1. What is C++?

* C++ is an object-oriented programming language. It is a Mid-Level programming language which means it can develop software, games, desktop applications.

1. What are the different data types present in C++?

* Primary : Integer, Character, float, Boolean, Double float, void.
* Derived : Function, array, Pointer.

1. Define ‘std’ in c++.

* ‘std’ stands for Standard Namespace. It is a collection of names (like classes, functions, and objects) provided by the C++ Standard Library. When you use features like cout, cin, vector, or string, these are all part of the std namespace.

1. What are references in C++ in simple terms ?

* A reference is like a nickname or an alias for another variable. It doesn’t create a new variable or copy data; instead, it directly refers to an existing variable. When you make changes using the reference, the original variable also changes because they both point to the same memory. A reference is created using the & symbol in the variable declaration.

1. Difference between Call by Value and Call by Reference.

* In Call by Value, the function gets a copy of the actual value of the argument. Any changes made inside the function do not affect the original variable.
* In Call by Reference, the function gets the actual reference (or alias) of the argument. Any changes made inside the function directly affect the original variable.

1. Define token in C++.

* A token is the smallest building block of a program. The compiler uses these tokens to understand and execute your code.
* Keywords: Reserved words with special meanings, like int, if, for, return.
* Identifiers/variables: Names given to variables, functions, or objects by the programmer.
* Literals: Fixed values like numbers, characters, or strings.
* Operators: Symbols used to perform operations, like +, -, \*, /, =.
* Punctuation or Special Symbols: Characters that structure the code, like ;, {}, ().
* Comments: Text ignored by the compiler, used for notes or explanations (// or /\* \*/).

1. differences between C and C++.

* C is a procedural language. It focuses on functions and procedures. C++ is a multi-paradigm language. It supports both procedural and object-oriented programming.
* C does not support object-oriented concepts like classes and objects. C++ Fully supports object-oriented concepts like classes, objects, inheritance, and polymorphism.
* C is mainly used for system-level programming like operating systems and embedded systems. While C++ is used for system programming, application development, and game development due to its flexibility and OOP features.

1. What is procedural language and object-oriented programming language?

* In procedural programming, the program is divided into small parts called functions. It follows a top-down approach, meaning the functions are executed step by step.
* In object-oriented programming, the program is divided into small parts called objects. Object-oriented programming follows a bottom-up approach.

1. What is embedded system?

* An embedded system is a specialized computer system designed to perform one or a few specific tasks. Unlike general-purpose computers (like laptops or desktops), embedded systems are usually built into larger devices and work as a part of them to handle specific functions.

1. What is pointer in C++?

* a pointer in C++ is a variable that stores the memory address of another variable. Instead of holding a value directly, like a regular variable, a pointer "points to" the location in memory where the value is stored.

1. What is the difference between reference and pointer?

* Pointer stores the memory address of a variable. Reference is an alias or copy for a variable.
* Pointers can point to different variables. Reference always refers to the same variable.
* Pointer occupies separate memory space. Reference shares the same memory as the variable.

1. What is the difference between function overloading and operator overloading?

* Function overloading occurs when you create multiple functions with the same name but different parameters. Operator overloading allows you to define custom behavior for operators (like +, -, \*, etc.) when applied to objects of user-defined types (like classes) (You can redefine how operators work with custom objects).

1. What is the difference between a while loop and a do-while loop?

* A while loop checks the condition before executing the code inside the loop. If the condition is false right from the start, the loop won't execute at all.
* A do-while loop checks the condition after executing the code inside the loop. The code inside the loop will always execute at least once, regardless of whether the condition is true or false.

1. What is for loop ?

* A for loop in C++ is a type of loop that is used to repeat a block of code a specific number of times.

1. Difference between prefix and postfix.

* Prefix: The increment/decrement happens first, before the variable is used in the expression. The updated value of the variable is immediately available for further operations.
* Postfix: The original value of the variable is used first, and then the increment/decrement happens. The value of the variable is updated after it has been used in the current operation.

1. What is Function Overriding?

* When a function of the same name, same arguments or parameters, and same return type already present/declared in the base class is used in a derived class is known as Function Overriding.

1. Difference between compile-time polymorphism and Runtime polymorphism.

* Compile-time polymorphism: Program behavior is determined during compilation (e.g., function/operator overloading).
* Runtime polymorphism: Program behavior is determined during execution (e.g., function overriding using virtual functions).

1. What is static binding and dynamic binding?

* Static Binding: Function or variable is determined at compile time.
* Dynamic Binding: Function is determined at runtime.

1. What is object-oriented programming?

* Object-Oriented Programming (OOP) is a way of designing and writing programs by organizing them into small, reusable pieces called objects. This includes class which is the blueprint of the class and objects which are the instance of the class.

1. What is a constructor and a destructor?

* Constructor: A constructor is a special function in a class that is automatically called when an object is created. Its purpose is to initialize the object, such as assigning values to its properties. It has the same name as the class and does not have a return type.
* Destructor: A destructor is a special function in a class that is automatically called when an object is destroyed (goes out of scope). Its purpose is to clean up resources (like closing files or releasing memory). It has the same name as the class, but is preceded by a tilde (~) and does not take any parameters or return a value.
* In python, Constructor is initialized using \_\_init\_\_ function, and destructor is using \_\_del\_\_() function.

1. What is recursion?

* Recursion in programming is a way of solving a problem where a function calls itself to break the problem into smaller and simpler parts. Think of it as a repeated process where a task is done in steps, with each step being smaller than the previous one.

1. What are the C++ access modifiers?

* Access modifiers are keywords that control the visibility of members (variables and functions) of a class. They determine who can access and modify the data and methods in a class.
* Private – It can neither be accessed nor be viewed from outside the class
* Protected – It can be accessed if and only if the accessor is the derived class
* Public – It can be accessed or be viewed from outside the class

1. What is STL?

* STL stands for Standard Template Library in C++. It is a collection of pre-written classes and functions that make it easier to work with common data structures and algorithms. It provides useful tools for tasks like storing data, sorting data, and performing searches, without needing to write complex code yourself.

1. When is void() return type used?

* The void keyword, when used as a function return type, indicates that the function does not return a value.

1. What is the difference between C++ and Python?

* C++ is faster because it is a compiled language. Python is slower because it is an interpreted language.
* Memory management is manual in C++ whereas in python it is automatic.
* C++ used in system-level programming, game development, embedded systems, and applications requiring high performance. Python is popular in web development, data science, machine learning, artificial intelligence.

1. Is deconstructor overloading possible? If yes then explain and if no then why?

* No destructor overloading is not possible. Destructors take no arguments, so there’s only one way to destroy an object. That’s the reason destructor overloading is not possible.

1. What do you mean by abstraction in C++?

* Abstraction is the process of showing the essential details to the user and hiding the details which we don’t want to show to the user or hiding the details which are irrelevant to a particular user.

1. Define inline function.

* If a function is inline, the compiler places a copy of the code of that function at each point where the function is called at compile time. One of the important advantages of using an inline function is that it eliminates the function calling overhead of a traditional function.

1. How memory is managed in managed in C++ manually?

* Memory Allocation: When your program needs memory (e.g., for creating objects or arrays), you request it from the system using specific keywords. ‘new’ keyword is used to allocate memory dynamically.
* Memory Deallocation: After you are done using the memory, you need to release it back to the system to avoid wasting resources. ‘delete’ is used to free memory that was allocated with new.

1. What is heap memory ?

* Heap memory is a part of the computer’s memory where dynamic memory allocation happens. This means that memory is allocated to the program during runtime, and the program decides how much memory it needs at that moment.

1. What is a Namespace in C++?

* A namespace in C++ is a way to organize code and avoid name conflicts. It acts like a container where you can group functions, variables, and classes together under a specific name.
* When multiple programs or libraries have functions or variables with the same name, a namespace helps differentiate between them by providing a unique scope.

1. What is a Virtual Function in C++?

* A virtual function in C++ is a function in a base class that you can override in a derived class. It allows runtime polymorphism, meaning the function to be executed is determined based on the type of object (not the type of pointer/reference) at runtime.
* Features: Declared using virtual keyword in the base class, Allows a derived class to provide its own version of the function, Supports runtime binding (dynamic binding) instead of compile-time binding.

1. difference between C++ and Java.

* C++ supports both procedural programming and object-oriented programming. Java strictly support object-oriented. Everything must be inside a class, even simple programs.
* C++: Memory is managed manually. Java: Memory is managed automatically. In Java, The Garbage Collector cleans up unused objects, so you don’t need to worry about manual memory management.
* C++: Supports pointers, Java: Does not have pointers.
* C++: Generally faster than Java because it compiles directly to machine code. Java: Slightly slower than C++ because it runs on the JVM.