2023/12

MASTER OF COMPUTER APPLICATION
FIRST SEMESTER
ADVANCED DATA STRUCTURE
MCA-102
[USE OMR SHEET FOR OBJECTIVE PART]

SET

A

Duration: 1hr. 30 mins.   Full Marks: 35

(**Objective**)

Time: 15 mins.   Marks: 10

Choose the correct answer from the following: $1\times10=10$

1. Which data structure follows the First In, First Out (FIFO) principle?
   a. Stack   b. Queue
   c. Array   d. Linked List

2. What is the time complexity of searching an element in a binary search tree (BST)?
   a. $O(Log(n))$ b. $O(n \log n)$
   c. $O(n)$ d. $O(1)$

3. A binary tree T has n leaf nodes. The number of nodes of degree-2 in T is _____?
   a. n-1   b. n
   c. 2n+1   d. 2n-1

4. In a binary tree, for every node the difference between the number of nodes in the left and right subtrees is at most 2. If the height of the tree is h > 0, then the minimum number of nodes in the tree is _____?
   a. 2h-1   b. 2h-1 + 1
   c. 2h – 1   d. 2h

5. What is the time complexity of adding an element to the end of an array?
   a. $O(1)$ b. $O(n)$
   c. $O(\log n)$ d. None of the above

6. What data structure is used in Depth-First Search (DFS) to keep track of visited nodes?
   a. Queue   b. Stack
   c. Array   d. Linked list

7. The number of edges from the root to the node is called _____ of the tree.
   a. Depth   b. Height
   c. Width   d. Level

8. What is the value of the postfix expression 6 3 2 4 + - *?
   a. 40   b. -40
   c. 18   d. -18

9. In a stack, if a user tries to remove an element from an empty stack it is called _____.
   a. Underflow   b. Overflow
   c. Garbage Collection   d. Empty collection

10. Choose correct output for the following sequence of operations.
    push(5)
    push(8)
    pop
    push(2)
    push(5)
    pop
    pop
    pop
    push(1)
    pop

a. 85251

b. 82551

c. 85521

d. 81255

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Time : 1 hr. 15 mins.   Marks : 25

[Answer question no.1 & any two (2) from the rest]

1. What is Data Structure? Explain different types of Data Structures   5
    along with suitable example.

2. Convert the following expression to postfix expression using stack data   10
    structure.
    A-B+(M^N)*(O+P)-Q/R^S*T+Z

3. Explain the concept of Depth-First Search (DFS) and Breadth First   4+6=10
    Search (BFS) in graph traversal.
    Describe the step-by-step process of how DFS and BFS explores a
    graph.
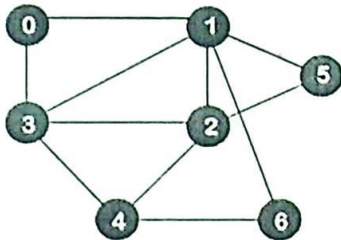
4. a) What is a binary Search tree? Construct Binary Search Tree for the   1+2+3=6
    following elements. 45, 15, 79, 90, 10, 55, 12, 20, 50. Also find out the
    inorder, preorder and post order traversal of the resultant graph.
    b) Explain the following term with respect to binary trees.   2+2=4
    (i) Strictly Binary tree
    (ii) Complete binary tree

5. What is Heap Data Structure? Explain different operations of Heap   2+3+5=10
    data structure. Draw Max Heap and Min Heap from the following
    elements.
    Input → 35 33 42 10 14 19 27 44 26 31

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