Roll No:
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ST. CLARET COLLEGE LIBRARY Bengaluru-13 AUTONOMOUS

St. Claret College

Autonomous, Bengaluru

UG END SEMESTER EXAMINATION - MAY 2026
BCA - II SEMESTER
CA 2124: 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 **[1 x 10 = 10]**

1. What is a data structure?
   a) A programming language b) A collection of algorithms
   c) A way to store and organize data d) A type of computer hardware
2. If an algorithm has a complexity of $O(n^2)$, it is considered as
   a) Linear b) Quadratic c) Constant d) Logarithmic
3. Which matrix type has most elements as zero?
   a) Identity matrix b) Diagonal matrix c) Sparse matrix d) Square matrix
4. Which of the following is true about a circular linked list?
   a) The last node points to the first node b) It has no pointers
   c) The first node is always NULL d) It is always doubly linked
5. What is the maximum number of elements that can be stored in an array-based stack of size n?
   a) n+1 b) n-1 c) n d) 2n
6. Which data structure is needed to convert infix notation to postfix notation?
   a) Tree b) Branch c) Stack d) Queue
7. The _____ form of access is used to add and remove nodes from a queue.
   a) LIFO, Last In First Out b) FIFO, First In First Out
   c) Both a and b d) None of these
8. Which of the following is an application of stacks?
   a) Function calls in recursion b) Expression evaluation
   c) Undo operations d) All of the above
9. The number of edges in a complete graph of n vertices is
   a) (n+1)/2 b) n(n-1)/2 c) $n^2/2$ d) n
10. Which data structure is used for hashing?
    a) Stack b) Linked List c) Hash Table d) Queue

PART-B

Answer any FIVE questions. Each answer carries TWO marks. **[5 x 2= 10]**

11. What is time space trade off?
12. Define abstract data type.
13. List any two advantages of a linked list.
14. Define recursion.
15. What is a priority queue?
16. Define graph. List its types.
17. Define heap.

PART-C

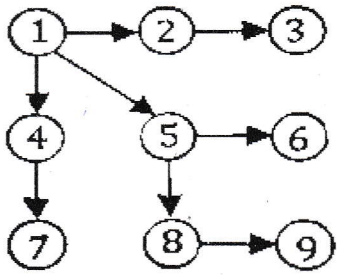
Answer any FOUR questions. Each answer carries FIVE marks. **[4 x 5= 20]**

18. Classify data structures with an example.
19. Write a C program to perform linear search.
20. Write an algorithm to insert a node at a specified location in a singly linked list.
21. Convert the given infix expression to a postfix expression
    ((A + (B ^ C) - D)) * (E- (A /C)))
22. Write a short note on types of queues.
23. Explain different types of hashing techniques.

PART-D

Answer any FOUR questions. Each answer carries 10 marks. **[4 x 10 = 40]**

24. a) Explain the asymptotic notations.
    b) Explain different types of control structures. (5 + 5)
25. a) Write a C program to perform bubble sort.
    b) Develop an algorithm to perform a binary search with an example. (5 + 5)
26. a) Explain the types of linked lists.
    b) Consider the graph below. Starting at vertex 1, traverse the graph by BFS. (4 + 6)



27. a) Convert the following infix expression to a postfix expression.
    (A+B^C^D)*(E+F/D)
    b) Explain the Tower of Hanoi problem for 3 disks with an example. (6 + 4)
28. Illustrate insert and delete operations of a linear queue with an example. (5 + 5)
29. a) Explain different Tree traversals with suitable examples.
    b) Define collision. List the different collision techniques. (7 + 3)