

TILAK MAHARASHTRA VIDYAPEETH, PUNE
MASTER OF COMPUTER APPLICATIONS
(Specialization in Data Science)
EXAMINATION : JANUARY - 2025
SEMESTER - I
Sub: Data Structures & Algorithms (MCDS 23-103)

Date : 08/01/2025

Total Marks : 60

Time: 2.00 pm to 4.30 pm

Instruction:

1. All questions are compulsory unless and otherwise stated.
2. Bold figures to the right of every question are the maximum marks for that question.
3. Candidates are advised to attempt questions in order.
4. Answers written illegibly are likely to be marked zero.
5. Use of scientific calculators, Log tables, Mollier Charts is allowed.
6. Draw neat and labelled diagram wherever necessary.

Q.1. Answer the following in 2-3lines. (Any 5) (10)

1. Give any two applications of queue.
2. Define deque and its types.
3. Define: (i) Complete binary tree (ii) Perfect binary tree.
4. What is weighted graph?
5. Write the time complexities of Insertion sort and Merge sort.
6. What is searching for algorithm? Define any one searching method.
7. Define time complexity.

Q. 2. Answer the following in short. (Any 4) (20)

1. What is Asymptotic Notation? List and explain the asymptotic notations.
2. Define Undirected graph. Explain the following graph operations with example:
(i) add vertex (ii) delete vertex
3. Explain divide and conquer algorithm with example.
4. Explain the difference between tree and graph.
5. Write a short note on priority queue.
6. What is singly linked list? Write an algorithm for delete a node to the beginning of a singly linked list.

Q. 3. Answer the following in detail. (Any 3) (30)

1. Explain heap as a data structure. Write an algorithm of insert operation in the max heap. Build a Max Heap by the following data arriving as a sequential set
23, 7, 92, 6, 12 14, 40, 44, 20, 21.
2. What is doubly linked list? Explain operations on doubly linked list.
Define B-Tree. Write and explain an algorithm to insert an element in a B-Tree.
3. Build a B-tree of order 4 by inserting data in the sequence given below:
92, 24, 6, 7, 11, 8, 22, 4, 5, 16, 19, 20, 78
4. Explain DFS algorithm with example.
5. What is sorting? Write and explain bubble sort algorithm with example and find its time complexity
