



SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Master of Computer Applications



Integrated MCA II Semester 3

Subject Name: Data Structures

Subject Code: IMCA13301

Type of course: Professional Core Course

Prerequisite (if any):

- C Programming Language
- Mathematical Fundamentals

List of Courses where this course will be prerequisite:

- Basic Mathematics
- Object Oriented Programming
- Database management Systems
- Computer Networks
- Machine Learning

Rationale: Data structure and algorithms help in understanding the nature of the problem at a deeper level. This helps the graduate to write efficient code while developing solutions to the problems in computer science.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks		Practical Marks		Total
L	T	P	C	TEE	CAT	TEP	CAP	
3	0	0	3	60	40	-	-	100

CAT: Continuous Assessment Theory comprised of CA1 and CA2 **CA1:** Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CAP:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course





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Content:

Sr. No.	Content	Teaching Hrs.	Module Weightage
1	Introduction to Data Structures: Definition, Types and Operations of Data Structures. Arrays: Definition and Types of Arrays, Storage Structure for Arrays in Memory, Operations on Linear Arrays: Traversing, Inserting, Deleting, Searching, Sorting and Merging.	03	07%
2	Searching: Linear Search and Binary Search, Comparison of Methods. Sorting: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort.	07	15%
3	Stacks: Definition, Representation of Stacks using Arrays, Operations on Stacks using Array, Application of Stacks: Arithmetic Expressions, Polish Notation, Conversion of Infix Expression to Postfix Expression, Evaluation of Postfix Expression. Queues: Definition, Representation of Queues using Array, Types of Queue: Simple Queue, Circular Queue, Double-Ended queue, Priority Queue, Operations on Simple Queues and Circular Queues using Array, Applications of Queues.	12	27%
4	Linked Lists: Definition, Comparison with Arrays, Representation, Types of Linked lists: Singly Linked List, Doubly Linked List and Circular Linked List, Operations on Lists: Traversing, Inserting, Deleting and Searching in lists.	12	27%
5	Graphs: Definition, Storage Representation of Graphs, Directed/Undirected Graphs, Weighted/Unweighted Graphs, Paths of different lengths, Cycle, Cyclic Graphs, Acyclic Graphs, Spanning Trees, Shortest Path, Traversal. Trees:	11	24%





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	Definition, Terminology, Binary Trees, Traversal of Binary Tree, Binary Search Tree, Inserting, Deleting and Searching in Binary Search Tree, Height Balanced Trees: AVL Trees, Insertion and Deletion in AVL Tree, 2-3 Trees, and Weight Balanced Tree.		
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Suggested Specification table with Marks (Theory):

%Distribution of Marks					
R Level	U Level	A Level	N Level	E Level	C Level
30	40	15	15	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom’s Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Sr. no.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Expert Data Structures with C	R.B. Patel	Khanna Book Publishing Company	2023	4 th Edition
2	Data Structures with C	Seymour Lipschutz	Schaum’s Outlines, Tata McGraw-Hill	2011	2 nd Edition
3	Data Structures Through C	Yashavant Kanetkar	BPB Publications	2022	4 th Edition
4	Data Structures Using C	Reema Thareja	Oxford University Press	2014	2 nd Edition
5	Fundamentals of Data Structures in C	Ellis Horowitz, SartajSahni, and Susan Anderson-Freed	Universities Press	2007	2 nd Edition
6	An Introduction to Data Structures with Applications	Jean-Paul Tremblay, Paul G. Sorenson	Tata McGraw-Hill ISBN: 9780070651500	2007	2 nd Edition





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7	Data Structures and Algorithm Analysis in C	Mark Allen Weiss	Pearson Education ISBN: 8177583581	2002	2 nd Edition
8	Design and Analysis of Algorithms	Parag H Dave, Himanshu B Dave	Pearson Education ISBN: 9332585482	2017	3 rd Edition
9	Introduction to Algorithms	Thomas H. Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein	The MIT Press, ISBN: 978- 0262033848	2009	3 rd Edition

Course Outcomes:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % Weightage
CO-1	Understand the fundamental concepts of data structures and apply the concept of arrays	07
CO-2	Perform sorting and searching operations and analyse the sorting techniques	15
CO-3	Implement stack, queue	27
CO-4	Apply linked list operations	27
CO-5	Understand the fundamentals of Trees and Graphs	24





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Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13
CO-1	3	1	2	2	1	1	0	2	0	0	1	0	0
CO-2	3	2	3	2	1	1	0	2	0	0	0	0	0
CO-3	3	1	2	2	1	1	0	1	0	0	1	0	0
CO-4	3	1	2	2	1	1	0	1	0	0	1	0	0
CO-5	3	2	3	2	1	1	1	1	0	1	1	0	0
Rationale*													

Rationale*: Explaining why it is matching this particular program outcome

List of Open learning website:

- https://www.tutorialspoint.com/data_structures_algorithms/index.htm
- <https://www.geeksforgeeks.org/data-structures/>
- <https://www.javatpoint.com/data-structure-tutorial>

List of Open-Source Software:

- Inbuilt compiler GCC available on UBUNTU

Major Equipment Needed: NA

