2.What is OOP? List OOP concepts?

• What is OOP?

• OOP stands for Object-Oriented Programming model that organizes software design around objects, rather than functions and logic. In OOP, programs are made up of objects that interact with each other, and these objects can contain data and code.

• List OOP concepts?

• Class

• Object

• Encapsulation

• Inheritance

• Polymorphism

• Abstraction

• Class:

• A blueprint or template for creating objects. It defines the attributes and methods that objects will have.

• Object:

• An instance of a class. It contains data and functions defined in the class.

• Encapsulation :

• Bundling data (attributes) and methods within an object, protecting data from unauthorized access.

• This concept promotes data security and prevents accidental modification.

• Encapsulation is achieved by making class attributes private and providing public methods to access or modify them.

- **Inheritance :**

  • Creating new classes (derived classes) based on existing classes (base classes), inheriting their attributes and methods

  • This allows for code reuse and the creation of hierarchical Lrelationships between classes. For example, a "Sports Car" class could inherit from the "Car" class, inheriting its attributes and methods while adding new ones specific to sports cars.

• Type of Inheritance

• Simple Inheritance
• Multilevel Inheritance
• Multiple Inheritance
• Hierarchical Inheritance
• Hybrid lnheritance

- **Polymorphism** • The ability of objects to take on multiple forms, allowing different objects to be treated as if they were the same type.

• This is achieved through method overriding, where a derived class provides a different implementation of a method inherited from its base class.

• Polymorphism enables you to write generic code that can work with objects of different types

• Type of Polymorphism

1. compile time polymorphism

• Constructor overloading
• Function overloading
• Operator overloading

2. Run time polymorphism

• Function overloading

- **Abstraction**

  • Abstraction is the process of only showing the necessary details to the user and hiding the other details in the background

  •Control and data are the two types of abstraction in C++

  • Abstraction in C++ is achieved through classes, header files, and access specifiers (public, private, protected).