Qassim University - College of Computer Science

Course: Data Structures (CS214)

Exam Type: Final Exam

Student Name: _____

Student ID: _____

PART 1: MULTIPLE CHOICE QUESTIONS [5 MARKS]

Instructions: Select the correct answer.

1. Which of the following principles describes the operation of a queue data structure?

a) First-In-First-Out

b) Last-In-First-Out

c) Random Access

d) Priority Based

2. When implementing a stack using a linked list, where are new elements typically added to maintain efficiency?

a) At the beginning of the linked-list

b) At the end of the linked-list

c) In the middle of the list

d) Randomly

3. What is the outcome of performing an "in-order" traversal on a Binary Search Tree?

a) The nodes in every subtree are visited in ascending order

b) The nodes are visited in descending order

c) The root is visited last

d) The leaves are visited first

4. An "output-restricted deque" places a limitation on which operation?

a) Deletion is restricted to one end only

b) Insertion is restricted to one end only

c) Access is restricted to the middle

d) It cannot be traversed

5. In the context of the del() function for a singly linked list, why is the "old" pointer necessary when deleting an intermediate node?

a) To update its link to point to the node after the node is deleted

b) To store the address of the deleted node

c) To reset the head pointer

d) To check for underflow

PART 2: TRUE OR FALSE [5 MARKS]

Instructions: Mark (T) for True and (F) for False.

6. Doubly linked list allows traversal in both forward and reverse direction. [ ]

7. Delete node with two children from BST by promoting the left child. [ ]

8. In binary tree, node with no successor is called leaf node. [ ]

9. Linked list can grow and shrink in size during its lifetime. [ ]

10. In circular queue, the queue is reported as full when rear reaches maximum size. [ ]

PART 3: AVL TREE CONSTRUCTION [10 MARKS]

Q: Construct an AVL tree using the following data. Show your work.

D A T S R U C B O K Y

PART 4: PROGRAMMING QUESTIONS [14 MARKS]

Q1: Write a C++ function to reverse a Linked List using Recursion. **[6 Marks]**

Q2: Write the code for `int stack::pop()` implementation in both Array and Linked List.

[8 Marks]

Array Implementation

Linked List Implementation

PART 5: OPERATIONS & TRACING [16 MARKS]

Q1: Write the Preorder, Postorder, and Inorder traversal of the following binary tree.

[6 Marks]



Preorder: _____

Postorder: _____

Inorder: _____

Q2: Circular Queue Tracing. **[10 Marks]**

Assume a Circular Queue of **Size = 5** (Initially Empty). Trace the values of `Front` and `Rear` after each operation.

Operation	Front	Rear
Initial	-1	-1
Enque(10)		
Enque(20)		
Enque(30)		
Enque(40)		
Deque()		
Enque(25)		
Deque()		
Enque(35)		