WORKSHEET SET 4

1. Java is an object-oriented programming (OOP) language that uses classes and is based on the idea of objects. The goal of OOP principles is to increase the readability and re - usability of code. There are four principles of object-oriented programming:

- **Abstraction-** With abstraction, consumers can only see the information that matters. It can be achieved by making abstract classes and interfaces. **Example- Coffee machines.**
- **Encapsulation**- Data security is aided by encapsulation, which lets us shield a class's data from system-wide access by acting as a capsule to protect a class's internal information. Making the fields private and accessing them through getter and setter methods, allows us to build encapsulation in Java. **Example- Bank accounts.**
- **Inheritance** makes it possible to create a child class that inherits the fields and methods of the parent class. **Example – Dogs and cats inheriting an Animal class.**
- **Polymorphism**- Method overloading and method overriding are two ways that polymorphism can be implemented in Java.
  When a class contains multiple methods with the same name, this is known as method overloading. They can be distinguished by their parameters.
  When a child class overrides a parent class's method, this is known as method overriding.
  Example - A individual who can has different relationships with is a real-world example of polymorphism like , a man is a father to his child, a husband to his partner, and a worker to his employer.

  2. In code

  1. The way to create an abstract class is to turn at least one member function into a pure virtual function. **Hence, the correct option is (a).**

  2. The following statements are true:

- An interface can contain following type of members- public, static, final fields (i.e., constants).
- A class can implement multiple interfaces.
- Many classes can implement the same interface.

  Hence, the correct option is (a).
  3. Method Overloading is determined at compile time. **Hence, the correct option is (b).**

  4. A default constructor does not require any parameters**. Hence, the correct option is (a).**

  5. Dot operator is used to access the members with help of object of class. **Hence, the correct option is (a).**

6. Once the class has been established, any number of objects that fall under that class can be produced. **Hence, the correct option is (c).**

7. A non- member function cannot access private data of the class**. Hence, the correct option is (a).**

8. The output will be 0 as there is no value assigned to int I.**Hence, the correct option is (b).**

9. The following statements are true:
1) Every class is part of some package.
2) All classes in a file are part of the same package.
3) If no package is specified, the classes in the file go into a special unnamed package.
Hence, the correct option is (a).

10. The output will be "**Derived::show()** called" as there is a base class – Base and a derived class- Derived. In the main method, an object is created which is a reference that points to a Derived class subject. As a result, derived fun() is invoked and run-time polymorphism takes place.

11. The program will throw a **compile error** as final methods cannot be overridden.

12. The output will be "**Base::show() called**" as the methods are made static.

13. The output will be **Test class Derived class** as in the test class, print statement will execute first, then due to super keyword referring to the upper method, derived class print statement will execute second.

14. The program will throw **a compile error** as there is an int data type associated with the getDetails method that overrides the Derived.getDetails method.
15. The output will be :
Adding to 100, x = 104 // because x has been incremented 4 times.
Adding to 0, y = 3 3 3 // because y has been incremented 3 times but printed only one time. Because Static variables are global variables.

16. The program will throw a **compile error** as there is an ambiguity for compiler to call which m1 method and there is semi colon in place for method body in second m1 method.

17. The program will throw a **compile error** as Null values cannot be assigned to primitive data types.

18. The output will be **0 0** as the default constructors initialize variables as 0.
19. The output will be:

Constructor called 10
Constructor called 5
Because, inside the class Test2, Test1 object is created and the object for class Test2 is created in main class.

20. The output will be **7** because the first element in array 2 is 7.

21. The output will be **2** as r is made a reference of type A, r.display prints the value.

22. The output will be **2** as b is made as a reference for class B and the value of j is 2.

23. The output will be **1 2** because when no specifier is declared, the member of class B will be called by default because both classes A and B include members with the same name, j. 1 2 will be printed because i = 1 and j = 2.

24. The output will be **1 2** because the super keyword calls the constructor of class A by constructor of class B, where the constructor of A initializes i = 1 & j= 2.

25. The output will be:
obj1.a = 4 obj1.b = 3
obj2.a = 4 obj1.b = 3
as the value of a and b is incremented and obj1 &obj2 refer to same memory address.