

# Advance Data Structure – CS1236

## Lab Assignment(2025) Set 1

### Assignment Set 1

1. Given an array of size  $n$  – insert integer data in the following order
  - a. Random data
  - b. Data inserted in descending order
  - c. Half of the data in random and rest in descending order
  - d. Data in ascending order

Perform insertion sort(ascending order) for each case.

Obtain the overall time complexity for each case of insertion sort

number of comparisons (inclusive of the loop invariants), assignment(=)  
[used for data movement or swap]

Assume timing of 1 unit for comparison and assignments

Add these timings to obtain the overall time complexity.

2. Dynamic array

Start with an array of size one.

Whenever the array is full -the size is doubled.

Cost of each insertion is 1 and that of resizing depends on how much data are to be copied?(each data to be copied takes one unit of time).

Using Bankers algorithm perform the operation of the dynamic array for  $n$  number of data.

Perform the Amortized time complexity for adding  $n$  number of data to this dynamic array.

3. Write a program to obtain a binary counter of  $n$  bits.

Use the implementation cost in the following way:

Every time you flip 0 → 1, pay the actual cost of \$1, plus put \$1 into a piggy bank.

So the total amount spent is \$2.

Now, every time you flip a 1 → 0, use the money in the bank (or on top of the tablet) to pay for the flip.

Display the cost table for every step.

Finally obtain the amortized cost after  $n$ th Operation.

4. Find the maximum flow through the following network and a corresponding minimum cut.
- Use an adjacency matrix to represent the directed graph with weighted edges.
- Output must represent-
- each augment path with final flow
  - the current max flow in each step
  - Final max flow
  - The min cut edges

