COURSE HANDOUT

DATA STRUCTURES (MCA-201)

MCA-2ND SEMESTER

ACADEMIC YEAR (2025-26)

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Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
MCA-201	Data Structures	Core	4	4	0	0	**40**	**60**	100

COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	To impart the basic concepts, implementations, and analysis of data structures
CO2	To introduce various techniques for representation of the data in the real world.
CO3	To strengthen the ability to solve problems with the help of fundamental data structures.
CO4	Student will be able to implement appropriate data structure in various domains.

Unit-I

Fundamental Notations: Primitive and composite data types, self-referential structures, Algorithms, Types of data structures, Operations, Time and space complexity of algorithms, Asymptotic notation.

(12 Hours)

Unit-II

Linear Data Structures: Arrays, Linked lists, Stacks, Queues, operations and their complexities, Implementations, Applications.

(8 Hours)

Unit-III

Non-Linear Data Structures: Trees, Binary Trees, traversing binary trees, threaded binary trees, Binary search trees, heaps, Graphs, Traversing graphs.

(10 Hours)

Unit- lV

Indexing Structures: ISAM, m-way trees, B–trees, B+–trees, Hashing techniques for direct access, Collision in hashing, Collision resolution.

(8 Hours)

Unit-V

Sorting & Searching: Internal and External sorts, Bubble sort, Insertion sort, Selection sort, Shell sort, Quick sort, Radix sort, Merge sort, Types of merging. Searching-linear and binary search methods, Comparison of sorting and searching methods.

(8 Hours)

Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Data Structure using C	Langsam, Yedidyah, Moshe J. Augenstein, and Aaron M. Tenenbaum	Pearson Education	1st (2019)
2.	Data Structure and Program Design in C	Robert L. Kruse and Bruce P. Leung	Pearson Education	2nd (2006)

Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Fundamentals of Data Structures	Horowiz E. and Sahni S.	Universities Press	2nd (2008)

2	An Introduction to Data Structures with Application	Jean-Paul Tremblay and Paul Sorenson	McGraw Hill Education	2nd (2017)
3	Data Structures with C	Seymour Lipschutz	Schaum Outlines	2011.
4	"Fundamentals of Data Structures in C",	Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed,	Universities Press	2008
5	Data Structures and Algorithms	Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman,	Pearson Education India	2001

COURSE PLAN		
Unit-I Fundamental Notations		
S.No	**Topics**	**Recommended Books**
1	Primitive and composite data types	Book 2, Ch.1
2	Self-referential structures	Book 2, Ch.1
3	Algorithms	Book 1, Ch.2
4	Types of data structures	Book 2, Ch.2
5	Operations	Book 2, Ch.2
6	Time and space complexity of algorithms	Book 2, Ch.2
7	Asymptotic notation	Book 2, Ch.2
Unit-II Linear Data Structures		
8	Arrays	Book 1, Ch.2
9	Linked lists	Book 1, Ch.3
10	Stacks	Book 2, Ch.3
11	Queues	Book 2, Ch.4
12	Operations and their complexities	Book 2, Ch.4
13	Implementations	Book 2, Ch.4
14	Applications	Book 2, Ch.4
Unit-III Non-Linear Data Structures		
15	Trees	Book 2, Ch.4
16	Binary Trees	Book 2, Ch.4
17	Traversing binary trees	Book 2, Ch.4
18	Binary search trees	Book 2, Ch.5
19	Threaded binary trees	Book 2, Ch.5
20	Heaps	Book 2, Ch.5
21	Graphs and Traversing graphs	Book 1, Ch.11
Unit-IV Indexing Structures		
22	ISAM	Book 2, Ch.12
23	m-way trees	Book 1, Ch.8
24	B–trees	Book 1, Ch.8
25	B+–trees	Book 1, Ch.8
26	Hashing techniques for direct access	Book 1, Ch.8
27	Collision in hashing	Book 1, Ch.8
28	Collision resolution	Book 1, Ch.8

Unit-V Sorting & Searching		
29	Internal and External sorts	Book 1, Ch.7
30	Bubble sort	Book 1, Ch.7
31	Insertion sort	Book 2, Ch.7
32	Selection sort	Book 1, Ch.7
33	Shell sort	Book 1, Ch.7
34	Quick sort	Book1, Ch. 7
35	Radix sort	Book 2,Ch 7
36	Types of merging	Book 2, Ch.7
37	Searching-linear and binary search methods	Book 2, Ch.7
38	Comparison of sorting and searching methods	Book 2, Ch.7

ADDITIONAL WEB RESOURCES

1.	**MOOC:** Data Structures and Algorithms Specializations https://www.coursera.org/specializations/data-structures-algorithms
2.	**NPTEL:** Video lectures on Data Structures & Program Design Lecture Series by Dr. J. Indumathi, Professor, Anna University, Chennai https://onlinecourses.swayam2.ac.in/cec24_cs07

GRADING AND ASSESSMENT

- **Sessional Test**: 20 marks
- **Assignment**: 10 marks
- **Attendance**: 10marks
- **Final Examination**: 60 marks

COURSE POLICIES

- **Attendance**: Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity**: MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions**: Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**

  Monday (12:05 PM - 12:55 PM)
  Friday (12:05 PM - 12:55 PM)

- **Contact Information**
  amita.bca@mietjammu.in