01/02/25

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

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
I–B.TECH–II–Semester End Examinations (Supply) - January- 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)	State the purpose of exception handling mechanism.	[1M]
b)	Classify the data structures.	[1M]
c)	List the advantages of Circular Linked List.	[1M]
d)	Distinguish between stack and queue.	[1M]
e)	Define Tree.	[1M]
f)	Define priority queue.	[1M]
g)	Define hash function.	[1M]
h)	Illustrate the time complexity of merge sort.	[1M]
i)	Name the properties of a graph.	[1M]
j)	What is a balance factor in AVL trees?	[1M]

PART-B **(50 Marks)**

2.a)	Write a C++ program to swap two numbers using function templates.	[5M]
b)	Explain about different types of Inheritance with an example C++ program.	[5M]
	OR	
3.a)	How do you find the complexity of an algorithm? What is the relation between the time and space complexities of an algorithm?	[5M] [5M]
b)	Discuss in detail about asymptotic notations with an examples.	
4.a)	Explain the implementation of Sparse Matrix data structure in C++ programming using Singly Linked List.	[5M] [5M]
b)	With neat diagrams, explain the Insert and Delete operations in Doubly Linked List data structure.	
	OR	
5.a)	Write a C++ program to implement the Stack ADT using arrays.	[5M]
b)	Elaborate how to evaluate postfix expression.	[5M]
6.	Analyze the operations performed on a binary tree with suitable examples.	[10M]
	OR	
7.	Define Priority Queue. What are the real time applications of Priority Queues? Explain the implementation of Priority Queue with an example.	[10M]
8.a)	Illustrate the linear search algorithm using an array with example.	[5M]
b)	Explain the step by step procedure of Merge Sort method for sorting the following unordered list of elements 38, 27, 43, 3, 9, 82, 10.	[5M]
	OR	
9.a)	Illustrate the step by step procedure of Quick Sort method for sorting the following unordered list of elements 44,33,23,43,55,12,64,77,75.	[7M]
b)	Write the Best, Average and Worst case time complexities of Quick Sort.	[3M]

10.a) Write an algorithm to traverse a graph using breadth first search. [5M]

b) Explain about adjacency matrix and adjacency list of graph. [5M]

OR

11.a) Explain AVL Tree with an example. [5M]

b) Explain about Red-Black trees with example. [5M]

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