

1. C++ Basics

Problem Statement 1: **const** and **#define**

Write a C++ program to demonstrate the use of **const** and **#define** for defining constant values.

The program should:

1. Define the value of **PI** using **#define**.
2. Declare a constant integer **DAYS_IN_WEEK** using **const** and assign it the value **7**.
3. Display the values of **PI** and **DAYS_IN_WEEK**.
4. Declare a floating-point variable **radius** and assign it the value **5.0**.
5. Calculate the area of a circle using **PI** and **radius**.
6. Display the radius and calculated area.
7. Include a commented example showing that a **const** variable cannot be changed after initialization.

Expected Output:

```
Value of PI using #define: 3.14159
Days in a week using const: 7
Area of circle with radius 5 is: 78.5397
```

Problem Statement 2: Explicit Type Casting

Write a C++ program that:

1. Declares two integer variables **a = 5** and **b = 2**.
2. Declares a third variable **c** of type **float**.
3. Uses **explicit type casting** to convert one of the integer variables to **float** before performing the division.
4. Stores the division result in variable **c**.
5. Displays the value of **c**.

Expected Output

```
2.5
```

2. Input and Output

Problem Statement 1: – Student Information

Write a C++ program that takes the student's **name, age, and marks** as input and displays them using **cout**.

Problem Statement 2: – Calculate Total

Write a C++ program that takes the prices of three items from the user, calculates the total, and displays the result.

Problem Statement 3: – Calculate Rectangle Perimeter

Write a C++ program that takes the length and width of a rectangle and calculates:

$$\text{Perimeter} = 2 \times (\text{Length} + \text{Width})$$

Display the result using `cout`.

Problem Statement 4: – Calculate Average

Write a C++ program that takes marks of three subjects, calculates the average, and displays the result.

Problem Statement 5: – Student Age

Write a C++ program that asks the user to enter their age and displays:

Your age is: 20

Problem Statement 6: – Two Numbers

Write a C++ program that takes two integers from the user and displays their:

- Sum
 - Difference
 - Product
-

Problem Statement 7: – Student Marks

Write a C++ program that takes marks of three subjects and displays the total marks.

Problem Statement 8: – Rectangle

Write a C++ program that takes the length and width of a rectangle and calculates its area.

Formula:

$$\text{Area} = \text{Length} \times \text{Width}$$

Problem Statement 9: – Student Information

Write a C++ program that takes the following information from the user:

- Name
- Age
- Department
- Marks

Then display all the information using `cout`.

Problem Statement 10: – `endl`

Write a C++ program that displays your:

- Name
- Department
- Semester

Use `endl` to print each item on a separate line.

Problem Statement 11: – `setw`

Write a C++ program to display the following table using `setw(10)`:

Number	Cube
2	8
3	27
4	64
5	125

Problem Statement 12: – Both Manipulators

Write a C++ program that uses both `endl` and `setw()` to display a simple student information table containing:

- Roll No.
- Name
- Marks

3. Conditional Statements

Problem Statement 1: Positive, Negative or Zero - if statement

Write a C++ program that takes a number as input and checks whether it is positive, negative, or zero. Display the appropriate message based on the entered number.

Hint: Use an if-else-if ladder.

Problem Statement 2: Check Even or Odd - if statement

Write a C++ program that takes an integer as input and determines whether it is even or odd. Display an appropriate message based on the result.

Hint: Use the modulus operator (%) to check the remainder when the number is divided by 2.

Problem Statement 3: Check Eligibility Based on Marks - if statement

Write a C++ program that takes a student's marks as input. If the marks are 50 or above, display "Eligible"; otherwise, display "Not Eligible".

Hint: Use an if-else statement to check the marks.

Problem Statement 4: Student Grade Calculator - if statement

Write a C++ program that takes a student's marks as input and displays the corresponding grade according to the following criteria:

- **A:** 80–100 marks
- **B:** 70–79 marks
- **C:** 60–69 marks
- **D:** 50–59 marks
- **Fail:** Below 50 marks

If the entered marks are less than 0 or greater than 100, display "**Invalid Marks**".

Hint: Use an **if-else-if** ladder to check the marks and assign the appropriate grade. First, validate that the marks are between 0 and 100.

Problem Statement 5: Find the Larger Number - if statement

Write a C++ program that takes two numbers as input and compares them. Display the larger number. If both numbers are equal, display "Both numbers are equal."

Hint: Use an if-else-if ladder to compare the two numbers and handle all three possible cases.

Problem Statement 6: Login Authentication System - if statement

Write a C++ program that takes two inputs: a user verification flag and a password verification flag. Display "Login Successful" only if both flags indicate that the username and password are correct. Otherwise, display "Login Failed".

Hint: Use nested if statements to check the user verification flag first and then the password verification flag.

Problem Statement 7: Scholarship Eligibility Checker - if statement

Write a C++ program that takes a student's marks and family monthly income as input. The student is eligible for a scholarship only if both of the following conditions are met:

- The student's marks are 80 or above.
- The family's monthly income is below Rs. 60,000.

Display "Scholarship Awarded" if the student meets both conditions. Otherwise, display "Not Eligible for Scholarship".

Hint: Use nested if statements to check the marks first and then the family income.

Course Registration

Problem Statement 8: Student Registration Eligibility - if statement

Write a C++ program that takes three inputs to check whether a student can register:

- **Admission Status:** Admission is confirmed.
- **Fee Status:** Required fee has been paid.
- **Document Verification Status:** All required documents have been verified.

Display "**Registration Allowed**" only if all three requirements are satisfied. Otherwise, display "**Registration Not Allowed**".

Hint: Use nested **if** statements with appropriate **else** branches to check each requirement one by one.