Joysticks, Digitizers, Image Scanners, Touch Panels, Light Pens, Voice Systems.

Output Primitives: Line Drawing Algorithms DDA, Bresenhaumôs Circle Generating Algorithm: Midpoint Circle Drawing Algorithm, Ellipse Generating Algorithm, Midpoint Ellipse Generating Algorithm, Character Generation, 2D Transformations: Translation, Rotation, Scaling, Reflection, Shear, Composite Transformation-Translation, Rotations, Scaling.

PART-B

Two Dimensional Viewing: Window-To-Viewport Coordinate Transformation, Clipping Operations, Point Clipping, Line Clippingï (Cohen-Sutherland Line Clipping, Liang-Barsky Line Clipping, Nicholl-Lee-Nicholl Line Clipping), Polygon Clippingï (Sutherland-Hodgeman Polygon Clipping, Weiler-Atherton Polygon Clipping), Curve Clipping, Text Clipping.

Three Dimensional Concepts: Three Dimensional Display Methodsï Parallel Projection, Perspective Projection, Surface Rendering.

Three Dimensional Transformations: Translation, Rotation, Scaling, Reflection, Shear.

Curves and Surfaces: Bezier Curves, B-Spline Curves, Fractal Geometory Methods, Octrees.

Visible-Surface Detection Methods: Back Face Detection, Depth Buffer Method, A-Buffer Method, Scan Line Method, Depth Sorting Method.

Concept of Shading: Modelling Light Intensity, Diffuse And Specular Reflection, Refracted Light, Concept Of Shading Methods.

TEXT:

1. Donald Hearn & M. Pauline Baker, ñComputer Graphics.ò Prentice Hall India.

REFERENCES :

1. F. S . Hill Jr., ñ Computer Graphics.ò Macmillan Publishing Company.
2. David F. Rogers, ñ Procedural Elements For Computer Graphics.òTata MacGraw Hill.

NOTE:

1. Each theory paper shall be of 3 hours duration and shall carry 100 marks (75 marks for written semester examination and 25 for internal assessment).
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L	T
3	1

Interpolation: Interpolation with equal intervals. Newton's Formula, Newton-Gregory Formula for forward and Backward Interpolation, Interpolation with unequal roots (Divided differences, Newton's General Interpolation formula, lagranges Interpolation formula), Central Difference Interpolation formula: Gaurs and Stirling Formula, Bessel Formula, Error in Interpolation Formula.

Inverse Interpolation: Connection between inverse Interpolation and solution of Equation, Roots by inverse Interpolation, Regula Falsi, Newtons method.

PART-B

Numerical Differentiation: Newton-Gregory formula, Central Difference Formula, Newton's Divided Difference Formula.

Numerical Integration: The Trepizodial Rule, Simpson one third Rule, Simpson three-eight Rule, Weddles Rule, Euler-Maclawin Summation Formula.

Solution of Differential Equation: Picard Method, Milne Method & Runge-Kutta Method. Newton Raphson Method Giraffes Root-Squaring Method for solving Algebraic Equations.

TEXT AND REFRENCES:

1. Ralph G. Stanton, Numerical methods for Science & Engineering, Prentice Hall of India Private Ltd, New Delhi.
2. James B. Scarborough, Numerical Mathematical Analysis,Oxford & IBH Publishing Co., New Delhi.
3. F.B. Hildebrand, An Introduction to numerical analysis, Tata McGraw Hill, New Delhi.
4. Carl-Erik Frioberg, Introduction to numerical analysis, Addison-Wesley Publishing Co.

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ORY AND COMPILER DESIGN

L T
3 1

Finite Automata and Regular Expression: Finite State System, Basic Definition, Deterministic and Non-Deterministic Finite Automata (Only Definition), Finite Automata With Output, Regular Expression.

Turing Machines: Definition Of Various Version Of Touring Machines, Deterministic, Non-Deterministic, Two-Way, Infinite Tape, Multi Tape, Multi Head, Statements Of Their Equivalence (Without Proof), Construction Of Turing Machines (Any Model) For Log N; N! , N2;

Context Free Grammars: Context Free Grammars, Derivation Trees, Simplification of Context-Free Grammars, Chomsky Normal Form, Greibach Normal Form.

Properties Of Context -Free Languages : The Pumping Leema For CFLõS Closure Properties Of CFLõS , Decision Algorithms For CFLõS.

PART-B

Introduction To Compiling: Compilers, Analysis Of Source Program, The Phases Of A Compiler, One Pass Compiler, Overview, Syntax Definition, Syntax-Directed Translation, Parsing, Lexical Analysis, Role of The Lexical Analyzer.

Syntax Analysis, The Role Of Parser, Context Free Grammars, Writing A Grammer, Top-Down Parsing (Recursive-Descent Parsing, Predictive Parsing, Transition Diagram For Predictive Parsing, Non Recursive Predictive Parsing, First And Follow, Ll(1) Grammers, Error Recovery In Predictive, Parsing .

Bottom-Up Parsing: Handles, Handle Pruning, Stack Implementation In Shift Reduce Parsing, Conflicts In Shift Reducing Parsing, LR-Parsers, LR Algorithm, LR Grammars, Constructing SLR Parsing Tables, Using Ambiguous Grammars, Error Recovery In LR Parsing.

TEXT :

1. Johan E. Hopcroft, Jeffery D.Ullman , ñIntroduction To Automata Theory Languages Computation.ò Narosa Publishing House.

REFRENCES:

1. Alfred V.Aho, Ravi Sethi, Jeffery D.Ullman, ñCompilers Principles, Techniques and Tools.òAddison-Wesley Publishing Company.
2. William A. Barrett, Bates, John D.Couch,òCompiler Construction Theory And Practice.

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1. Each theory paper shall be of 3 hours duration and shall carry 100 marks (75 marks for written semester examination and 25 for internal assessment).
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L	T
3	1

Introduction ï Definition of a graph, application of graphs, finite and infinite graphs, incidence and degree, isolated vertex, pendant graph, null graph.

Path and circuits-Isomorphism, subgraphs, walks, paths, circuits, connected graphs, disconnected graphs and its componenets, Euler graph, operations on graphs, Hamiltonian paths and circuits, travelling salesman problem.

Trees and fundamental circuits- Trees, properties of the trees, pendant vertices in a tree, distance and centres in a tree , rooted and binary trees, on counting trees, spanning tree, fundamental circuits, finding all spanning trees of a graph, spanning tree in a weighted graph.

PART-B

Planar and Dual graphs- combinatorial Vs. Geometric Graphs, planar graphs, diffirent representations of a planar graph, detection of planarity, Geometric Dual, combinatorial dual, thickness and crossings,

Matrix representation of graphs- Incidence graph, submatrices of A(G), circuit matrix, cut-set matrix, path matrix adjacency matrix.

Directed Graphs- Definition of a directed graph, types of digraphs, digraphs and binary relations, directed path and connectedness, trees with directed edges, fundamental circuits in a digraph, adjacency matrix of a graph, acyclic digraphs and decyclization.

Graph algorithms- algorithm for connectedness, a spanning tree, a set of fundamental circuits, directed circuits, shortest path algorithm, depth search first on a graph, algorithm for planarity testing, algorithm for isomorphism.

TEXT:

1. Narsingh Deo, ñGraph Theoreyò , Prentice Hall India.

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L	T
3	1

efinition, nature & Scope of Cyber Laws. Sociolegal Implications of Computer Science, Cyber Laws.

Cyber Crimes: Definition & Kinds of Cyber Crimes. International and Foreign Developments. Common Cyber Offences: Pheakering, Internet Frauds, Hackers, Stalking, E-Mail, Security Invasion, Money Laundering, Data-Diddling, Theft of Information.

Contractual Aspects: Hardware Contracts: User Requirement Specification, Negotiation, Sales & Leases, Delivery & Payment, Sellerôs Obligations, Buyerôs Remedies. Software Contract: Selecting Software, Types of Software, What is Software, Software License, Principal Commercial Terms, Warranties, Software Maintenance.

Liability: Contractual Liability, Strict Liability, Negligence, Criminal.

Miscellaneous (Briefly); Copyright & Patent Protection, Evidence, Protecting Confidential Information.

Part-B

The Information Technology Act, 2000:
Introduction: Definition, A Brief Summary of the Act.
Digital Signature & Electronic Governance (Sections 3 to 10)
Secure Electronic Records & Secure Digital Signatures (Sections 14 to 16).
Regulation of Certifying Authorities (Sections 17 to 34).
Digital Signature Certificates (Sections 35 to 39).
Duties of Subscribers (Sections 40 to 42).
Penalties, Adjudication Offences (Sections 45 to 47 & Sections 65 to 78).
Cyber Regulations Appellate Tribunal (Sections 48 to 64).

Text Books:

1. The Information Technology Act, 2000.
2. Chris Reed (Ed.), Computer Law, 1996: Universal Law Publishing Co. Pvt. Ltd.
3. Mittal D.P., Law of Information Technology (2000): Taxmannôs.

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DATA STRUCTURE Using C

L T P
3 1 6

Overview of C: General structure of C Program.

Data types, Operators and expressions: Constants and Variables, Data types, Declaring Variables, Storage Classes, Different types of expressions and their Evaluation, Conditional Expression, Assignment statement, Enumerated data type, Redefining/ Creating data types, Library functions, Type casting.

Input/Output: Unformatted and formatted I/O Functions (Character and strings I/O, *Scanf ( ), Printf ( )*)

Control Statements: Decision making using *if, if-else, elseif* and *switch*_statements, Looping using *for*, *while* and *do-while* statements, Transferring Program controlling *break* and *continue* statements, Programming examples to illustrate the use of these control statements.

Pointers: Definition, Need of pointers, declaring Pointers, Accessing Values via Pointers, Pointer arithmetic, Types of pointers.

Functions: Defining a function, Local variables, *return* statement, invoking a Function, specifying and passing arguments to a function, Functions returning non Integer, External, static, and register variable, block structure, initialization and recursion.

Structures: Declaring a structure type, Declaring Variables of structure type, Initializing Structures, Accessing Elements of structures, arrays of structures, nested structures, Pointers to structures.

PART-B

Preliminaries: Concept & notation, common operation on data structures, algorithm complexity, time-space trade off between algorithm, physical & logical representation of different data structures.

Arrays: Arrays defined, representing arrays in memory, Various operation (traversal, insertion, deletion), Multidimensional arrays, Sequential allocation, Address calculation, Sparse arrays.

Linked List: Definition, type (linear, circular, doubly linked, inverted), representing linked lists in memory, advantages of using linked list over arrays, various operations on Linked list (traversal, insertion, deletion).

Stacks: Definition & concepts of stack structure, Implementation of stacks, Operation on stacks (push & pop), Application of stacks (converting arithmetic expression from infix notation to polish and their subsequent evaluation), quick sort technique to sort an array, recursion).

Queue: Definition & concept of queues, implementation of queue, operation on queues (insert & delete), Type of queues (circular queue, priority queue).

Trees Structures: Tree, Binary Trees, Tree Traversal Algorithms (Pre-Order, In-Order, Post-Order), Threaded Trees, Trees in various Sorting & Searching Algorithms & their Complexity (Heap Sort, Binary Search Trees).

Graphs: Description of graph structure, Implementing graphs in memory, Graph traversals (Depth First Searching, Breadth First Searching, Shortest Paths Problems).

Sorting & Searching: Selection sort, Bubble sort, Merge sort, Radix sort, Quick sort, Sequential search, Linear search and their complexity.

ublications
8. Gottfried B.: Programming in C: Tata McGraw Hill
9. Jean Paul Tremblay & Paul G. Sorenson: An Introduction to Data Structures with Applications: Tata McGraw Hill.
10. Robert L. Kruse: Data Structures & Program Design: PHI.

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GEMENT SYSTEM L T
3 1

Basic Concepts, Data Modeling for a Database, Records and Files, Abstraction and Data Integration, The Three-Level Architecture Proposal for DBMS, Components of a DBMS, Advantages and Disadvantages of a DBMS.

Data Models, Data Associations, Data Models Classification, Entity Relationship Model, Relational Data Model, Network Data Model, Hierarchical Model.

File Organization, Serial Files, Sequential Files, Index-Sequential Files, Direct File, Secondary Key Retrieval, Indexing Using Tree Structures.

The Relational Model, Relational Database, Relational Algebra, Relational Calculus.

Relational Database Manipulation, SQL, Data Manipulation, Basic Data Retrieval, Condition Specification, Arithmetic and Aggregate Operators, SQL Join: Multiple Tables Queries, Set Manipulation, Categorization, Updates, Views: SQL, QUEL, Data Definition, Data Manipulation; QUEL, Condition Specification, Renaming, Arithmetic Operators, Multiple Variable Queries, Aggregation Operators in QUEL, Retrieve into Temporary Relation, Updates, Views .

PART-B

Relational Database Design, Relational Scheme and Relational Design, Anomalies in a Database: A Consequence of Bad Design, Universal Relation, Functional Dependency, Relational Database Design.

The Network Model, The Network Data Model, DBTG Set Construct and Restrictions, Expressing an M: N Relationship in DBTG, Cycles in DBTG, Data Description in the Network Model, Schema and Sub schema, DBTG Data Manipulation Facility.

The Hierarchical Data Model, The tree Concept, Hierarchical Data Model, Data Definition, Data Manipulation, Updates, Implementation of the Hierarchical Database.

Concurrency Management, Serializability, Concurrency Control, Locking Scheme, Timestamp-Based Order, Optimistic Scheduling, Multiversion Techniques, Deadlock and Its Resolution.

Database Security, Integrity, and Control, Security and Integrity, Threats, Defense Mechanisms, Integrity .

TEXT:

3. Desai, B., ñAn Introduction To Database Concepts.ò Galgotia Publications, New Delhi.

REFRENCES:

4. Date C.J., ñAn Introduction to Database Systemsò, Narosa Publishing House, New Delhi.
5. Elimsari And Navathe, ñFundamentals of Database Systemsò, Addison Wesley, New York.
6. Ullman, J.D , ñPrincipals Of Database Systemsò, Galgotia Publications, New Delhi.

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