

## Worksheet 4 Answers

### 1) OOPS:

**OOPS(Object Oriented Programming)** is a methodology to design a program using classes and objects.

#### **OOPS Concept:**

OOPs concepts includes following Object oriented programming concepts.

- 1) Object
- 2) Class
- 3) Inheritance
- 4) Polymorphism
- 5) Abstraction
- 6) Encapsulation

### 1) Object:

An object can be represented as an entity that has state and behaviour.

**Example :** A car is an object that has states such as colour, model, price and behaviour such as speed, start, gear change, stop etc.

### 2) Class :

A class can be considered as a **blueprint** which **you can use to create as many objects as you like**.

**Example :** we have a class Website that has two data members. This is just a blueprint, it does not represent any website, however using this we can create Website objects that represents the websites.

### 3) Inheritance :

The process by which one class acquires the properties and functionalities of another class is called inheritance. Inheritance provides the idea of reusability of code and each sub class defines only those features that are unique to it, rest of the features can be inherited from the parent class.

**Example:** we have a parent class Teacher and a child class MathTeacher. In the MathTeacher class we need not to write the same code which is already present in the parent class. Here we have college name, designation and does() method that is common for all the teachers, thus MathTeacher class does not need to write this code, the common data members and methods can be inherited from the Teacher class.

**Types Of Inheritance :**

**Single Inheritance:** refers to a child and parent class relationship where a class extends the another class.

**Multilevel inheritance:** refers to a child and parent class relationship where a class extends the child class. For example class A extends class B and class B extends class C.

**Hierarchical inheritance:** refers to a child and parent class relationship where more than one classes extends the same class. For example, class B extends class A and class C extends class A.

**Multiple Inheritance:** refers to the concept of one class extending more than one classes, which means a child class has two parent classes.

Java doesn't support multiple inheritance. Most of the new **OO languages** like Small Talk, Java, C# do not support Multiple inheritance. Multiple Inheritance is supported in C++.

In java we can achieve through interfaces.

#### 4)Polymorphism :

It is a Greek Word.Poly means many,morphism means forms.

When we are having a many forms for a single thing that is called Polymorphism.

**Example :** let's say we have a class Animal that has a method animalsound(), here we cannot give implementation to this method as we do not know which Animal class would extend Animal class.

#### Two ways to Achieve Polymorphism

1) Method Overloading

2) Method Overriding

#### 5)Abstraction :

The Process that hiding the implementation details and showing only the functionality.

**Example :** when you login to your bank account online, you enter your user\_id and password and press login, what happens when you press login, how the input data sent to server, how it gets verified is all abstracted away from the you.

**6)Encapsulation :** simply means binding object state(fields) and behaviour(methods) together. If you are creating class, you are doing encapsulation.

**Example :** Make the instance variables private so that they cannot be accessed directly from outside the class. You can only set and get values of these variables through the methods of the class. Have getter and setter methods in the class to set and get the values of the fields.

2) 1)A

2)

3)B

4)A

5)A

6) C

7)A

8)D

9)A

10) Derived::show() called

11) Derived::show() called

12) Compile Time Error

13)Compile Time Error

14)Compile Time Error

15)104

16)Compile Time Error

17)Compile Error

18)0 0

19) Constructor called 10

Constructor called 5

20)error

21)2

22)2

23)1 2

24)1 2

25) obj1.a = 4 obj1.b = 3  
obj2.a = 4 obj1.b = 3