FULL STACK DEVELOPMENT – WORKSHEET 4
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Q1. Write in brief about OOPS Concept in java with Examples. (In your own words)

Ans: Object Oriented Programming or OOPs refers to languages that use objects in programming, they use objects as a primary source to implement what is to happen in the code. Object-oriented programming aims to implement real-world entities like inheritance, hiding, polymorphism etc. in programming. The main aim of OOP is to bind together the data and the functions that operate on them so that no other part of the code can access this data except that function.

OOPS concepts are as follows:

1. Class
2. Object
3. Method and method passing
4. Pillars of OOPs
    - Abstraction
    - Encapsulation
    - Inheritance
    - Polymorphism
        - Compile-time polymorphism
        - Runtime polymorphism

Classes and Objects:

- A class is a blueprint or template that defines the structure and behaviour of objects.
- An object is an instance of a class, representing a real-world entity.

<u>class and objects one simple java program</u>:

```
public class GFG {

	static String Employee_name;
	static float Employee_salary;

	static void set(String n, float p) {
		Employee_name = n;
		Employee_salary = p;
	}

	static void get() {
		System.out.println("Employee name is: " +Employee_name );
		System.out.println("Employee CTC is: " + Employee_salary);
```

```
    }

    public static void main(String args[]) {
        GFG.set("Rathod Avinash", 10000.0f);
        GFG.get();
    }
}
```

Pillar 1: Abstraction

Abstraction involves simplifying complex reality by modelling classes based on their essential properties and behaviours while hiding the unnecessary details.

```
//abstract class
abstract class GFG{
//abstract methods declaration
    abstract void add();
    abstract void mul();
    abstract void div();
}
```

Pillar 2: Encapsulation

Encapsulation refers to the bundling of data (attributes) and methods (functions) that operate on that data into a single unit (a class).

```
//Encapsulation using private modifier

//Employee class contains private data called employee id and employee name
class Employee {
    private int empid;
        private String ename;
}
```

Pillar 3: Inheritance

Inheritance allows a class (subclass or child class) to inherit properties and methods from another class (superclass or parent class).

```
//base class or parent class or super class
class A{
    //parent class methods
    void method1(){}
    void method2(){}
}

//derived class or child class or base class
class B extends A{ //Inherits parent class methods
```

```
//child class methods
        void method3(){}
        void method4(){}
}
```

Pillar 4: Polymorphism

Polymorphism allows objects of different classes to be treated as objects of a common superclass.

```
sleep(1000) //millis

sleep(1000,2000) //millis, nanos
```

Q2. Write simple programs(wherever applicable) for every example given in Answer 2.

Multiple Choice Questions

Q1. Which of the following is used to make an Abstract class?

A. Making at least one member function as pure virtual function
B. Making at least one member function as virtual function
C. Declaring as Abstract class using virtual keyword
D. Declaring as Abstract class using static keyword

Ans: A. Making at least one member function as pure virtual function

```
class AbstractClass {
public:
   virtual void pureVirtualFunction() = 0; // Pure virtual function
};
```

Q2. Which of the following is true about interfaces in java.

- An interface can contain the following type of members.
  ....public, static, final fields (i.e., constants)
  ....default and static methods with bodies
- An instance of the interface can be created.
- A class can implement multiple interfaces.
- Many classes can implement the same interface.

A. 1, 3 and 4
B. 1, 2 and 4
C. 2, 3 and 4
D. 1,2,3 and 4

Ans: A. 1, 3 and 4

Q3. When does method overloading is determined?

A. At run time
B. At compile time
C. At coding time
D. At execution time

Ans: B. At compile time

Q4. What is the number of parameters that a default constructor requires?

A. 0
B. 1
C. 2
D. 3

Ans**:** A. 0

Q5. To access data members of a class, which of the following is used?

A. Dot Operator
B. Arrow Operator
C. A and B both as required
D. Direct call

Ans: A. Dot Operator

Q6. Objects are the variables of the type ____?

A. String
B. Boolean
C. Class
D. All data types can be included

Ans: C. Class

Q7. A non-member function cannot access which data of the class?

A. Private data
B. Public data
C. Protected data
D. All of the above

Ans: A. Private data

Q8. Predict the output of following Java program

```
class Test {
int i;
}
class Main {
public static void main(String args[]) {
```

```
Test t = new Test();
System.out.println(t.i);
}
}
```

A. garbage value
B. 0
C. compiler error
D. runtime Error

Ans: B. 0

Q9. Which of the following is/are true about packages in Java?

- Every class is part of some package.
- All classes in a file are part of the same package.
- If no package is specified, the classes in the file go into a special unnamed package
- If no package is specified, a new package is created with folder name of class and the class is put in this package.

A. Only 1, 2 and 3
B. Only 1, 2 and 4
C. Only 4
D. Only 1, 3 and 4

Ans: A. Only 1, 2 and 3

For Q10 to Q25 find output with explanation.

Q10.Predict the Output of following Java Program.

```
class Base {
public void show() {
System.out.println("Base::show() called");
}
}
class Derived extends Base {
public void show() {
System.out.println("Derived::show() called");
}
}
public class Main {
public static void main(String[] args) {
Base b = new Derived();;
b.show();
}
}
```

Ans: Derived::show() called

Q11. What is the output of the below Java program?

```
class Base {
final public void show() {
System.out.println("Base::show() called");
}
}
class Derived extends Base {
public void show() {
System.out.println("Derived::show() called");
}
}
class Main {
public static void main(String[] args) {
Base b = new Derived();;
b.show();
}
}
```

Ans: compilation error

Q12.Find output of the program.

```
class Base {
public static void show() {
System.out.println("Base::show() called");
}
}
class Derived extends Base {
public static void show() {
System.out.println("Derived::show() called");
}
}
class Main {
public static void main(String[] args) {
Base b = new Derived();
b.show();
}
}
```

Ans: Base::show() called

Q13.What is the output of the following program?

```
class Derived
{
public void getDetails()
{
System.out.printf("Derived class ");
}
}
public class Test extends Derived
{
public void getDetails()
{
System.out.printf("Test class ");
super.getDetails();
}
public static void main(String[] args)
{
Derived obj = new Test();
obj.getDetails();
}
}
```

Ans: Test class Derived class

Q14. What is the output of the following program?

```
class Derived
{
public void getDetails(String temp)
{
System.out.println("Derived class " + temp);
}
}
public class Test extends Derived
{
public int getDetails(String temp)

{
System.out.println("Test class " + temp);
return 0;
}
public static void main(String[] args)
{
Test obj = new Test();
obj.getDetails("Name");
}
        }
```

Ans: Compilation error

Q15.What will be the output of the following Java program?

```
class test
{
public static int y = 0;
}
class HasStatic
{
private static int x = 100;
public static void main(String[] args)
{
HasStatic hs1 = new HasStatic();
hs1.x++;
HasStatic hs2 = new HasStatic();
hs2.x++;
hs1 = new HasStatic();
hs1.x++;
HasStatic.x++;
System.out.println("Adding to 100, x = " + x);
test t1 = new test();
t1.y++;
test t2 = new test();
t2.y++;
t1 = new test();
t1.y++;
System.out.print("Adding to 0, ");
System.out.println("y = " + t1.y + " " + t2.y + " " + test.y);
}
}
```

Ans: Adding to 100, x = 104
Adding to 0, y = 3 3 3

Q16.Predict the output

```
class San
{
public void m1 (int i,float f)
{
System.out.println(" int float method");
}
public void m1(float f,int i);
{
System.out.println("float int method");

}
public static void main(String[]args)
{
San s=new San();
s.m1(20,20);
}
}
```

Ans: Syntax error

Q17.What is the output of the following program?

```
public class Test
{
public static void main(String[] args)
{
int temp = null;
Integer data = null;
System.out.println(temp + " " + data);
}
}
```

Ans: Compilation error

Q18.Find output

```
class Test {
protected int x, y;
}
class Main {
public static void main(String args[]) {
Test t = new Test();
System.out.println(t.x + " " + t.y);
}
}
```

Ans: 0 0

Q19.Find output

```
// filename: Test2.java
class Test1 {
Test1(int x)
{
System.out.println("Constructor called " + x);
}
}
class Test2 {
Test1 t1 = new Test1(10);
Test2(int i) { t1 = new Test1(i); }
public static void main(String[] args)
{
Test2 t2 = new Test2(5);
}
        }
```

Ans: Constructor called 10

Constructor called 5

Q20.What will be the output of the following Java program?

```
class Main
{
public static void main(String[] args)
{
int []x[] = {{1,2}, {3,4,5}, {6,7,8,9}};
int [][]y = x;
System.out.println(y[2][1]);
}
}
```

Ans: 7

Q21.What will be the output of the following Java program?

```
class A
{
int i;
public void display()
{
System.out.println(i);
}
}
class B extends A
{
int j;
public void display()
{
System.out.println(j);
}
}
class Dynamic_dispatch
{
public static void main(String args[])
{
B obj2 = new B();
obj2.i = 1;
obj2.j = 2;
A r;
r = obj2;
r.display();
}
}
```

Ans: 2

Q22. What will be the output of the following Java code?

```
class A
{
int i;
void display()
{
System.out.println(i);
}
}

class B extends A
{
int j;
void display()
{
System.out.println(j);
}
}
class method_overriding
{
public static void main(String args[])
{
B obj = new B();
obj.i=1;
obj.j=2;
obj.display();
}
        }
```

Ans: 2

Q23.What will be the output of the following Java code?

```
class A
{
public int i;
protected int j;
}
class B extends A
{
int j;
void display()
{
super.j = 3;
System.out.println(i + " " + j);
}
}
class Output
{
public static void main(String args[])
```

```
{
B obj = new B();
obj.i=1;
obj.j=2;
obj.display();
}
}
```

Ans: 1 2

Q24.What will be the output of the following Java program?

```
class A
{
public int i;
public int j;

A()
{
i = 1;
j = 2;
}
}
class B extends A
{
int a;
B()
{
super();
}
}
class super_use
{
public static void main(String args[])
{
B obj = new B();
System.out.println(obj.i + " " + obj.j)
}
}
```

Ans: Syntax error, ';' missing in the 24th line – "System.out.println(obj.i + " " + obj.j)"

Q 25. Find the output of the following program.

```
class Test
{
int a = 1;
int b = 2;
Test func(Test obj)
{
Test obj3 = new Test();
obj3 = obj;
```

```
obj3.a = obj.a++ + ++obj.b;
obj.b = obj.b;
return obj3;
}
public static void main(String[] args)
{
Test obj1 = new Test();
Test obj2 = obj1.func(obj1);
System.out.println("obj1.a = " + obj1.a + " obj1.b = " + obj1.b);
System.out.println("obj2.a = " + obj2.a + " obj1.b = " + obj2.b);
}
        }
```

Ans: obj1.a = 4 obj1.b = 3

obj2.a = 4 obj1.b = 3