Basic concept OOP

The following are the major characteristics of any object oriented programming language and they are

1. Object
2. Class
3. Data abstraction
4. Data encapsulation
5. Inheritance
6. Overloading
7. Polymorphism
8. Dynamic binding
9. Message passing

Objects: **The object represents the data and associated function as single unit**. Each object is identified by unique name. Every object should be member of a particular class. The object can interact with each other by sending message to one another.
Ex: The Mango, Banana are the object of class fruit

Classes: A class is a user defined data type. **It is a way of grouping objects having similar characteristics**. Once a class is defined any number of Object of that class are created. It can hold both data and functions.

Data abstraction: **It refers to the process of representing essential features without including the background details or explanations**.

Data encapsulation: **The wrapping of data and functions into a single unit is called as data encapsulation**. It prevent the direct access of data. The data can be accessed only through methods (function) present inside the class. The data cannot be modified by external nonmember function of class. The data encapsulation enable data hiding.

Data hiding: The concept of insulating the data from direct access by the program is called data hiding.

Inheritance: **Is the process by which object of one class acquires the properties of the object of another class** OR the process of forming a new class from an existing class is known as inheritance. The object of one class acquire the properties of another class through inheritance. The existing class is known as base class. The new class is called as derived class. The derived class share some of the properties of base class and thus we reuse the code

Polymorphism:It is a Greek word. The meaning of this word is the ability to take more than one form. Example Consider the operation of addition of 2 numbers, the operation will generate the sum. The term polymorphism can be defined as the ability of a function to have a same name and multiple form. The polymorphism technique is extensively used in implementing inheritance technique.

Overloading: It allow the objects to have different meaning depend upon context. There are two types of overloading
A) **Operator overloading:** when an existing operator operates on new data type, it is called operator overloading. If the operands are string then it will produce the third string by joining the string. Thus the

process of making the operator to show the different behavior in different instance is known as **operator overloading**.

B) **Function overloading**: The same function name to carry out similar types of activities with various data items. Or the single function name is used to perform the different type of operation is called **function overloading**

Dynamic binding: The binding is the process of connecting one program to another. Dynamic binding means code associated with a procedure call is known as only at the time of program execution time.

OR

The dynamic binding means linking of a procedure call to the code at run time i.e. during execution of program. It associated with polymorphism and inheritance.

Message passing: The objects communicates with one another by sending and receiving the information to another. By using this concept it is very easy to develop or build systems. The message for an object is a request for execution. The message passing involves specifying the name of the object, name of the message (function) and the information to be sent.

Advantages of OOP over earlier program

OOP offers several benefits to both the program designer and the user with following advantages

- The data hiding helps the programmer to build secure program
- We can avoid redundant code by using inheritance
- Software complexity can be easily managed
- Easy to upgrade
- Easy to partition the work
- We can avoid redundant code by using inheritance
- OOP can communicate through message passing , using this we can communicate the outside the system very easily

Applications of OOP

Mainly we use in user interface design and in real business system. The promising area for application of OOP include

- Real time systems
- simulation and modeling
- Object oriented data base
- CIM/CAM/CAD systems
- Parallel programming and Neural network
- Computer graphic application
- Artificial intelligence and expert system

Limitation of OOP

The major disadvantages by using OOP are

- To convert real world problem into object oriented model is difficult
- Adaptability of flow diagram using classes and object is difficult
- OOP software is not having set standard.

Example for OOP
C++, Java, C#, Python

NOTE:
The difference between procedural and object oriented programming approach

	Procedure Oriented Programming	Object Oriented Programming
Divided Into	In POP, program is divided into small parts called **functions**.	In OOP, program is divided into parts called **objects**.
Communication	By Function call	By message passing
Importance	In POP, Importance is not given to **data** but to functions as well as **sequence** of actions to be done.	In OOP, Importance is given to the data rather than procedures or functions because it works as a **real world**.
Approach	POP follows **Top Down approach**.	OOP follows **Bottom Up approach**.
Access Specifies	POP does not have any access specifier.	OOP has access specifiers named Public, Private, Protected, etc.
Data Moving	In POP, Data can move freely from function to function in the system.	In OOP, objects can move and communicate with each other through member functions.
Expansion	To add new data and function in POP is not so easy.	OOP provides an easy way to add new data and function.
Data Access	In POP, Most function uses Global data for sharing that can be accessed freely from function to function in the system.	In OOP, data cannot move easily from function to function, it can be kept public or private so we can control the access of data.
Data Hiding	POP does not have any proper way for hiding data so it is **less secure**.	OOP provides Data Hiding so provides **more security**.
Overloading	In POP, Overloading is not possible.	In OOP, overloading is possible in the form of Function Overloading and Operator Overloading.
Examples	Example of POP are : C, VB, FORTRAN, Pascal.	Example of OOP are : C++, JAVA, VB.NET, C#.NE