TechSoC ’28 Problem Statements

Objective:

The TechSoc Community aims to familiarize the students with the basics of computer programming and various tools used within the community. This would expose the students to various programming, technical, and core aspects of engineering before starting out in clubs. This is a community where students can discuss, solve, and learn together and network with other students to solve common problems. Before diving directly into the problem statements, students are advised to familiarize themselves with the following topics.

Throughout the activity of this community, students would be given resources (in Hindi and English) and some problem statements to work on based on what they have learned from those resources. Each problem statement has been carefully curated by the seniors and hence, seniors shall help you out at any time. The difficulty would start at beginners level, and will slowly advance in the difficulty level as you guys would solve them.

Prerequisites:

1. Knowledge about any one programming language (preferably C++ or Python)
2. Using Git and GitHub tools as collaborative tools to work on projects

Refer to the resources given below to start with it.

- Python:
  ▶ Python Tutorial For Beginners in Hindi | Complete Python Course 🔥
  https://www.kaggle.com/learn/python
  https://www.kaggle.com/learn/intro-to-programming
- C++:
  ▶ Introduction to C++, Installing VS Code, g++ & more | C++ Tutorials for Beginners...
  – Recommended till 19th video of the playlist

  ▶ C++ Tutorial for Beginners - Full Course

- Git and GitHub:
  First, create an account with your mail ID in GitHub.
  Git & GitHub Tutorial For Beginners In Hindi - हिंदी में
  Git, GitHub, & GitHub Desktop for beginners

Problem Statements:

Task 1 (Beginner Level):

Concepts used: control statements, conditional statements,

As now you all are familiar with at least 1 programming language. We want to let you know the extreme reality that only theory won't do anything you need to practice your skills. Design a modern Calculator in any of the programming languages but there are some basic requirements:

- Calc. should be able to do all basic functionality like addition , subtraction, etc.
- It should have functions like log , trigonometry too.
- Use of math libraries is strictly prohibited.
- It should also have an option to solve quadratic equations(Use its formula).

Some Ideas to make it better:

- Add functionality to solve n linear equations in n variables(at least for n = 2).
- Add functionality to solve differentiations and integrals.

Submission Link: https://forms.gle/3eubYd5QDfFHimmv8

Task 2 (Intermediate Level):

Concepts used: file management, functions, escape sequences, strings

Implement a program that mimics a student academic roll record system, allowing students to register, log in, and view their grades. Admins should be able to manage and enter grades. The system should also calculate and display the Semester Performance Index (SPI) and Cumulative Performance Index (CPI) for each student.

- Create a function to register users as either students or admins using a unique user id and password and allow them to login based on successful credentials. Ensure role-based access control: only admins can enter and manage grades, while students can only view their grades and performance indices
- Allow Admins to input and update student grades for courses each semester in their unique student id. Assume each course is of 4 credits and store the grades (*AP (10), AA (10), AB (9)....*) for each course by semester. The number of courses per semester is decided by the admin at the time of grading.
- Store the details of all registered users (students and admins) and their respective grades.
- Implement a function to calculate and return the SPI for a specified semester and CPI considering all the completed semesters.
- Implement a function to display the academic details (Student ID, grades by course, SPI, and CPI) for all semesters.

Note: No. of courses may vary each semester and for grading system refer IITI Curriculum

Submission Link: https://forms.gle/pdo7CsgSk3mUvUyL8

Task 3 (Advanced Level):

Build a Snake Game

a. As you all are now familiar with at least 1 programming language, it's time to try it out with something fun, so for task 3 you will have to use your skills in that particular language and make any virtual game (preferably a snake game which we all played in our childhood).
b. Resources:
   Building Snake Game in C++ : OOPS Programming (Hindi) with concepts a...
