

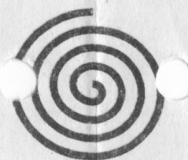
7. Explain in brief about tree traversal. Pre-order and In-order traversals are given below for a binary tree. Draw the corresponding binary tree :

Pre-order: A, B, D, G, H, C, E, F, I, K, J

In-order: B, G, H, D, A, E, C, I, K, F, J

8. Demonstrate the insertion of the key (a, g, f, b, k, d, h, m, j, e, s, i, r, x, c, l, n, t, u, p) in a B-tree of order 5.
9. Write the algorithm of Bubble Sort and explain this sorting technique with an example using the algorithm. Also write the worst-case time complexity of Bubble Sort.

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Roll No. :

Total No. of Questions : 9] [Total No. of Printed Pages : 4

BCA-3002

BCA (Semester-III) (NEP) Examination, 2024-25

(Major)

DATA STRUCTURE USING C AND C++

[Paper : Second]

Time : 2 Hours]

[Maximum Marks : 75

Note : 1. This paper consists of three Sections-A, B and C.
Attempt questions from all Sections as directed.

2. The candidates are required to answer only in serial order. If there are many parts of a question, answer them in continuation.

3. "B" copy will not be provided.

Section-A

(Short Answer Type Questions)

Note : All questions are **compulsory**. Each question carries 5 marks. [9×5=45]

1. (a) State two situations when you would prefer using arrays over linked lists.
- (b) Write equivalent postfix expression for $2 * 5 + 7 - 4 ^ 2 \times 6 + 23 * (24 / 4 + 8)$.
- (c) "Circular Queue is better than Linear Queue." Justify the statement.
- (d) What is Sparse Matrix?
- (e) Define hashing and collision.
- (f) Which internal sorting algorithm would you use in case the input is almost sorted? Why?
- (g) Give a mathematical formula to compute the number of leaf nodes in a complete binary tree if its height is known.
- (h) Differentiate between Tree and Graph.
- (i) How does the merge sort work? Explain.

Section-B

(Long Answer Type Questions)

Note : Attempt **only one** question from the following. Each question carries 15 marks. [1×15=15]

2. Define Stack. Convert, using algorithm, the following infix expression into its equivalent prefix expression using stack:
 $((A + B) * C - (D - E) ^ (F + G))$
3. What is circular queue? Write the implementation of circular queue using array and write method to perform insertion and deletion on it.
4. Sort the following list of numbers elaborating the steps of selection sort: 95, 43, 51, 7, 1, 46.
5. Explain how can a binary tree be stored in the form of an array. For which kind of tree is this storage most efficient?

Section-C

(Long Answer Type Questions)

Note : Attempt **only one** question from the following. Each question carries 15 marks. [1×15=15]

6. Write C/ C++ function or algorithm that deletes a node from beginning, middle and end of a doubly linked list.