17623

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – Dip.CSE-2024
Course Name – Data Structures
Course Code - DCS30101
(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 worst case time complexit of linear search algorithm.

a) O(n) b) O(logn)
c) O(nlogn) d) None

(ii) An algorithm that calls itself directly or indirectly known as

a) Sub algorithm b) Recursion
c) Traversal Algorithm d) None of these

(iii) Select the correct term used to describe the process of adding an element to a data structure.

a) Deletion b) Traversal
c) Insertion d) Analysis

(iv) Select which asymptotic notation should use to describe the best_case time complexity of an algorithm.

a) O-notation b) Ω-notation
c) Θ-notation d) Big-Oh notation

(v) Choose the correct option for O(n) time complexity of an algorithm.

a) The algorithm runs in constant time b) The algorithm runs in logarithmic time
c) The algorithm runs in linear time d) The algorithm runs in exponential time

(vi) Select the number of passes required for insertion sort algorithm.

a) N b) N-1
c) N+1 d) None of them

(vii) Select the sorting technique that use term 'pivot'.

a) Selection sort b) Insertion sort
c) Quick sort d) merge sort

(viii) Select the technique applicable for merge sort.

a) Divide and conquer
b) Greedy algorithm
c) Dynamic programming
d) branch and bound

(ix) Select the arrangement of the array elements [34, 8, 64, 51, 32, 21] after second pass using insertion sort.

a) 8, 21, 32, 34, 51, 64
b) 8, 32, 34, 51, 64, 21
c) 8, 34, 51, 64, 32, 21
d) 8, 34, 64, 51, 32, 21

(x) Select the number of sub arrays produced by quick sort algorithm for a given array.

a) 2
b) 3
c) 4
d) 1

(xi) Select the algorithm that is based on heap sort.

a) Fibonacci heap
b) Binary tree
c) Priority queue
d) FIFO

(xii) Choose the correct term for the number of edges from the root to a node in a tree

a) Height
b) Depth
c) Length
d) Width

(xiii) Choose the correct option for Preorder, Inorder and Postorder Traversal sequences for the following traversals. S1: N, M, P, O, Q S2: N, P, Q, O, M S3: M, N, O, P, Q

a) S1 is preorder, S2 is inorder and S3 is postorder
b) S1 is inorder, S2 is preorder and S3 is postorder
c) S1 is inorder, S2 is postorder and S3 is preorder
d) S1 is postorder, S2 is inorder and S3 is preorder

(xiv) Identify the value of the postfix expression. ab + cd/- where a=5, b=4, c=9, d=3

a) 6
b) 23
c) 5
d) 3

(xv) Identify the correct option: in a normal queue, insertion is performed at the _______ and deletion is performed at the _______.

a) Front, Front
b) Rear, Rear
c) Front, Rear
d) Rear, Front

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Construct a binary search tree from the following list of numbers, : [10, 5, 15, 3, 7, 12, 18]. (3)

3. Define asymptotic notations. (3)
4. Identify the different applications of stack and queue. (3)
5. Explain the conditions to check whether a circular queue is empty or full. (3)
6. Explain the concept of a push algorithm in a stack. (3)

OR

Evaluate the postfix expression 5 3 * 10 2 / + using a stack. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Evaluate the postfix expression of 456*+ using a stack, also show the prefix expression. (5)
8. Describe the difference between time complexity and space complexity. (5)
9. Explain the concept of "FIFO" (First-In, First-Out) in the context of a queue. (5)

10. Construct a binary search tree for the following numbers start from an empty binary search tree. 45,26,10,60,70,30,40. Delete keys 10,60 and 45 one after the other and show the trees at each stage. (5)
11. Differentiate between array and linked list. (5)
12. Explain how can you implement a queue using an array. Discuss the advantages and disadvantages of array. (5)

OR

Explain doubly linked list and state the advantages over singly linked list. (5)

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