

USN

--	--	--	--	--	--	--	--	--

Course Code

M	M	C	2	0	3
---	---	---	---	---	---

Second Semester MCA Degree Examinations, August 2026
DATA STRUCTURE AND ALGORITHMS

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO: PI)</u>
<u>MODULE – 1</u>			
1. a.	What are data structures, why are they important, and how can we analyze the performance of algorithms built upon them?	10	(1.2.1:1:1)
b.	What is an array? Demonstrate any two operations of an array with an algorithm.	10	(1.2.1:1:2)
(OR)			
2. a.	Mention and describe different types of arrays. Illustrate its uses.	10	(1.2.1:1:1)
b.	Define recursion. Demonstrate the usage of recursive functions using Fibonacci series.	10	(1.2.1:1:2)
<u>MODULE – 2</u>			
3. a.	What is stack? Describe with its operations.	10	(2.2.1:2:2)
b.	Define singly linked list. Develop with an example program.	10	(2.2.1:2:1)
(OR)			
4. a.	Define queues. Describe the operations along with algorithms.	10	(2.3.1:2:2)
b.	Convert the following expressions from infix to postfix: (i) $A + (B * C + D) / E$ (ii) $(A + B) * (C + D)$	10	(3.2.1:2:3)
<u>MODULE – 3</u>			
5. a.	Define the following terms:	10	(4.2.1:3:1)
b.	Demonstrate with algorithm the working of BFS. Root (ii) Node (iii) Height (iv) Depth (v) Leaf node	10	(5.3.1:3:2)
(OR)			
6. a.	Describe with algorithm different methods of traversals of BST.	10	(5.2.2:3:2)
b.	Illustrate the Dijkstra's algorithm.	10	(6.2.1:3:3)
<u>MODULE – 4</u>			
7. a.	What is comparison sort? Demonstrate selection sort for the following elements : 45, 20, 40, 5, 15, 25, 50, 35, 30, 10.	10	(6.2.1:4:1)
b.	Design the program for finding an element using Binary search.	10	(5.2.1:4:2)
(OR)			
8. a.	Demonstrate merge sort with its algorithm and example.	10	(4.2.1:4:3)
b.	Describe briefly about Hashing technique.	10	(5.2.2:4:1)
<u>MODULE – 5</u>			
9. a.	Define Heap. Briefly explain its operations and applications.	10	(5.3.1:5:2)
b.	What is the principle of dynamic programming? Describe it briefly.	10	(4.2.1:5:1)

(OR)

- | | | | | |
|------------|-----------|---|-----------|--------------------|
| 10. | a. | What is segment tree? Describe how to construct a segment tree with an example. | 10 | (5.2.1:5:2) |
| | b. | Design the case study as described: “A real-world library system would involve more complex data structures, algorithms, and error handling. The choice of data structure and algorithm depends on the specific requirements of the system, such as the expected size of the library, the frequency of different operations, and the need for efficient searching and | 10 | (5.2.1:5:1) |

** ** *