QP CODE

B1036

Enrollment Number: ……

Name: ……

BCA DEGREE EXAMINATIONS, APRIL 2025
Second Semester
B21CA04DC – Data Structures
(2024 January Admissions)

Time: 3 Hours **Max Marks: 70**

Section A

Answer any ten of the following questions in a word or sentence each. Each question carries 1 mark.

1. Give an example of a contiguous data structure.
2. What is an array?
3. What is a stack?
4. Define the term "queue."
5. What is the purpose of function **free()**?
6. Define degree of a node in tree?
7. Define the term "graph."
8. What does FIFO stands for?
9. What is a circular queue?
10. Define algorithm.
11. What is the purpose of a doubly linked list?
12. What is the best case time complexity of a sequential search?
13. What is the name of a graph which has either a self-loop or parallel edges or both?
14. What is recursion in programming?
15. What is the best case time complexity of insertion sort?

(1X10=10)

Section B

Answer any five of the following questions in two or three sentences each. Each question carries 2 marks.

16. Differentiate a linear and nonlinear data structure.
17. What are the basic operations of a stack?
18. Write four examples of a circular queue in computing.
19. Define depth-first search (DFS) with an example.

20. How does a binary search tree differ from a binary tree?
21. What are the applications of a linked list?
22. Define the time complexity of an algorithm.
23. What is the difference between searching and sorting?
24. Explain static and dynamic memory allocation
25. Explain different tree traversals with examples.

(2X5=10)

Section C

Answer any five of the following questions in a paragraph each. Each question carries 4 marks.

26. Explain Evaluation of Postfix Expression with an example.
27. Describe the operations performed on a queue.
28. Write short notes on circular and doubly linked lists.
29. Explain the steps involved in traversing a linked list.
30. What is the role of a priority queue? Give an example.
31. Explain how a binary search tree is constructed.
32. Differentiate between divide and conquer algorithms and backtracking algorithms.
33. Explain AVL tree.
34. Describe Kruskal's algorithm with an example.
35. Compute the time complexity of the following relations:

    i. $T(n) = 410$

    ii. $T(n) = 4*n - 12$

    iii. $T(n) = 13*n^5 + 4*n - 7$

    iv. $T(n) = 3*n^2 + n + 4$

(4X5=20)

Section D

Answer any two of the following questions in three pages each. Each question carries 15 marks.

36. Describe how infix expressions are converted to prefix expressions? Convert the following infix expression into prefix expression

    (A+B)*C/(D-E)*(F+G)
37. Explain linked list, its operations and advantages over array.
38. Discuss the types of graphs, their representations, and applications in computing.
39. Write a detailed note on algorithm complexity and analyze the best, worst, and average case complexities of binary search algorithm.

(15X2=30)