Department of Scientific Computing, Modeling and Simulation

SC: 504 - Computational Lab - I

Test - 4

Sem - I, M.Sc (Scientific Computing)

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Time: 10:15 AM to 11:15 AM | Date: September 30, 2025 | Max mark: 20

Note:

1. Write the time and space complexity for each program. This part is optional and has no marks.

1. **Attempt ALL**

(a) Write a C program that: (4)

1. Reads n integers into a dynamically allocated array.
2. Uses a `for` loop with `if--else if--else` conditions to count how many numbers are:
   - Positive
   - Negative
   - Zero
3. Uses **nested loops** to print all pairs of elements in the array where the sum of the pair is positive.

Example Input:

```
5
3 -1 0 4 -2
```

Example Output:

```
Positive count: 2
Negative count: 2
Zero count: 1
Pairs with positive sum:
(3, -1)
(3, 0)
(3, 4)
(3, -2)
(-1, 4)
(0, 4)
(4, -2)
```

(b) Write a C program that prints the following pattern using a `while` loop: (5)
Accept `n` from the user. For example `n = 5`, the output should be:

```
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1
```

(c) Write a C program to

1. Reads n integers into a dynamically allocated array.
2. Perform the following on the array :
   i. Replace each even number with 0. (1)
   ii. Replace each odd numbers with 1. (1)
   iii. Sort the modified array in non-decreasing order. (4)

Example :

```
arr = [4,3,2,1]
Output: [0,0,1,1]
```

- Replace the even numbers (4 and 2) with 0 and the odd numbers (3 and 1) with 1. Now, arr = [0, 1, 0, 1].
- After sorting arr in non-descending order, arr = [0, 0, 1, 1].

(d) Write a C program to read n integers into a dynamically allocated array. Then count the number of good pairs in this array. A pair (i, j) is called good if $arr[i] == arr[j]$ and $i < j$. (5)

Example :

```
Input: arr = [1,2,3,1,1,3]
Output: 4
Explanation: There are 4 good pairs :
             (0,3), (0,4), (3,4), (2,5) 0-indexed.
```

>>> Practice >> Consistency >> Perfection.