OOP Java Lab Questions

1. Introduction to Java

Q1. Write a program to take a student's name, roll number, and marks in three subjects. Calculate and display the total and average using Scanner.

Q2. Write a program using switch-case to perform basic arithmetic operations: addition, subtraction, multiplication, and division.

Q3. Create a Java program to check whether a number is even or odd using if-else statements.

2. Classes and Objects

Q1. Create a student class with fields: name, ID, and marks. Include methods to input and display details.

Q2. Design a class Rectangle with length and breadth. Add a method to calculate area and perimeter.

Q3. Create a class TemperatureConverter with a method that converts Celsius to Fahrenheit and vice versa.

3. Inheritance

Q1. Create a class Person with name and age. Derive a class Teacher with additional fields subject and salary. Show how inheritance works.

Q2. Demonstrate **constructor chaining** in multilevel inheritance: Person → Employee → Manager.

Q3. Create a class Animal with method sound(). Override it in Dog, Cat, and Cow classes to show different animal sounds.

4. Polymorphism

Q1. Create a class Calculator with method multiply (int, int) and multiply (double, double) to demonstrate **method overloading**.

Q2. Write a program where a superclass Shape has method area(). Override it in Circle, Triangle, and Rectangle classes using **runtime polymorphism**.

Q3. Demonstrate instanceof keyword to check object types in an inheritance hierarchy.

5. Abstraction and Encapsulation

Q1. Create an abstract class Appliance with abstract method start(). Create concrete classes Fan and WashingMachine to implement it.

Q2. Create a class BankAccount with private fields (account number, balance) and provide public methods to access and update them using getters/setters.

Q3. Demonstrate how abstraction works using interfaces: Define an interface Drawable and implement it in Circle and Square.

6. Packages and Access Control

Q1. Create a user-defined package mathops with a class Operations having methods add (), subtract (). Import it into another class and use it.

Q2. Show the use of all **access modifiers** (private, public, protected, and default) by creating variables and methods in different classes.

Q3. Create two packages: package1 with class A and package2 with class B. Access class A from B using import.

7. Exception Handling

Q1. Write a Java program to take two numbers as input and divide them. Handle ArithmeticException (divide by zero).

Q2. Write a program to handle ArrayIndexOutOfBoundsException when accessing an array element.

Q3. Create a program to accept age from the user. Throw and catch a user-defined exception if age is less than 18.