**Course: Object Oriented Programming**

**Lab 03**

**Constructors, Static Variables and Static Methods**

**Task 1:** Design a class Cylinder, which has following members:

* + Data:
    - radius
    - height
  + Constructor
    - A no-argument constructor. This constructor print this statement “A no argument constructor”.
    - A one-argument constructor receiving height and setting radius to default value 1
    - A two-argument constructor receiving height and radius (demonstrate the use of this reference by using same names for parameters and instance variables)
  + Methods:
    - Setter functions (total 2)
    - Getter functions (total 2)
    - computeArea
    - computeVolume
      * look for the relevant formulae over internet
    - displayInfo
      * Showing cylinder height, radius, area and volume
* Test class to test Cylinder
  + Demonstrate all the above constructors/methods by creating different objects and calling each constructor/method at least once

**Task 2:** Write a date class to model a date object.

* + Date
    - year
    - month
    - day

Value of day should not be greater than 30, if day value is greater than 30 reset it one.

Value of month should not be greater than 12, if month value is greater than 12 than reset it to one.

* + Constructors
    - No argument constructor. In this constructor set Day value to 7, month value to 10 and year to 2020.
    - One parameterized constructor for setting all three fields
  + Methods
    - A method to print date in “dd/mm/yy” format
    - Implement the setter and getter methods for day and month.
* Write DateTest class for the Date class
  + Create two date objects **d1** and **d2** by calling constructors with appropriate values
  + Input date, month and year from user using Scanner object
  + Create two reference variables (**d3** and **d4**) of type date.
  + Print date for **d1, d2** by calling print method of date.
  + Assign **d2** to a new object **d3** and **d3** to **d4**
  + Change **d3** month through the setter methods
  + Print **d1, d2, d3 and d4** by calling print method of date and observe the effect of reference types

**Task 3:**

Create a SavingsAccount class. Use a static data member annualInterestRate to store the annual interest rate for each of the savers. Each member of the class contains a private data member savingsBalance indicating the amount the saver currently has on deposit. Provide member function calculateMonthlyInterest that calculates the monthly interest by multiplying the balance by annualInterestRate divided by 12; this interest should be added to savingsBalance.

Provide a static member function modifyInterestRate that sets the static annualInterestRate to a new value.

Write a driver program to test class SavingsAccount. Instantiate two different objects of class SavingsAccount, saver1 and saver2, balances of 2000.00 and 3000.00, respectively. Set the annualInterestRate to 3 percent. Then calculate the monthly interest and print the new balances for each of the savers.

Then set the annualInterestRate to 4 percent, calculate the next month's interest and print the new balances for each of the savers.

**Task 4:**

Write a JAVA program that creates a class GuessTheWord, where class attributes is a static variable score(int).

In GuessTheWord create a static method, levelOne(with 3 string type arguments). In this method, ask user to input the word, and then you have compare it with words given in method arguments.

If user input = word 1, score will have -1; if user input = word 2, score will have +5 and if

user input = word3, score will have +1.

Now make another class GuessTheWordLevelTwo which will have another static method levelTwo which will give bonus of 10 and print the score and also print “You are Now at LEVEL 2”

In main (GameTest Class) levelTwo will be loaded only when score value will be greater than or equal to 10.