1 - Introduction

OOP is a programming technique in which programs are written on the basis of objects.

- Object is a collection of data and functions.

OOP Principles

Encapsulation

Definition: Encapsulation is the process of **binding data and methods** that operate on that data into a single unit (class) and **restricting direct access** to the data from outside the class.

- The bundling of data members and functions inside a single unit called class
- **Example:** Medicine Capsule.

Abstraction

Definition: Abstraction is the process of **hiding unnecessary details** and **showing only essential features** of an object or system.

- Displaying only essential information and hiding details.
- **Example:** Mobile Apps.

Data Encapsulation Vs Abstraction

Encapsulation	Abstraction
Hides **data** using access control.	Hides **implementation details**.
Focuses on **data protection**.	Focuses on **simplifying complexity**.
Achieved using **classes & access modifiers**.	Achieved using **abstract classes or interfaces**.
Example: `private` variables with getters/setters.	Example: `startCar()` hides how the engine starts.

Inheritance

Definition: Inheritance is a feature in object-oriented programming that allows one class (the **child** or **subclass**) to **acquire properties and behaviors (data and methods)** from another class (the **parent** or **superclass**).

The capability of a class derive properties and characteristics from another class is called Inheritance.

- **Sub Class:** Child class.
- **Super Class:** Parent class.

Polymorphism

Definition: Polymorphism is the ability of an object to take on **many forms**, allowing the same function or method to behave differently based on the object that invokes it.
One interface to be used for different types of objects or different behaviors.