

# TECHNOCRATS INSTITUTE OF TECHNOLOGY

(An Autonomous Institute Affiliated to RGPV Bhopal)

DEPARTMENT OF COMPUTER APPLICATIONS

Semester		I		Program		MCA				
Subject Code:		MCA-101	Subject Name		Discrete Mathematics and Linear Algebra					
Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical		Total Marks					
ES	MS	Assignment/Quiz	ES	LW						
70	20	10	-	-	100	2	1	-	3	

UNITs	Descriptions
I	<b>Sets, Relations and Functions:</b> Sets, Subsets, Power sets, Complement, Union and Intersection, Demorgan's law Cartesian products, Relations, relational matrices, properties of relations, equivalence relation, functions, Injection, Surjection and Bijective mapping, Composition of functions, the characteristic functions and Mathematical induction.
II	<b>Boolean Algebra</b> Unit I- Boolean algebra: Introduction of Boolean algebra, truth table, basic logic gate, basic postulates of Boolean algebra, principle of duality, canonical form, Karnaugh map.
III	<b>Linear Algebra</b> Vectors: Vectors and spaces Linear combinations and spans: Vectors and spaces Linear dependence and independence: Vectors and spaces Subspaces and the basis for a subspace: Vectors and spaces Vector dot and cross products: Vectors and spaces Matrices for solving systems by elimination: Vectors and spaces Null space and column space Functions and linear transformations: Matrix transformations Linear transformation examples: Matrix transformations Transformations and matrix multiplication: Matrix transformations Inverse functions and transformations: Matrix transformations Finding inverses and determinants: Matrix transformations More determinant depth: Matrix transformations Transpose of a matrix
IV	<b>Matrices and Eigen value Problems</b> Matrices - Rank of a Matrix - Consistently of a system of linear equations - Solution of the matrix equation - Row - reduced Echelon Form - Eigenvalues and Eigenvectors - Properties - Cayley - Hamilton Theorem - Inverse of a matrix.
V	<b>Graph Theory</b> Finite graphs, incidence and degree, isomorphism, sub graphs and union of graphs, connectedness, walk,

paths, and circuits Eulerian graphs ,tree properties of trees, pendant vertices in tree, center of tree, spanning trees and cut vertices, binary tree ,matrix representation of graph, incidence and adjacency matrix and their properties, applications of graphs in computer science.

#### Reference Books-

1. J.P. Trembley & R.P. Manohar "Discrete Mathematical Structure with applications to Computer Science".
2. Kenneth H. Rosen-203 "Discrete Math & its Applications" 5th ed.
3. K.A. Ross and C.R.B. Writht "Discrete Mathematics ".
4. Bernard Kolman & Robert C. Busby "Discrete Mathematical Structures for Computer Science".

Note : Paper is to be set unit wise with internal choice.









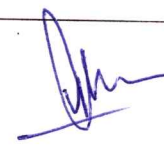

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## DEPARTMENT OF COMPUTER APPLICATIONS

Semester		I		Program		MCA				
Subject Code:		MCA-102	Subject Name		Object Oriented Programming using C++ & Problem solving					
Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical		Total Marks					
ES	MS	Assignment/Quiz	ES	LW		L	T	P		
70	20	10	-	-	100	2	1	-	3	

UNITs	Descriptions
I	C++ basics, decisions and loops: for, while, do-while, functions, storage classes, array: 1-dimensional and 2-dimensional and pointers: basics of pointers, pointers and array, passing pointer in function.
II	Concept of oops, object, class, encapsulation, access modifiers: public, private and protected, constructor and destructor, polymorphism: function and operator overloading, inline function, friend function.
III	Inheritance, types of inheritance, multiple inheritance, abstract classes, early and late binding, problem associated with late binding, constructor with inheritance, inheritance and pointer, virtual function.
IV	C++ I/O system, formatted I/O, creating insertors and extractors, file I/O basis, text file and binary file, creating disk files and file manipulations: adding new records, deleting old records, searching and changing existing records using file manipulation functions (like: seekg(), seekp(), tellg() and tellp()).
V	UML concepts, object-oriented paradigm and visual modeling, UML diagrams, UML specifications, object model, object-oriented design, identifying classes and object, object diagrams.

#### Reference Books-

1. Lafore R. "Object Oriented Programming in C++", Galgotia Pub.
2. Lee "UML & C++ a practical guide to Object Oriented Development 2 ed, Pearson.
3. Schildt "C++ the complete reference 4ed, 2003.
4. Hans Erit Eriksson "UML 2 toolkit" Wiley.
5. Balagurusawmy "Object Orienter Programming with C++".
6. B.G., Boach "Object Oriented Analysis & Design with Applications", Addison Wesley.
7. S. Parate "C++ Programming", BPB.
8. Boggs "Mastering UML" BPB Publications.

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## DEPARTMENT OF COMPUTER APPLICATIONS

Semester		I		Program		MCA				
Subject Code:		MCA-103	Subject Name		Data Structure and Applications					
Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical		Total Marks					
ES	MS	Assignment/Quiz	ES	LW		L	T	P		
70	20	10	-	-	100	2	1	-	3	

UNITs	Descriptions
I	<b>Data Structure Prerequisites:</b> Array, Structure, pointers, pointer to structure, functions, parameter passing, recursion. <b>Stack and Queue:</b> contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack; evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback; circular queue; various operations on queue; linked implementation of stack and queue- operations
II	<b>General List:</b> list and it's contiguous implementation, it's drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; linked list using arrays.
III	<b>Trees:</b> definitions-height, depth, order, degree, parent and child relationship etc; Binary Trees- various theorems, complete binary tree, almost complete binary tree; Tree traversals-preorder, in order and post order traversals, their recursive and non recursive implementations; expression tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree. Heap-definition.
IV	<b>Searching, Hashing and Sorting:</b> requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; hashing-basics, methods, collision, resolution of collision, chaining; Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.
V	<b>Graphs:</b> related definitions: graph representations- adjacency matrix, adjacency lists, adjacency multilist; traversal schemes- depth first search, breadth first search; Minimum spanning tree; shortest path algorithm; kruskals & dijkstras algorithm.

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Miscellaneous features Basic idea of AVL tree- definition, insertion & deletion operations; basic idea of B-tree- definition, order, degree, insertion & deletion operations; B+-Tree- definitions, comparison with B-tree; basic idea of string processing.

**Reference Books-**

1. Kruse R.L. Data Structures and Program Design in C; PHI
2. Aho "Data Structure & Algorithms".
3. Trembly "Introduction to Data Structure with Applications".
4. Tennenbaum A.M. & others: Data Structures using C & C++; PHI
5. Horowitz & Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.
6. Yashwant Kanetkar, Understanding Pointers in C, BPB.

Note : Paper is to be set unit wise with internal choice.





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## DEPARTMENT OF COMPUTER APPLICATIONS

Semester		I		Program		MCA				
Subject Code:		MCA-104	Subject Name		Operating system and Architecture					
Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical		Total Marks					
ES	MS	Assignment/Quiz	ES	LW		L	T	P		
70	20	10	-	-	100	2	1	-	3	

UNITs	Descriptions
I	<p>Register Transfer Language and Micro-operations: Concept of bus, data movement among registers, a language to represent conditional data transfer, data movement from/to memory.</p> <p>Design of simple Arithmetic &amp; Logic Unit &amp; Control Unit, arithmetic and logical operations Along with register transfer, timing in register transfer.</p> <p>Architecture of a simple processor: A simple computer organization and instruction set, instruction formats, addressing modes, instruction cycle, instruction execution in terms of microinstructions, interrupt cycle, concepts of interrupt and simple I/O organization, Synchronous &amp; Asynchronous data transfer, Data Transfer Mode: Program Controlled, Interrupt driven, DMA (Direct Memory Access).</p> <p>Implementation of processor using the building blocks. Pin Diagram of 8086, Architecture of 8086.</p>
II	<p>Introduction: Evolution of operating systems (History of evolution of OS with the generations of computers), Types of operating systems, Multitasking, Timesharing, Multithreading, Multiprogramming and, Real time operating systems, Different views of the operating system, System Programmer's view, User's view, Operating system concepts and structure, Layered Operating Systems, Monolithic Systems.</p> <p>Processes: The Process concept, The process control block, Systems programmer's view of processes, Operating system services for process management, Scheduling algorithms, First come first serve, Round Robin, Shortest run time next, Highest response ratio next, Multilevel Feedback Queues, Performance evaluation of scheduling algorithms stated above</p>
III	<p>Memory Management : Memory management without swapping or paging, Concepts of swapping and paging, Page replacement algorithms namely, Least recently used, Optimal page replacement, Most recently used, Clock page</p>





	replacement, First in First out (This includes discussion of Belady's anomaly and the category of Stack algorithms), Modeling paging algorithms, Design issues for paging system, Segmentation, Segmented Paging, Paged Segmentation
IV	Inter-process Communication and Synchronization: The need for inter-process synchronization, Concept of mutual exclusion, binary and counting semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, Classical problems in concurrent programming, Dining Philosopher's problem, Bounded Buffer Problem, Sleeping Barber Problem, Readers and Writers problem, Critical section, critical region and conditional critical region, Monitors and messages. Deadlocks: Concepts of deadlock detection, deadlock prevention, deadlock avoidance. Banker's Algorithm
V	File System: File systems, directories, file system implementation, security protection mechanisms. Input/output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access. Principles of I/O software: Goals interrupt handlers, device drivers, and device independent I/O software. User space I/O Software. Disks: Disk hardware, Disk scheduling algorithms (namely First come first serve, shortest seek time first, SCAN, C-SCAN, LOOK and C-LOOK algorithms) Error handling, track-at-a-time caching, RAM Disks. Clocks: Clock hardware, memory-mapped terminals, I/O software.

#### Reference Books-

1. Milenkovic, M., "Operating Systems - concepts and Design" McGraw Hill International Edition Computer Science series 1992.
2. Galvin P., J.L. Abraham Silberschatz. "Operating System Concepts". John Wiley & Sons Company, 1989.
4. Tanenbaum, A.S. "Modern Operating System", Prentice Hall of India Pvt. Ltd. 1995.
3. William Stallings "Operating Systems", Prentice Hall of India Pvt. Ltd.
4. M. Morris Mano, "Computer System Architecture", PHI, 3rd edition, 1993
5. Liu and Gibson, "8086/8088 Micro processor Assembly Language"

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DEPARTMENT OF COMPUTER APPLICATIONS

Semester		I		Program		MCA				
Subject Code:		MCA-105	Subject Name		Software Engineering Methodologies					
Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical		Total Marks					
ES	MS	Assignment/Quiz	ES	LW		L	T	P		
70	20	10	-	-	100	2	1	-	3	

UNITs	Descriptions
I	<b>System concepts and Software Engineering paradigms:</b> The system concept, characteristics of system, elements of system, The System Development Life Cycle, The Role of System Analyst. various information gathering tools, feasibility study & structures tools of system analysis, Software Requirement – Initial Requirements, Document – SRS Document - Requirements Change Management - Project Management
II	<b>Software Process, Product and Project:</b> The Product : Software, Software Myths, The process : Software Engineering : A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Software Process Models, Component – Based Development, Fourth Generation Techniques, Software process and Project Metrics : Software measurement
III	<b>Software Project Planning and Design:</b> Software Project Planning : Project planning objectives, Decomposition Techniques, Empirical estimation models, The Make/Buy Decision., Risk analysis. Software Design: Design Principles, Cohesion & Coupling, Design notation and specification, structure design methodology.
IV	<b>Software Quality Assurance and Testing:</b> Software Quality Assurance : Quality Concepts, The Quality Movement, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Statistical Software Quality Assurance, Software Reliability, Mistake Proofing for Software, Introduction to ISO standard. Testing Strategies: A strategic approach of software testing strategic issues, unit testing, integration testing, validation testing, system testing, the art of debugging. OOA, OOD.

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V	<b>UML and DSS</b> Introduction to UML : Use Case Approach : Identification of Classes and Relationships, Identifying State and Behavior, Use Case Diagram, Class Diagram – State Diagram - Sequence Diagram – Activity Diagram – Deployment Diagrams Introduction to DSS: Decision Support System concepts, types of DSS. CASE tools, Re-engineering
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#### Reference Books-

1. R. S. Pressman, "Software Engineering – A practitioner's approach", 6th ed., McGraw Hill Int. Ed., 2002.
2. Pankaj Jalote "Software Engg" Narosa Publications.
3. Ian Sommerville : Software Engineering 6/e (Addison-Wesley)
4. Richard Fairley : Software Engineering Concepts (TMH)
5. Elis Awad, "System Analysis & Design", Galgotia publications
6. W.S. Jawadekar: Management Information Systems, TMH Publication, India
7. Hoffer "Modern System Analysis & Design" 3e, Pearson Edition

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