W e b E n g i n e e r i n g

Lab 02 **Marks 100**

Instructions

Work on this lab individually.
You can use your books, notes, handouts etc. but you are not allowed to borrow anything from your peer student.

Objectives

Today's lab will help you to refresh your programming concepts in Java, including inheritance , abstract classes and use of interfaces in java.

Submission

Required within lab.

What you have to do

Program the following tasks in Java, compile and execute them. The name of your files will be according to the task given in this lab.

- You must do all tasks on console.

Task 1 [50]

Write a class **Shape** with data members *area*(double) and *volume*(double). This class includes the following methods:

- calculateArea() – Abstract function.
- calculateVolume() – Abstract function.
- toString() – A concrete function to display the area and volume.

Write the following subclasses which are extending the functionalities of **Shape** Class.

- **Square** with data members *width*(double), *length*(double), and *height*(double). This class must override the abstract functionality of super class.
- **Sphere** with data members r*adius*(double), and *Pi* (this must be set to 3.14). This class must override the abstract functionality of super class.

Write a driver class and create 3-5 objects and test the functionality of the code.

Hint: ***Area of square = $L * W$, Volume of Square = $L * W * H$, Area of Sphere = $\pi * r * r$, Volume of Sphere = $\pi * r * r * r$.***

Task 3 [25]

- Create a class **Vehicle** having function move() which prints a string "Move".
- Create a class **Car** inheriting from **Vehicle**, and having the same function which is printing "moving car".
- Create a class **Bike** inheriting from **Vehicle** having the same function too, and printing "moving bike".

Write a Driver class and do upcasting and down casting to test the functionalities.

Task 4 [25]

Write an interface **StudentData** which include following function declarations:

- setName()
- setRollNumber()
- setCGPA()
- getName()
- getRollNumber()
- getCGPA()
- display()

Write a subclass **Student** which will implement all these functions. Create the object of the class with the help of reference variable of interface and make calls to all the functions.

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