? C++ Interview Questions and Answers (1–50)

1. What is C++?

Answer: C++ is an object-oriented programming language that extends the C programming language.

2. Who developed C++?

Answer: Bjarne Stroustrup in 1979 at Bell Labs.

3. What are the basic features of C++?

Answer:

- Object-oriented
- Platform-independent
- Supports pointers and low-level memory management
- Strong type checking
- Operator overloading

4. What is the difference between C and C++?

Answer: C is procedural; C++ supports both procedural and object-oriented programming.

5. What is a class in C++?

Answer: A class is a blueprint for creating objects.

6. What is an object?

Answer: An instance of a class containing data and methods.

7. What are access specifiers in C++?

Answer:

- `public`
- `private`
- `protected`

8. What is a constructor?

Answer: A special method that is automatically called when an object is created.

9. What is a destructor?

Answer: A method called when an object is destroyed to free resources.

10. What is function overloading?

Answer: Defining multiple functions with the same name but different parameters.

11. What is operator overloading?

Answer: Giving additional meaning to operators for user-defined data types.

12. What is inheritance?

Answer: A mechanism where one class acquires properties and behaviors of another class.

13. What are types of inheritance in C++?

Answer:

- Single
- Multiple
- Multilevel
- Hybrid
- Hierarchical

14. What is polymorphism?

Answer: The ability to take many forms; achieved using overloading and overriding.

15. What is encapsulation?

Answer: Binding data and methods into a single unit (class) and hiding the details.

16. What is abstraction?

Answer: Showing only essential features and hiding the implementation details.

17. What is a virtual function?

Answer: A function declared using the `virtual` keyword that can be overridden in a derived class.

18. What is a pure virtual function?

Answer:

```
virtual void display() = 0;
```

19. What is an abstract class?

Answer: A class that has at least one pure virtual function.

20. What is the difference between `struct` and `class` in C++?

Answer: By default, members of `struct` are public, while in `class` they are private.

21. What is a friend function?

Answer: A function that can access private and protected members of a class.

22. What is a static member?

Answer: A member shared by all objects of the class.

23. What is the difference between `new` and `malloc()`?

Answer:

- `new` calls constructor and allocates memory
- `malloc()` just allocates memory

24. What is the use of `this` pointer?

Answer: Refers to the current object in a class.

25. What is the difference between shallow and deep copy?

Answer:

- Shallow: Copies only pointer values
- Deep: Copies data the pointer points to

26. What are templates in C++?

Answer: Allow functions and classes to operate with generic types.

27. What is the Standard Template Library (STL)?

Answer: A collection of template classes and functions like vectors, stacks, and maps.

28. What are the components of STL?

Answer:

- Containers
- Algorithms
- Iterators
- Functors

29. What is an exception in C++?

Answer: Runtime error that can be handled using `try`, `catch`, and `throw`.

30. What is the difference between `throw` and `try-catch`?

Answer:

- `throw` raises an exception
- `try-catch` handles it

31. What is the use of `typeid` operator?

Answer: Returns the type information at runtime.

32. What is RTTI?

Answer: Run-Time Type Information — allows determination of object type at runtime.

33. What is the scope resolution operator `::`?

Answer: Used to define a function outside of a class or to access global variables.

34. What is a namespace?

Answer: Avoids name conflicts by grouping entities under a unique name.

35. What is a pointer?

Answer: A variable that stores the memory address of another variable.

36. What is a reference variable?

Answer: An alias for another variable.

37. What is the difference between pointer and reference?

Answer:

- Pointers can be null, references cannot
- Pointers can change, references cannot be reseated

38. What is the difference between `delete` and `delete[]`?

Answer:

- `delete` deallocates memory for single objects
- `delete[]` for arrays

39. What are virtual destructors?

Answer: Ensure that the correct destructor is called when deleting derived class objects through base pointers.

40. What is `const` keyword?

Answer: Specifies that a variable or method cannot be modified.

41. What is a `volatile` keyword?

Answer: Prevents compiler optimization for variables that can be changed externally.

42. What is `mutable` in C++?

Answer: Allows a class member to be modified even if the object is `const`.

43. What is inline function?

Answer: Suggests compiler to insert function code at the point of call to save overhead.

44. What is a lambda function?

Answer: An anonymous function introduced in C++11.

45. What are smart pointers?

Answer: Objects that manage memory automatically (e.g., `shared_ptr`, `unique_ptr`).

46. What is the difference between stack and heap?

Answer:

- Stack: Fast, stores function frames
- Heap: Slower, used for dynamic allocation

47. What is dynamic binding?

Answer: The decision to call a function is made at runtime (via virtual functions).

48. What is the default constructor?

Answer: A constructor with no parameters.

49. What is a copy constructor?

Answer: Constructor used to copy objects.

50. What is the `main()` function in C++?

Answer: Entry point of every C++ program.