UNIVERSITY OF CENTRAL PUNJAB

Faculty of Information Technology & Computer Science

Data Structures & Algorithms (SECP2043)

Assignment No. 1

Spring 2023 (Section P2 & P8)

Submission date: Tuesday 18th April, 2023 (09:50am for P2 and 04:25pm for P8)

Submission mode: Handwritten A4 sheets individual assignment. Neatness and clarity carry heavy weightage.

Q. No. 1: What is Big O notation? Explain using any real life example other than package delivery problem discussed in class. What is computational complexity of any sorting algorithm for integers stored in an array of size N?

Q. No. 2: Suppose you have a sorted array of n integers and you want to check if a specific integer x exists in the array. What is the worst-case time complexity of the following approaches, and which one would you choose for the best performance? (Justify your answers mathematically).

1. Linear search through the array, comparing each element to x until a match is found or the end of the array is reached.
2. Binary search on the array, repeatedly dividing the search interval in half until a match is found or the interval is empty.
3. Explore ternary search and then find its computational complexity.

Q. No. 3: Write a C++ function called “merge_lists” that takes two singly linked lists, where each list is sorted in ascending order, and merges them into a **single sorted linked list**. The function should return a pointer to the head of the merged list. Also find the worst-case time complexity.