

# **KAMARAJ COLLEGE (Autonomous)**

Accredited with A+ Grade by NAAC

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

THOOTHUKUDI – 628 003

**(6 Pages)**

**Reg. No: .....**

**Question Code No : 25001413**

**Sub Code : 24PMCA22**

**PG Degree - End Semester Examinations, November 2025**

**Second Semester**

**M.C.A**

**Advanced Data Structures**

**(For those who joined in July 2024 onwards)**

**Time: 3 Hours**

**Maximum : 75 Marks**

**PART – A (10 × 1 = 10 Marks)**

**Answer ALL Questions**

**Choose the correct answer**

1. In the context of Sets in data structures, which of the following operations is NOT typically supported?
  - (a) Duplicate insertion
  - (b) Union
  - (c) Intersection
  - (d) Difference
2. What distinguishes a Map from a Set?

- (a) A Map stores values without keys, while a Set stores key-value pairs
  - (b) A Set allows duplicates, while a Map does not
  - (c) A Map stores key-value pairs, while a Set stores only values
  - (d) A Set is always ordered, while a Map is not
3. Which of the following is a characteristic of linear recursion?
- (a) A recursive function calls itself twice in each call
  - (b) A function makes a single recursive call and does constant work afterward
  - (c) Recursive calls are made in a tree-like manner
  - (d) The function has no base case
4. What is the time complexity of a standard binary recursive algorithm for computing Fibonacci numbers?
- (a)  $O(n)$
  - (b)  $O(\log n)$
  - (c)  $O(2^n)$
  - (d)  $O(n^2)$
5. What is a dequeue?
- (a) A queue implemented with both singly and doubly linked lists

- (b) A queue with insert/delete defined for both front and rear ends of the queue
  - (c) A queue with insert/delete defined for front side of the queue
  - (d) A queue implemented with a doubly linked list
6. Identify the name of all nodes that are at same level and share the same parent.
- (a) Siblings
  - (b) Ancestor
  - (c) Descendant
  - (d) Depth
7. What is the primary characteristic of a priority queue?
- (a) Elements are stored in a sorted array
  - (b) Elements are processed in random order
  - (c) Each element has a priority, and the highest priority is served first
  - (d) It uses LIFO order
8. What distinguishes a multimap from a map?
- (a) A multimap does not store key-value pairs
  - (b) A multimap allows multiple values for the same key
  - (c) A multimap only stores unique keys
  - (d) A multimap is unordered



13. (a) Define stack ADT and Explain about the simple array-based stack implementation and its operations.

**(OR)**

(b) Discuss the three iterative steps for Round Robin Scheduling using a Queue.

14. (a) Illustrate bottom-up heap construction of a heap.

**(OR)**

(b) List out the applications in which there is particular advantage of using a sorted map rather than a traditional map.

15. (a) Explain insertion and deletion operations for AVL trees.

**(OR)**

(b) Write an algorithm and analyze an efficient randomized quick-select.

**PART - C (5 X 8 = 40 Marks)**

**Answer ALL Questions choosing either (a) or (b).**

**Answer should not exceed 600 words.**

16. (a) Describe the concept of sets and how to implement the set ADT using list.

**(OR)**

(b) Describe the concept of the matrix abstract data type.

17. (a) Summarize the concept of linear recursion algorithm with example.

**(OR)**

(b) Discuss about the running time analysis to four recursive algorithms.

18. (a) Define tree and Explain about the properties of general tree with example.

**(OR)**

(b) Define deque ADT and Illustrate the concept of implementing a deque with a circular array.

19. (a) Write an algorithm for sorting with a priority queue and its execution of selection and insertion sort in detail.

**(OR)**

(b) Illustrate the concept of collision-handling schemes.

20 (a) Explore the working of divide and conquer and explain the quick-sort algorithm.

**(OR)**

(b) Explain the Prim-Jarnik algorithm for the minimum spanning trees problem.