Code No.: R22AI203ES	R22	H.T.No.			8	R						

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
I–B.TECH–II–Semester End Examinations (Regular) - June- 2025
DATA STRUCTURES THROUGH C++
(Common for CSC, CSD, CSM)

[Time: 3 Hours] **[Max. Marks: 60]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(10 Marks)**

1. a)	What is the function template?	[1M]
b)	What do you mean by non-linear data structure? Give example.	[1M]
c)	Outline the advantages and disadvantages of an array.	[1M]
d)	What operations can be performed on stacks?	[1M]
e)	List the applications of binary tree.	[1M]
f)	Define a heap tree.	[1M]
g)	What is hash function?	[1M]
h)	List the different sorting algorithms.	[1M]
i)	Define adjacency matrix.	[1M]
j)	Give an example of a Red-Black Tree.	[1M]

PART-B **(50 Marks)**

2.a)	What is a friend function? Discuss its pros and cons with respective to normal member functions?	[5M]
b)	What is operator overloading? Write a C++ program illustrating operator overloading.	[5M]
	OR	
3.a)	Design an algorithm for Fibonacci search.	[5M]
b)	Discuss in detail asymptotic notations with an example.	[5M]
4.a)	Explain the procedure to insert and delete element from sparse matrix.	[5M]
b)	Write an algorithm to evaluate postfix expression.	[5M]
	OR	
5.a)	Inspect the process of inserting a single linked list.	[5M]
b)	Assess the way of representing the stack using the arrays.	[5M]
6.	Explain binary tree traversals: inorder, preorder and postorder. Write algorithms and give examples for each.	[10M]
	OR	
7.a)	Demonstrate priority queues. Discuss their real-world applications.	[5M]
b)	Discuss the applications of max-heaps in computer science.	[5M]
8.a)	Illustrate the linear search algorithm with example.	[5M]
b)	Explain any two Hash functions.	[5M]
	OR	
9.a)	Discuss the concept of quick sort with an example.	[5M]
b)	Explain the concept of merge sort in detail.	[5M]
10.a)	What is a graph? Explain the properties of graphs.	[5M]
b)	Differentiate BFS and DFS.	[5M]
	OR	
11.a)	Build an AVL tree with the following values: {15, 20, 24, 10, 13, 7, 30, 36, 25, 42, 29}	[5M]
b)	Explain about Binary search tree with suitable example.	[5M]

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