

**BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE  
(AUTONOMOUS)**

*I – MCA I - Semester Supplementary Examinations (BR23), February - 2026*

**DATA STRUCTURES (MCA)**

Time: 3 hours

Max. Marks: 70

*Answer any Five Questions One Question for One UNIT  
ALL the Question Carry Equal Marks*

	<b>UNIT-I</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
1.a) What is the difference between constants and variables in programming, and how are they used in a program? Explain.		7M	CO 1	BL 2
b) Show the correct hierarchy of arithmetic operators in C with an example for the following. (1) **, * or /, + or - (2) **, *, /, +, - (3) **, /, *, +, - (4) / or *, - or +		7M	CO 1	BL 2
<b>OR</b>				
2.a) How to manage the input and output operators in C? Explain with an example.		7M	CO 1	BL 2
b) How can decision-making be implemented in C programming using control structures like if, if-else, and switch? Explain.		7M	CO 1	BL 2
	<b>UNIT-II</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
3.a) Define the function. Why are functions needed? Explain.		7M	CO 2	BL 1
b) Determine the program to find whether a number is even or odd using functions.		7M	CO 2	BL 5
<b>OR</b>				
4.a) How to copy and compare the structures? Explain with an example.		7M	CO 2	BL 2
b) List the applications of pointers. Illustrate the null pointers.		7M	CO 2	BL 2
	<b>UNIT-III</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
5.a) Explain the different types of data structures. Also discuss their merits and demerits		7M	CO 3	BL 2
b) List the types of recursion. Analyze the recursive factorial function with an example.		7M	CO 3	BL 4
<b>OR</b>				
6.a) How to insert a new node in a linked list? Explain		7M	CO 3	BL 2
b) Elaborate the memory representation of a circular doubly linked list with a neat sketch.		7M	CO 3	BL 6

**Marks      CO      BL**

**UNIT-IV**

- |   |    |      |      |
|---|----|------|------|
| 7.a) Illustrate the push, pop and peek operations on a stack  | 7M | CO 4 | BL 2 |
| b) Design the queue structure in each case when the following operations are performed on an empty queue.<br>(a) Add A, B, C, D, E, F (b) Delete two letters (c) Add G (d) Add H<br>(e) Delete four letters (f) Add I | 7M | CO 4 | BL 6 |

**OR**

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|--|----|------|------|
| 8.a) Summarize the properties of a good hash function and calculate the hash value for keys 1234 and 5642 using the mid-square method. The hash table has 100 memory locations | 7M | CO 4 | BL 2 |
| b) Explain the linear probing with an example.   | 7M | CO 4 | BL 2 |

**UNIT-V**

- |   | <b>Marks</b> | <b>CO</b> | <b>BL</b> |
|---|--------------|-----------|-----------|
| 9.a) Explain the difference between bubble sort and quick sort. Which one is more efficient?                  | 7M           | CO 5      | BL 2      |
| b) What are the two ways of representing binary trees in the memory? Which one do you prefer and why? Explain | 7M           | CO 5      | BL 2      |

**OR**

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|--|----|------|------|
| 10.a) What is the maximum height of a tree with 32 nodes? Explain.   | 7M | CO 5 | BL 2 |
| b) Design an expression, $Exp = ((a + b) - (c * d)) \% ((e \wedge f) / (g - h))$ , construct the corresponding binary tree with a neat sketch. | 7M | CO 5 | BL 6 |

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