

**COURSE STRUCTURE AND SYLLABUS APPROVED IN THE
BOARD OF STUDIES MEETING HELD ON JULY-2000 TO BE
EFFECTIVE FROM THE ACADEMIC YEAR 2000-2001.**

M. Tech (Computer Science)

Scheme of Evaluation

I Semester

	Subject	L	P	C	Int	Ext	Max Min Marks		
							Total	Ext to pass	
MT 1.1	Data Structures through C++	4	-	8	40	60	100	24	50
MT 1.2	Computer Fundamentals	4	-	8	40	60	100	24	50
MT 1.3	Database Management Systems	4	-	8	40	60	100	24	50
MT 1.4	Operating Systems	4	-	8	40	60	100	24	50
MT 1.5	Computer Vision and Graphics	4	-	8	40	60	100	24	50
MT 1.6	Computer Communications	4	-	8	40	60	100	24	50
MT 1.7	Data Structures through C++ Lab	-	4	4	40	60	100	24	50
MT 1.8	DBMS (ORACLE) Lab	-	4	4	40	60	100	24	50

DATA STRUCTURES USING ‘C++’

UNIT-I

Arrays and Strings: Storage structures for arrays, Strings operations, and sparse matrix representation.

UNIT-II

Stacks and Queues: Definition, representation of stacks, operations on stacks, Application of stacks: Infix, Prefix and Postfix notation. Recursion. Queue and it's sequential representation, operations on queues.

UNIT-III

Linked Lists: singly linked lists, doubly linked lists, insertion and deletion operations, simple applications of linked lists.

UNIT-IV

Sorting: Bubble sort, selection sort, insertion sort, merge sort, radix sort and quick sort.

UNIT-V

Searching linear search, binary search and hashing Techniques. Files: Sequential and Random Access file operations.

UNIT-VI

Trees: Definition, Binary tree, Binary Search tree, Tree traversal techniques: Inorder, Post order, preorder.

UNIT-VII

Graphs: Terminology, representation graphs, depth first search and breadth first search of graphs.

UNIT-VIII

Set representation: Union and find Algorithms and Heap sort, Complexity of Algorithms: Definition, time Complexity of simple algorithms.

TEXT BOOKS:

1. Data Structures using C and C++ - A.M. Tenenbaum Y. Langsam and M. J. Augenstein.
2. Data Structures – seymour Lipschutz, Schaum Series.

COMPUTER FUNDAMENTALS

UNIT-I

Introduction to Functional Units of computer, Representation of integers, Real numbers, Addressing Modes, Instruction formats – single, two, three and zero address formats.

UNIT-II

Introduction to memories – RAM, ROM AND CACHE memory. Control unit – Hardwired, Micro and Nano programmed control units. Introduction to I/o Organization I/o-Memory mapped and I/O mapped interrupts. DMA.

UNIT-III

Basic Concepts of pipelining, instruction queue and Data dependency Forms of parallel processing, array processors, Inter Connection networks.

UNIT-IV

Graph Theory I: Basic concepts, Isomorphism's and subgroups, Trees and their properties, spanning trees, directed trees, Binary trees.

UNIT-V

Graph Theory – II: Planar graphs, Euler's formulae, multigraphs and Euler Circuits, Hamiltonian graphs, chromatic numbers, four color problem, Network flows, Matching problem.

UNIT-VI

Alphabets, languages, Regular expressions, Non deterministic and deterministic finite automata, Context free grammars, ambiguous CFG.

UNIT VII

Design of push down automata, design of Turing Machines, Chomsky Hierarchy.

Text books:

1. Carl Hamacher, Zvonko G. Vranesic – Computer Organization – Mcgraw-Hill International Editions – Computer science series – 1996.
2. Joe L Moh, Abraham Kandal and Theoder P Baker – Discrete Mathematics.
3. John E Hopcroft & Jeffery D Ullman – Introduction to Automata Theory, Languages and Computation – Addison wesly.

DATABASE MANAGEMENT SYSTEMS

UNIT-I: Introduction

Database systems – data models – instances and schemes – database models – Relational Hierarchical and network – data independence – DDL and DML – database manager – database Administrator – database users – Overall system architecture.

UNIT-II: Relational Model

Structure of relational databases – the relational algebra – the tuple relational calculus and the Domain relational calculus – Relational commercial languages – SQL/QUEL/QBE.

UNIT-III: Integrity constraints

Domain constraints – referential integrity – functional dependencies – assertions and triggers.

UNIT-IV: Database Design

Introduction to E-R concepts – details of R-R modeling-additional E-R concept – case study – Normalization – functional dependencies – lossless decompositions – Normal forms – Additional design considerations.

UNIT-V: File and system Architecture

File Organization – sequential files – mapping relational data to files – data dictionary storage-Buffer management – indexing – B+ tree index files – static and dynamic hash functions – Index definition in SQL/Cluster.

UNIT VI: Crash Recovery

Failure classification-log based recovery-shadow paging.

UNIT-VII: Concurrency control

Schedules testing for serializability-lock based protocols-time stamp based protocols-validation techniques-multiversion schemes.

UNIT-VIII: Integrity, views, Security and Catalogs.

Integrity constraints – creating views – Security: the Grant statement in SQL – system catalogs and schemas.

TEXT BOOKS:

1. Henry F Korth and Abraham Silber Schatz – “Database system Concepts”, MGH.
2. Patrick O’Neil and Elizabeth O’neil- “Database principles, programming and performance, 2nd edition.

OPERATING SYSTEMS

UNIT-I

Operating System Introduction, Structures – Simple Batch, multi programmed, time-shared, personal computer, parallel, distributed systems, Real-time systems, system components, Operating-system services, system calls, virtual machines, system design and implementation

UNIT-II

Process and CPU Scheduling – Process concepts and scheduling, operation on processes, cooperating processes, threads and interposes communication scheduling, criteria, scheduling, algorithm, multiple-processor scheduling, Real-Time scheduling.

UNIT-III

Memory Management and Virtual Memory - Logical versus physical address space, swapping, contiguous allocation, paging, segmentation, segmentation with paging, demand paging, performance of demanding paging, page Replacement, Page Replacement Algorithm, Allocation of frames, Thrashing.

UNIT-IV

File System Interface and Implementation – Access methods, Directory structure, protection, file system structure, allocation methods. Free-space Management, Directory Management, Directory implementation, Efficiency and performance.

UNIT-V

Process management and Synchronization – The critical section problem synchronization Hardware, semaphores and classical problem of synchronization, critical regions, Monitors.

UNIT-VI

Deadlocks – System model, dead locks characterization, Methods for handling dead locks deadlock prevention, deadlock avoidance, deadlock detection and recovery from deadlock.

UNIT-VII

Case Study – I – Unix - Design principles, programmer interface, User interface, process management, memory management, file system, I/O system, inter process communication.

UNIT-VIII

Case Study – II – Linux System - Design principles, Kernel modules, process management, scheduling memory management, file systems, input and output interposes communication, network structure, security.

TEXT BOOKS

- 1) Operating Systems Concepts – Abraham Silberschatz and Peter Baer Galvin-John Wiley & Sons, Inc., 5th Edition.

COMPUTER VISION AND GRAPHICS

Raster scan Graphics displays: basics, DDA line derivation and algorithm, Bresenham's line derivation and algorithm. Bresenham's Circle and ellipse derivations and algorithm. Frame buffers, addressing the raster and character display.

Polygons and 2D transformations: generation of polygons, filling routines: edge list, edge fill, flag and seed fill algorithms. Scaling, rotation, Translation, homogenous coordinates and rotation about an arbitrary point.

Segments and windowing and clipping: segment tables-segmented display file-other data structures for files. Window, view port, viewing transformations, clipping, polygon and line clipping algorithms.

3-D graphics: 3-D primitives, 3-D transformations, projections-parallel, isometric, and perspective projections.

3-D graphics-II: 3-D clipping, hidden surface removal, painter's algorithm, overlapping edges, shading algorithms.

Image analysis and computer vision: representation of binary and gray level images. Introduction, spatial features, edge detection techniques.

Image Enhancement: Enhancement by point processing: some simple intensity transformations, histogram processing, histogram equalization, image subtraction, image averaging, spatial filtering.

Morphological structure: skeleton algorithm, thinning algorithm, Morphological processing and transforms. Image segmentation-window slicing, component labeling, boundary based approaches, region based approaches.

Text Books:

1. Procedural elements for Computer Graphics: David F. Rogers. McGraw-Hill International editions.
2. Digital Image processing: Addison-Wesley publishing company – Rafael C. Gonzalez Richard E. Woods.
3. Fundamentals of digital image processing – Anil K. Jain-Prentice – Hall of India – Private Limited.

COMPUTER COMMUNICATIONS

UNIT-I

Network hardware – Reference models – Transmission media – Narrowband ISDN – Broadband ISDN – ATM.

UNIT-II

The Data link layer – Design issues – Error detection and correction – Elementary Data Link protocols – sliding window protocols – Data link layer in HDLC, Internet and ATM.

UNIT-III

Channel allocation methods – TDM, FDM, ALOHA, Carrier sense multiple access protocols, collision free protocols – IEEE standard 802 for LANS – Ethernet, token bus, Token ring-Bridges.

UNIT-IV

Network Layer – Routing, Algorithms – shortest path, flooding, flow based, distance vector, link state, Hierarchical, Broadcast routing, Congestion Control algorithms – General principles of congestion control, congestion prevention policies, choke packets and load shedding.

UNIT-V

Internet Working – Tunneling, internetworking, fragmentation, network layer in Internet – IP protocols, IP address, subnets, internet control protocols, OSPF, BGP, internet multicasting, mobile IP. Network layer in the ATM networks – cell formats, connection setup, routing and switching, service categories, and quality of service, ATM LANs.

UNIT-VI

The Transport Layer – Elements of transport protocols – addressing, establishing a connection, realising connection, flow control and buffering and crash recovery, END to END PROTOCOLS – UDP, reliable byte stream (TCP) – end to end format, segment format, connection establishment and termination, sliding window revisited, adaptive retransmission, TCP extension, Remote Procedure Call – BLAST, CHAN, SELECT, DCE.

UNIT-VII

Application Layer – Network security – cryptographic algorithms – DES, RSA, Security mechanisms – Authentication protocols, message integrity protocols – firewalls-filter based firewalls-proxy based firewalls, limitations.

UNIT-VIII

Application Layer – Name Service (DNS), Domain Hierarchy, Name servers, Name resolutions, Traditional Applications – SMTP, MIME, World wide web – HTTP, Network Management – SNMP.

TEXT BOOK:

1. COMPUTER NETWORKS – ANDREW TANENBAUM, Prentice Hall of India, New Delhi – Third Edition.
2. COMPUTER NETWORKS – A SYSTEMS APPROACH – Larry L. Peterson & Bruce S. Davie – Second Edition – Harcourt Asia PTE LTD.