SWT 12031: Practical for Object oriented Program
Lab Sheet No: 09
Abstraction in Java

Time: - 09.30 – 12.30 pm **Submission Due: 2023/07/17**

Title: Abstraction in Java.

Aim: Getting practice to use an abstract class or method while writing java programs.

Tasks:

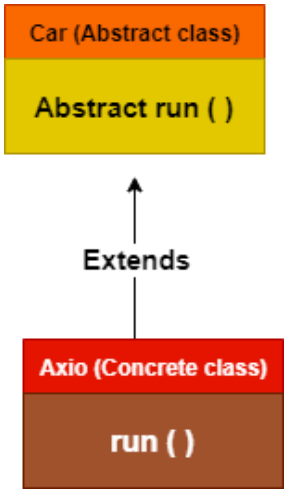
- Abstract Class
- Abstract Methods

Exercise 01:

1. Write a program using abstraction in java.
   a. Create an abstract class – Animal.
   b. Create an abstract method – animalSound ( ).
   c. Define a regular method – sleep ( ).
   d. Create a subclass – Cow by inheriting the Animal class and define the methods.
   e. Create the main class, create the object and call the methods.
   f. Try to create an object for the Animal class and discuss the output.

Exercise 02:

1. Write a java program using the illustration given below. You are required to use the concept of abstraction.



Exercise 03:

1. Write a program to calculate the area of the shapes given.
    a. Create an abstract class called **ObjectArea** with the abstract method **area ( ).**
    b. Create a subclass **Square** which extends the ObjectArea class and perform the area calculation of square.
    c. Create a subclass **Triangle** which extends the ObjectArea class and perform the area calculation of triangle.
    d. Next, create the **AreaTest** class with the main method. Within this class,
        i. Create the objects **sqr** and **tri** for Square and Triangle respectively.
        ii. By passing the values for each shape created, perform the area calculation and call the method.

Exercise 04:

1. Write a program to perform mathematical operation.
    a. Create an abstract class called **Calculation** with the abstract method **calculate().**
    b. Create a subclass **Addition** which extends the Calculation class and perform the addition operation.
    c. Create a subclass **Subtraction** which extends the Calculation class and perform the subtraction operation.
    d. Create a subclass **Multiplication** which extends the Calculation class and perform the multiplication operation.
    e. Create a subclass **Division** which extends the Calculation class and perform the division operation.
    f. Next, create the **Calculation** class with the main method. Within this class,
        i. Create the objects **add**, **subt**, **mult** and **div** for Addition, Subtraction, Multiplication and Division respectively.
        ii. By passing the values for each object created, perform the mathematical operations.

Discussion:

- Only abstract methods are used in abstract classes. Is this true or false? Explain.
- Is it necessary for a class to have at least one abstract method if it is declared abstract? Explain.
- Is it possible to use the keyword "abstract" for constructors, Instance Initialization Blocks, and Static Initialization Blocks?
- An abstract class cannot be instantiated. So, why are constructors permitted in abstract classes?
- Can Abstract method be declared as Static, Final and Private? Explain.