American International University-Bangladesh (AIUB)

Data Structure Lab Task 2 [C]

Date: 08-04-2025 **Marks: 20**

********** Answer Any 2 **********

Task 1: In a C++ classroom project, students are given a shuffled list of student roll numbers and are tasked with organizing and then locating a specific roll number efficiently. They begin by repeatedly comparing adjacent elements in the list, ensuring that larger values gradually sink toward the end through multiple passes. Once the roll numbers are correctly arranged in ascending order, they employ a technique that systematically divides the list in half, checking the midpoint against the target and narrowing the search range accordingly. This two-phase approach allows them to transform an unsorted dataset into a structured one and then pinpoint the desired entry with minimal comparisons. Write the code accordingly.

Task 2: In a university inventory management system developed in C++, students are asked to process a list of serial numbers of newly delivered lab equipment. To organize the entries, they begin by sequentially scanning the list, placing each serial number into its appropriate position within the already processed portion, ensuring that no shifting step is skipped even if it requires multiple backward comparisons. After the complete list is arranged in increasing order, they utilize a technique that narrows the search window by continually checking the midpoint of the current range, swiftly honing in on the required serial number without scanning each element individually. This dual-phase strategy mimics real-world scenarios where unstructured input must be efficiently searched only after proper organization. Write the code accordingly.

Task 3: Write a C++ program to manage and analyze student marks using arrays and structures.

- Define a struct Student with:
  - string name
  - int roll_no
  - int marks[5] for 5 subjects
- Input details for **5 students**
- Calculate and display:
  - Total marks
  - Average marks