

## C++ Practice Questions (Basic to Advanced)

### 1. Basic I/O and Variables

- Write a program that takes your age as input and prints it back.
- Ask the user for two numbers and print their sum.
- Input your name and print a greeting message.
- Input the radius of a circle and print the area.
- Input three floating numbers and display their average.

### 2. Data Types and Operators

- Input two integers and print their addition, subtraction, multiplication and division.
- Convert temperature from Celsius to Fahrenheit.
- Find the remainder when a user enters two numbers.
- Check if a number is even using modulus operator.
- Calculate simple interest from P, T, R.

### 3. Conditional Statements

- Input a number and check if it's positive, negative or zero.
- Find the largest of three numbers.
- Check if a number is divisible by 5 and 11.
- Input marks and print grade A, B, C, D, or F.
- Check whether a character is vowel or consonant.

### 4. Loops

- Print numbers from 1 to 100.
- Print multiplication table of any number.
- Print sum of first N natural numbers.
- Print factorial of a number.
- Print all even numbers between two inputs.

## **5. Patterns**

- Print square star pattern of size N.
- Print right triangle star pattern.
- Print half pyramid of numbers.
- Print diamond pattern.
- Print inverted triangle.

## **6. Arrays**

- Input N numbers in array and print them.
- Find maximum and minimum number in array.
- Find sum of all elements of array.
- Count even and odd numbers in an array.
- Reverse an array without using another array.

## **7. 2D Arrays**

- Input a matrix and print it.
- Add two matrices.
- Multiply two matrices.
- Find sum of diagonal elements.
- Find largest element in matrix.

## **8. Strings**

- Input a string and count vowels.
- Reverse a string without using built-in functions.
- Check if string is palindrome.
- Convert string to uppercase manually.
- Count number of words in a string.

## **9. Functions**

- Write a function to find factorial.
- Write a function to check prime.

- Write a function to find GCD of two numbers.
- Write function to convert days into years, months, days.
- Write a function to swap two numbers using reference.

## 10. Recursion

- Print Fibonacci series using recursion.
- Find factorial using recursion.
- Find sum of digits using recursion.
- Calculate power ( $a^b$ ) using recursion.
- Reverse a number using recursion.

## 11. Pointers

- Print value and address of a variable using pointers.
- Swap two numbers using pointers.
- Find sum of array elements using pointers.
- Pointer-to-pointer example.
- Function that accepts pointer argument.

## 12. Dynamic Memory Allocation

- Create dynamic array of N integers and print it.
- Find sum of dynamic array elements.
- Create dynamic 2D array.
- Allocate memory for string using new.
- Resize a dynamic array manually.

## 13. Structures

- Create structure for student details.
- Store details of 5 employees in structure array.
- Pass structure to function.
- Sort structure array by marks.
- Print books written by given author.

## **14. OOP Concepts**

- Create classes for student, bank, car, etc.
- Constructor types: default, parameterized, copy.
- Inheritance: single, multilevel, multiple.
- Polymorphism: function overloading and virtual function.
- Encapsulation using getters and setters.

## **15. File Handling**

- Write name and roll number to file.
- Read file and print content.
- Append text to existing file.
- Count words in a text file.
- Copy content from one file to another.

## **16. Exception Handling**

- Handle division by zero.
- Handle invalid array index.
- Throw exception if age < 18.
- Catch multiple exception types.
- Create custom exception class.

## **17. Templates**

- Template for swapping two values.
- Template to find maximum of two numbers.
- Class template for simple calculator.
- Template to search element in array.
- Template for stack class.

## **18. STL**

- Vector: insert, erase, sort.
- Stack operations.

- Queue operations.
- Map insertion and search.
- Use STL sort and reverse.

## 19. Algorithms

- Binary search.
- Bubble sort.
- Selection sort.
- Insertion sort.
- Quick sort or merge sort.

## 20. Advanced C++ – Lambda Expressions

- Use lambda to print numbers.
- Lambda to add two numbers.
- Capture variables using lambda.
- Use lambda inside STL sort.
- Lambda returning another lambda.

## 21. Advanced C++ – Smart Pointers and Namespaces

- Use unique\_ptr with class.
- Use shared\_ptr and show reference count.
- Use weak\_ptr.
- Create your own namespace.
- Use namespace alias and nested namespace.