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 reuse of Java code. There are four principles of object-oriented programming:

- **Abstraction-** With abstraction, consumers are intended to see only 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 you 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 program will throw a compile error as no class has been declared public**. Hence, the correct option is (c).**

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.