



M.C.A. I Semester Degree Examination, July - 2024

Data Structures with Algorithms

Time : 3 Hours

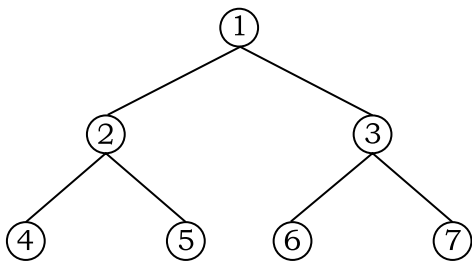
Maximum Marks : 70

Note : Answer *any five* of the following questions with question No. 1 (Q.1) **Compulsory**.

1. (A) Describe the classification of data structures based on their organization and usage, providing examples for each type. **7**
(B) Discuss the bubble sort algorithm, its implementation and analyze its time complexity. Provide an example to demonstrate its operation. **7**
2. (A) Implement a stack using arrays in C programming. Provide code snippets for push, pop, and peek operations. **7**
(B) Define the primitive operations of a queue and discuss how they are different from stack operations. **7**
3. (A) Explain the concept of linked lists and how they differ from arrays. Discuss the advantages and disadvantages of using linked lists compared to arrays. **7**
(B) Discuss the applications of linked lists in polynomial representation and sparse matrix manipulation. **7**
4. (A) Discuss the graph traversal techniques, such as depth-first search (DFS) and breadth-first search (BFS). **7**
(B) Introduce the basic concepts of graphs, including vertices, edges and graph terminology such as directed and undirected graphs, weighted and unweighted edges, and cycles. **7**
5. (A) Illustrate the construction of a binary search tree for the set of keys {5, 3, 8, 2, 4, 7, 9}. **7**
(B) Explain how rotations are used to maintain balance during insertion and deletion operations. **7**



6. (A) Explain the concept of a circular queue and discuss its advantages over a linear queue in certain scenarios. **7**
- (B) Differentiate between singly linked lists, circular linked lists, and doubly linked lists. Discuss the advantages and disadvantages of each type of linked list. **7**
7. (A) Discuss the different traversal techniques used in binary trees, including inorder, preorder and postorder traversals. Implement all the three traversal techniques for the tree given below. **7**



- (B) Provide examples to illustrate the process of hashing and collision resolution using techniques such as chaining and open addressing. **7**
8. Write short notes on the following :
- (A) Properties of Binary search tree **5**
- (B) Selection Sort **5**
- (C) Dequeue **4**

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