BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – B.Tech.(CSE)-AIML-2021/B.Tech.(CSE)-AIML-2022/B.Tech.(CSE)-AIML-2023

Course Name – Data Structure and Algorithms/Data Structure & Algorithms

Course Code - ESCM302

(Semester III)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select the number of sub arrays that does the quick sort algorithm divide the entire array into

a) two b) three
c) four d) one

(ii) Select the algorithm implementations which is similar to that of an insertion sort

a) Binary heap b) Insertion sort
c) Quick sort d) merge sort

(iii) Select the average number of inversions in an array of N distinct numbers

a) N(N-1)/4 b) N(N+1)/2
c) N(N-1)/2 d) N(N-1)/3

(iv) Choose the correct options. At any time the position of the element to be inserted will be calculated by the relation

a) Rear = (Rear + 1) % SIZE b) Rear = (Font + 1) % SIZE
c) Font = (Rear + 1) % SIZE d) Font = (Font + 1) % SIZE

(v) Choose the empty condition of circular queue?

a) Font > Rear b) Font == Rear
c) Font < Rear d) Font -Rear +1

(vi) Predict the correct one when an insertion operation can take inside the circular queue.

a) Rear =Rear -1 b) Rear =Rear +1
c) Font =Font+1 d) Font =Font-1

(vii) Select the correct Time complexity of swapping operation of bubble sort is

a) O(n) b) O(n logn)
c) O(n2) d) O(n3)

(viii) Select the number of passes does an insertion sort algorithm consist of

a) N b) N-1

d) None of them

c) N+1

(ix) Select the technique of direct search

a) Binary Search b) Hashing

c) None of these d) linear search

(x) Two main measures for the efficiency of an algorithm are defined as

a) Complexity and capacity b) Time and space

c) Data and space d) Complexity and capac

(xi) An algorithm is define as a _____ procedure for calculation

a) only jump b) One step

c) none of these d) only j

(xii) Select which of the following case does not exist in complexity theory-

a) Worst case b) Average case

c) Null case d) Best case

(xiii) Identify the tree in which every node has at most two children.

a) B Tree b) AVL Tree

c) Binary Tree d) Threaded Binary Tree

(xiv) Name the type of tree that maintains balance by performing rotations during insertions and deletions.

a) B+ Tree b) AVL Tree

c) Threaded Binary Tree d) Binary Search Tree

(xv) Recognize the tree where pointers to the next node in traversal order are maintained to speed up in-order traversal.

a) Binary Tree b) AVL Tree

c) B+ Tree d) Threaded Binary Tree

Group-B

(Short Answer Type Questions) 3 x 5=15

2. **Compute** the time complexity? (3)

```
for (int i=0; i<=n; i )
{
  for (int j=0; j<=n; j )
  {
    Statement 1;
    Statement 2;
    ..............
    Statement n;
  }
}
```

3. **Explain** the time complexity of common operations (insertion, deletion, and search) in an AVL tree, and how does it compare to a regular binary search tree (BST)? (3)

4. Define asymptotic notations. (3)

5. Explain the concept of a DeQueue algorithm in a Queue. (3)

6. **Illustrate** what a graph is and explain the main components of a graph. (3)

OR

Differentiate a connected graph and a disconnected graph. Provide examples of each. (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Explain the tree traversal techniques with an example. (5)
8. Evalute the postfix expression of 456*+ using a stack. (5)

9. Explain insertion, deletion, traversal operation in data structure (5)
10. Describe the difference between time complexity and space complexity. (5)
11. Write down and express the different types of searching procedure namely BFS and DFS (5)
12. Compare Between Linear and Non-linear Data Structures (5)

OR

Explain Operations Performed on Stacks and Queues (5)

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