

Roll No:

Date:

St. Claret College

Autonomous, Bengaluru

UG END SEMESTER EXAMINATION-MAY 2025

BSC - II SEMESTER

CS 224: DATA STRUCTURES

TIME: 3 hours.

9

MAX.MARKS: 80

This paper contains TWO printed pages and FOUR parts

Instructions:

1. Verify and ensure that the question paper is completely printed.
2. Any discrepancies or questions about the exam paper must be reported to the COE within 1 hour after the examination.
3. Students must check the course title and course code before answering the questions.

PART-A

Answer ALL questions. Each answer carries ONE mark.

[10 x 1 = 10]

1. _____ is a data structure used to organize elements hierarchically.
a) Tree b) Graph c) List d) Queue
2. Big Oh(O) notation is used to calculate the _____ time complexity of an algorithm.
a) Lower Bound b) Upper Bound c) Average Bound d) None of the above
3. What is the index of the first element of an array in C?
a) -1 b) 0 c) 1 d) Depends on the size of the array
4. What does a node in a singly linked list contain?
a) Data only b) Pointer only c) Data and Pointer d) Data and Two Pointers
5. Identify the correct statement about a circular linked list.
a) The last node points to the first node. b) It has a fixed size.
c) The last node points to NULL. d) It is always doubly linked.
6. Which of the following is NOT a valid stack operation?
a) Push b) Pop c) Peek d) Remove
7. The data structure used to evaluate postfix expressions is
a) Queue b) Stack c) Linked List d) Tree
8. The queue is implemented using
a) Array b) Linked List c) Both A and B d) Stack
9. The term that does NOT represent a type of binary tree is
a) Full Binary Tree b) Complete Binary Tree
c) Ternary Tree d) Strictly Binary Tree
10. A graph is a collection of
a) Nodes b) Edges c) Nodes and Edges d) Trees



PART-B

Answer any TEN questions. Each answer carries TWO marks.

[10 x 2 = 20]

11. Define control structures.
12. What is an abstract data type? Give an example.

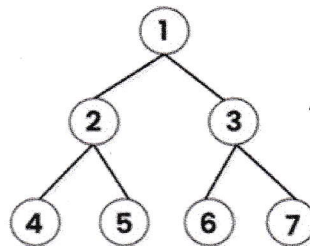
13. Differentiate between Math.floor(3.7) and Math.ceil(3.7).
14. What is a sparse matrix? Give an example.
15. Differentiate malloc() and calloc().
16. List any two applications of stacks.
17. Convert the infix expression $P=A+B-C(D * E)$ to postfix expression.
18. Demonstrate the Tower of Hanoi problem for 3 disks with a neat diagram.
19. Define a priority queue.
20. What is an AVL tree.
21. Define heap Tree.
22. What is Hashing?

PART-C

Answer any **FOUR** questions. Each answer carries **FIVE** marks.

[4 x 5 = 20]

23. Explain asymptotic notations.
24. Write a C program to perform linear search.
25. Develop an algorithm to create a node in the singly linked list.
26. Write an algorithm to evaluate the postfix expression.
27. Explain the types of queues.
28. Define tree traversal. Perform inorder, preorder, and postorder traversals on the given tree.



PART-D

Answer any **THREE** questions. Each answer carries **TEN** marks.

[3 x 10 = 30]

29. a) Define data structure. Explain the classification of data structures.
b) Describe the basic operations that can be performed on data structures with examples. [5 + 5]
30. a) Apply the binary search algorithm on the array {10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60} to find the key element 50.
b) Write an algorithm to search for an element using a binary search technique. [5 + 5]
31. a) Develop an algorithm to delete a node from the beginning of the singly linked list.
b) Develop an algorithm to delete a node from the end of the singly linked list. [5 + 5]
32. a) Explain push() and pop() operations in stack with an example.
b) Convert the infix expression $P = (A + B * C ^ D - E)$ to postfix expression. [5 + 5]
33. a) Define graph.
b) Perform BFS traversal for the following graph starting from node 1 and show the step-by-step execution. [2 + 8]

