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BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Tech.(CSE)-2024/B.Tech.(CSE)-AIML-2024/B.Tech.(CSE)-AIR-2024/B.Tech.(CSE)-2025/B.Tech.(CSE)-AIML-2025/B.Tech.(CSE)-AIR-2025

Course Name – Data Structure and Algorithms

Course Code - BES07010 (T)

(Semester II)

Full Marks : 40

Time : 2:0 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 10=10

1. Choose the correct alternative from the following :

- (i) Identify a time-space tradeoff, if you optimize for lower space usage, it typically happens to the execution time
 - a) Execution time increases
 - b) Execution time decreases
 - c) Execution time remains unchanged
 - d) It depends on the specific algorithm
- (ii) Select from the following that $O(n)$ time complexity mean for 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
- (iii) Select the avg 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) Select worst case complexity of bubble sort
 - a) $O(n)$
 - b) $O(n \log n)$
 - c) $O(n^2)$
 - d) $O(n^3)$
- (v) The array are as follows: 1,2,3,6,8,10. Select the recursive call to find element 6
 - a) 3rd call
 - b) 4th call
 - c) 5th call
 - d) 6th call
- (vi) Select the number of elements that can be stored in array `int x [10][20]`.
 - a) 230 elements
 - b) 200 elements
 - c) 8000 elements
 - d) any number of elements
- (vii) Select from the following that uses FIFO method
 - a) Stack
 - b) Hash Table
 - c) Linked list
 - d) Queue
- (viii) Choose the traversal strategy used in the binary tree
 - a) depth-first traversal
 - b) breadth-first traversal

- c) random traversal
- d) Priority traversal
- (ix) Consider the following data and choose which one is Preorder Traversal Sequence, Inorder and Postorder sequence. 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
- (x) Choose the Data structure used in standard implementation of Depth First Search
- a) List
- b) Tree
- c) Queue
- d) Stack

Group-B

(Short Answer Type Questions)

$$3 \times 5 = 15$$

2. Describe path in a graph. Distinguish the difference between a simple path and a cycle in a graph. Provide an example of each. (3)
3. Define algorithm with its characteristics. (3)
4.

```
int Stack[10] = {5, 4, 3, 23, 11, 4, 6, 7};  
Top = 7;
```

Here, Top points to the topmost element of the stack.
Perform 3 POP operations, then 4 PUSH operations with elements 22, 12, 5, and 16. Find the final value of Top. (3)
5. Describe the Big Omega notation. (3)
6. Evaluate the postfix expression $5\ 3\ *\ 10\ 2\ /\ +$ using a stack. (3)

OR

Convert the infix expression $A + B * (C - D)$ to postfix notation using a stack. (3)

Group-C

(Long Answer Type Questions)

$$5 \times 3 = 15$$

7. Explain the concept of "FIFO" (First-In, First-Out) in the context of a queue. (5)
8. Explain how can you implement a queue using an array. Discuss advantages and disadvantages. (5)
9. Write the algorithm to evaluate a postfix expression using a stack. (5)

OR

Evaluate the infix expression $3 + 8 - 9 / 8$ to postfix notation using a stack. (5)