Experiment. No. 01

Title: *Program on classes and objects.*

Criteria	Excellent 4	Good 3	Satisfactory 2	Needs Improvement 1	Marks Obtained
Program Implementation	Error-free, efficient code	Minor errors, good logic	Code works with some issues	Major errors or incomplete	
Output & Documentation	Complete output with proper documentation	Good output, adequate documentation	Basic output shown	Incomplete or missing output	
Viva/Questions	Excellent responses to all questions	Good responses to most questions	Satisfactory responses	Poor or no responses	
GitHub	Properly Updated	No Proper organization	Incomplete	Not Updated	
Total					

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Subject In-charge Sign:……..

Experiment No. 1

Aim: **To write a Java program to demonstrate the concept of classes and objects, showcasing object-oriented programming principles such as encapsulation and reuse of code.**

Software: **IDE:** VS Code/Notepad
Java Version: Java jdk 21
Operating System: Windows/Linux/macOS

Pre-lab Questions:

Q1. What is a class in Java?
Ans:A class in Java is a blueprint or template that defines objects by specifying their fields (data) and methods (behavior).

Q2. What is an object?
Ans:An object in Java is an instance of a class that represents a real-world entity with state (data) and behavior (methods).

Q3. What is the difference between a constructor and a method?
Ans:Constructor: Special block used to initialize objects, has the same name as the class, and does not have a return type.
Method: Defines the behavior of objects, has its own name, and must have a return type .

Q4. What is the use of the new keyword?
Ans:The new keyword in Java is used to create a new object of a class and allocate memory for it.

Theory:

What is a Class?
A class in Java is a blueprint or template from which objects are created.
It defines data members (variables) and methods (functions) that represent the behavior of the object.
Example:-

```
class Student {
   int rollNo;
   String name;
   void display() {
      System.out.println("Roll No: " + rollNo + ", Name: " + name);
                  }
}
```

What is an Object?
An object is an instance of a class.
It occupies memory and has its own identity, state, and behavior.
Example:-
Student s1 = new Student(); // s1 is an object of Student class
What is a Constructor?
A constructor is a special method in Java that is used to initialize objects of a class.
It is automatically called when an object is created using the new keyword.
A constructor has the same name as the class and does not have a return type, not even void.

What is the new keyword in Java?
The new keyword in Java is used to create objects dynamically during runtime. When you use new, it:
Allocates memory in the heap for the object.Calls the constructor to initialize the object.

Steps in Object-Oriented Programming: -
1. Define the class with variables and methods.
2. Create objects using the new keyword.
3. Access members using the object (objectName.variable or objectName.method()).
4. Initialize data using constructors or setter methods.
5. Retrieve or display data using getter methods or print statements.

Problem Statement:

To write a Java program to demonstrate the concept of classes and objects, showcasing object-oriented programming principles such as encapsulation and reuse of code.

Program:

```
public class Class1
{
    int n;
    String s;
    public Class1()
    {
        System.out.println("Default Constructor");
        System.out.println("n="+n+"s="+s);

    }
    public void setN(int n1)
    {
        n=n1;


    }
    public void setS(String s1)
    {
        s=s1;

    }
    public int getN()
    {
        return n;
    }
    public String getS()
    {
        return s;
    }
    public static void main(String args[])
    {
        Class1 c1 = new Class1();
        c1.setN(12);
        c1.setS("Harshit");
        System.out.println("n="+c1.getN());
        System.out.println("s="+c1.getS());
```

```
    }
}
```

Output:

```
PS C:\Harshit Java> javac Class1.java
PS C:\Harshit Java> java Class1
Default Constructor
n=0s=null
n=12
s=Harshit
PS C:\Harshit Java>
```

Post-lab Question:

Q1. Can we have multiple classes in a single .java file?
Ans:Yes, we can have multiple classes in a single .java file, but only one public class, and the filename must match that public class name.

Q2. What happens if the filename doesn't match the public class name?
Ans:If the filename doesn't match the public class name in Java, it gives a compilation error:

Q3. What is the role of the main() method in Java?
Ans:The main() method in Java is the entry point of the program where execution begins.

Q4. What is the difference between Procedure Oriented Programming and Object-Oriented Programming?
Ans:Procedure-Oriented Programming (POP) focuses on functions and step-by-step instructions, while Object-Oriented Programming (OOP) focuses on objects, encapsulation, inheritance, and reusability.

Lab Outcome:

Understand and apply the fundamentals of Java Programming and Object-Oriented Programming.

Conclusion:

The above experiment demonstrates the use of classes and objects in Java. By defining a class Student, we encapsulate data (properties) and behavior (methods) in one reusable structure. Objects created by this class hold unique data but share common behaviors. This reflects core principles of object-oriented programming like modularity, reusability, and abstraction.