

Reg. No.

CSE1 Group-1 Subgroup-B Odd



Indian Institute of Information Technology, Surat
Department of Computer Science & Engineering
End Semester Lab Examination, 1st Sem, 2025-26
Fundamentals of Computer and C Programming (CS101)

Timing: 11:00 AM to 1:00 PM

Date: Nov 24, 2025

Marks: 25

Instructions:

- Work on the computer assigned to you. You should log-in with the **exam** user whose details are given on the board.
- You will have **45 minutes** to code the solutions to both the problems.
- After 45 minutes, you must stop coding. **Do not modify** your code after this time.
- The remaining time will be used for a **viva** (oral examination). Lab instructors will evaluate your code and ask questions about your solution and related concepts.
- You will be graded on:
 - **Correctness:** Does the program work as specified? Does it handle all the edge cases? Code that does not compile at the end of 45 minutes will receive a **zero** for the 'correctness' portion.
 - **Adherence to instructions:** Does the program follow all instructions, such as writing functions with specified function prototypes or using specified structures? Does the program print appropriate user instructions and error messages?
 - **Best practices:** Code clarity, proper indentation, use of comments, and variable naming.
- Since we do not have an uninterrupted power supply, please save your work frequently.
- You may (and should!) carry pen and blank paper with you, but no other devices including phones, smartwatches, and calculators are allowed.
- You must write your solutions in C. You may include any library that is present on your system. Lab instructors will not debug or help compile your code.

1. Count Uppercase

(10)

Write a C program that asks a user to enter a single word (as a string of up to 100 characters). You can assume the input string satisfies this length constraint. Write a function `int count_uppercase(const char str[])`; that takes this string and returns the total number of uppercase alphabet letters it contains. You must then print the result.

2. Gauss's Law

(15)

According to Gauss's Law, the electric flux through a closed surface is proportional to the total charge enclosed within it. Write a C program that calculates the total charge enclosed by a 2D circular disk centered at (0, 0).

- Scan an integer `n`. It is guaranteed that $1 \leq n$ and $n \leq 10$.
- Scan in `n` charges (each with an x-coordinate, y-coordinate, and q-value) into an array of struct `PointCharge` as described below.
- Scan radius `r` as `double`
- Write a function `double enclosed(struct PointCharge charges[], int n, double r)`; that sums the `q` value of any charge that is **strictly inside** the circle of radius `r` centered at (0, 0).

```
#define MAX_CHARGES 10
struct PointCharge {
    double x;
    double y;
    double q; // charge value
};
```

E.g.: Input `n=3`, charges 10, -5, and 3 at locations (1, 1), (2, -4), and (10, 0) respectively and radius `r=10`. Output 5.0.

Explanation: Only charges 10 and -5 are strictly inside this circle. Thus, the total enclosed charge is 5.