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

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
I–B.TECH–II–Semester End Examinations (Supply) – December - 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)	Define inheritance and polymorphism.	[1M]
b)	Classify the data structures.	[1M]
c)	Discuss the advantages and disadvantages of Arrays over Linked Lists.	[1M]
d)	Convert the expression (A + B) * C - (D - E) ^ (F + G)) to equivalent postfix notation.	[1M]
e)	Define tree.	[1M]
f)	State the main features of priority queues.	[1M]
g)	List the hashing techniques.	[1M]
h)	Compare quick sort and merge sort.	[1M]
i)	Write the applications of graphs.	[1M]
j)	Define Red black tree.	[1M]

PART-B   (50 Marks)

2.a)	Write a C++ program to swap two numbers using function templates.	[5M]
b)	Explain about throwing an exception.	[5M]

OR

3.a)	Apply the concept of recursive function to perform Fibonacci search on a given list of elements.	[5M] [5M]
b)	Define big- O notation and theta notation? Give examples.	

4.a)	Explain representation of arrays along with their advantages and disadvantages.	[5M]
b)	What is sparse matrix? How is it implemented using arrays?	[5M]

OR

5.	Develop a program to perform operations on a doubly linked list.	[10M]

6.	Explain threaded binary tree ADT in detail.	[10M]

OR

7.	Define max heap. Explain its properties and how it is used to implement a max-priority queue.	[10M]

8.a)	Write a C++ Program to search an element using binary search	[5M]
b)	Explain the concept hash table with an example.	[5M]

OR

9.a)	Define Sorting? Sort the following elements using Quick Sort? Give the time complexity of quicksort 9, 17, 5, 28, 3, 11, 7, 78, 1, 33, 8, 45, 2, 4, 12, 6, 34.	[7M]
b)	Explain Radix sort with example.	[3M]

10.a)	Explain about adjacency matrix and adjacency list.	[5M]
b)	Write an algorithm to traverse a graph using breadth first search.	[5M]

OR

11.a)	Discuss in detail about red -black trees.	[5M]
b)	Compare binary tree and binary search trees with example.	[5M]

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