Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

Lab Number:	**9**
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Title:

1. Write a java program to create an abstract class named Shape that contains two integers and an abstract method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea() that prints the area of the given shape.

Learning Objective:

Students will be able to implement abstract class and abstract method programs.

Learning Outcome:

- Understanding the abstraction concept and hiding of the unnecessary code.

Course Outcome:

ECL304.4	1. Implement different programming applications using packaging.

Theory:

- Explain in details about necessity of data hiding in any application / project.
  Data hiding ensures, or we can say guarantees to restrict the data access to class members. It maintains data integrity.
  Data hiding means hiding the internal data within the class to prevent its direct access from outside the class.
  Data hiding also reduces system complexity for increased robustness by limiting interdependencies between software components.
  Encapsulation in Java is a mechanism of wrapping the data (variables) and code acting on the data (methods) together as a single unit….. Therefore, it is also known as data hiding.
  To achieve encapsulation in Java − Declare the variables of a class as private.

- Explain abstract class and abstract methods.
  A class that is declared using "abstract" keyword is known as abstract class. It can have abstract methods(methods without body) as well as concrete methods (regular methods with body).

  A normal class(non-abstract class) cannot have abstract methods.

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In this guide we will learn what is a abstract class, why we use it and what are the rules that we must remember while working with it in Java.

Abstract methods are those types of methods that don't require implementation for its declaration.

These methods don't have a body which means no implementation. A few properties of an abstract method are: An abstract method in Java is declared through the keyword "abstract"

Algorithm :	1. START 2. Create abstract class Shape. 3. Create class Rectangle extended by Shape. 4. Create class Triangle extended by Shape. 5. Create class Circle extended by Shape. 6. Create public abstract class 7. Crate all object and display. 8. END
Program:	

```
package inheritance1;
import java.util.*;

abstract class Shape{
	int length,breadth,radius;
	Scanner input = new Scanner(System.in);
	abstract void printArea();
}

class Rectangle extends Shape{
	void printArea() {
		System.out.println("For finding the Area of
Rectangle");
		System.out.print("Enter length and breadth");
		length = input.nextInt();
		breadth = input.nextInt();
		System.out.println("The area of Rectangle is: "
+ length * breadth);

	}
}

class Triangle extends Shape{
	void printArea() {
		System.out.println("For finding the Area of
Triangle");
```

```
                System.out.println("Enter Base and Height:");
                 length = input.nextInt();
                 breadth = input.nextInt();
                 System.out.println("The area of Triangle is: "
+ (length * breadth) / 2);
        }
}
class Cricle extends Shape {
        void printArea() {
                System.out.println( "For finding the Area of
Cricle");
                System.out.print("Enter Radius: ");
                radius = input.nextInt();
                System.out.println("The area of Cricle is: " +
3.14f * radius * radius);
        }
}
public class abstractshape {
        public static void main(String[] args) {
                Shape rec = new Rectangle();
                rec.printArea();

                Shape tri = new Triangle();
                tri.printArea();

                Shape cri = new Cricle();
                cri.printArea();
        }
}
```

Input given:

-

Output Screenshot:

```
For finding the Area of Rectangle
Enter length and breadth 12
 2
The area of Rectangle is: 24
For finding the Area of Triangle
Enter Base and Height:
6 7
The area of Triangle is: 21
For finding the Area of Cricle
Enter Radius: 3
The area of Cricle is: 28.26
```