RIC | RIPHAH INTERNATIONAL COLLEGE
Project of Riphah International University
HARBANSPURA CAMPUS

Data Structure and Algorithm

Assignment No 1

Part A: Theoretical Concepts (10 Marks)

Q1. Define and differentiate the following (in tabular form where applicable):
a. Array vs. Linked List
b. Stack vs. Queue
c. Static vs. Dynamic Memory Allocation (6 Marks)

Q2. Explain the **List Abstract Data Type**. Discuss how lists can be implemented using arrays and linked lists. (4 Marks)

Part B: Data Structure Implementations (10 Marks)

Q3. Explain the types of linked lists:
a. Singly Linked List
b. Doubly Linked List
c. Circular Linked List
For each type, provide a diagram and describe one real-life application. (4 Marks)

Q4. Describe the **Stack ADT**. Write a C++ program to implement a stack using arrays. (3 Marks)

Q5. What is the use of C++ templates in data structures? Explain with a simple example of a template-based stack class. (3 Marks)

Part C: Queues and Trees (5 Marks)

Q6. Discuss the concept of a **Queue ADT** and compare it with a stack. Explain two real-world uses of queues. (2 Marks)

Q7. Write the implementation logic of a queue using:
a. Linked List
b. Circular Array (2 Marks)

Q8. What is a **Priority Queue**? Explain its implementation using arrays and binary trees. (1 Mark)

Bonus Question (Optional - 3 Marks)

Explain **Binary Trees** and mention at least three applications where they are used in computing.

Important instruction:

- Data must not be copied from the websites.
- Explain all question properly after getting the knowledge in depth from different resources.
- Each student must have different content, no one can copy the assignment of other students.
- Assignment must be on MS word in typed form.
- Assignment must be submitted before dead line.
- Assignment must be submitted on google class room and then also submit it to me in hard form in class room.