Object Oriented Programming Lab (PCC-CS593)

LAB OBJECTIVE

Upon successful completion of this Lab the student will be able to:

- Learn concepts of object oriented programming like class, constructor, overloading, inheritance, overriding
- Basic Standalone application Programming in JAVA.
- Understand the wrapper class, vectors, arrays in JAVA
- Develop interfaces- multiple inheritance, extending interfaces
- Learn how to create and access packages in JAVA
- Learn multithreaded programming, handling errors and exceptions, applet programming and graphics programming
- Learn about File, JCF and generics
- Learn to write GUI programming

Assignment-1

Objective:

The objective of this assignment is to learn how to write some **Simple JAVA Programs.**

1. Write a program to print your name.

2. Write a program to read the price of an item in the decimal form (like 75.95) and print the output in paise (like 7595 paise).

3. Write a program to convert the given temperature in *Fahrenheit* to *Celsius* using the following conversion formula:
$C = (F-32)/1.8$

4. Write a program to determine sum of the following series for given value of n:
$1 - 1/2^2 + 1/3^2 - ..... + 1/n^2$

5. Write a program to find the sum of digits of a given integer number (take input using command-line argument).

6. Write a program to find the reverse of a given integer number. (take input using command-line argument)

7. Write a program to find the factorial of a given integer number using recursion. (take input using command-line argument)

8. Write a Program of Sum of Series ($1+x+x^2+x^3+x^4+$…… up to n-th terms).

9. Write a program to calculate the Simple Interest (si) while your inputs are principle (p), time in years (n) and rate of interest (r). (take input using command-line argument)

10. Write a program to find the roots of the quadratic equation $ax^2 + bx + c = 0$ where a, b and c are constants.

11. Write a program to show Fibonacci series up to n-th terms using recursion.

12. WAP to print all prime number within a given range.

13. WAP to calculate GCD/HCF of two numbers.

Assignment-2

Objective:

The objective of this assignment is to learn Classes and Objects concept.

1. Add two numbers by taking input using Command Line Input, Scanner class and BufferedReader class.
2. Write a program to find Area and Circumference of Cylinder Using Constructors - Keyboard Input or Command Line Input.
3. Write a program to find Area and Volume of Cone Using Constructors - Keyboard Input or Command Line Input.
4. Create a class First, make instance variable [int x], method [void show ()] and also put main method inside that class and use the instance variable and method from main.

5. Create a class; make its instance variable and method. Use them from main, declared in different class.
6. Create a class, make method inside it and pass object as parameter of this method. (a. pass same class's object, b) pass different class's object)
7. Create a class; put a method inside this class which will return a class reference return same class and/or different class object.
8. See the problems below:

   Write a JAVA Program to make a *Student class* with proper attributes like roll no, name, stream, and college.
9. Design a class to represent a *Bank Account*. Include the following things:

   Fields
   - Name of the depositor
   - Account number
   - Type of account
   - Balance amount in the account

   Methods
   - To assign initial values
   - To deposit an amount
   - To withdraw an amount after checking balance
   - To display the name and balance

Assignment-3

Objective:

The objective of this assignment is to learn **Polymorphism & Inheritance.**

1. Create a class and test if method overloading holds good for return type of method or not.
2. Overload the constructors for class Box for cube and cone and also display its volume.
3. Do the problem 2 for method overloading.
4. Create a class EMP having instance variable name and id. Create its subclass (say Scientist) which has instance variable no_of_publication and experience. Now create its subclass, say Dscientist which has instance variable award. Put a method: public String toString () { } in every class where you describe about the class and from main create object of each class and print each object.
5. Create a class with a method void show () and make 3 subclasses of it and all subclasses have void show () method overridden and call those methods using their class references.
6. [*] Do the problem 4 using dynamic method dispatching.

Assignment-4

Objective:

The objective of this assignment is to learn **inheritance and abstract** classes.

1. Check without having any abstract method/s whether a class can be abstract; if so, then use that concrete method/s from another class having main method.
2. Create an abstract class with three abstract methods check whether you can we override only few methods (not all methods) in subclass or not.
3. Assume that a bank maintains two kinds of account for its customers, one called savings account and other called current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance (say Rs. 1000) and if the balance falls below this level a service charge is imposed (say Rs. 100).

   Create a class **Account** that stores customer name, account number and type of account. From this class derive two classes **Curr_Acct** and **Savn_Acct** respectively to make them more specific to their requirements. Include the necessary methods to achieve the following tasks:
   a. Accept deposit from a customer and update the balance.
   b. Display the balance.
   c. Compute and deposit interest.
   d. Permit withdrawal and update the balance.
   e. Check for minimum balance, impose penalty, if necessary, and update the balance.

   Use constructors to initialize the class members.

Assignment-5

Objective:

The objective of this assignment is to learn i**nterface, inner class** concept.

1. Create an interface named Shape with a field pie (=3.14). Create two subclasses of it named Circle and Rectangle create object of the two classes and calculate their area.
2. Create a class which contains an inner class. Show that inner class can use member of outer class directly, but Outer class can use member of Inner class only through its object. Check the name of class file, you created.
3. Create two interfaces, each with two methods. Inherit a new interface from the two, adding a new method. Create a class by implementing the new interface and also inheriting from a concrete class. In main (), create an object of derived class and call the methods. [do all without package statement]
4. Write a program to demonstrate anonymous inner class (using super class and interface)

Assignment-6

Objective:

The objective of this assignment is to learn **blocks and package** concept.

1. Show that ordinary block is executed when object is created and also the order of execution of these blocks (for multiple blocks/ inherited block).
2. Show that static block is executed at the time of class loading and also the order of execution of these blocks (for multiple blocks/ inherited block).
3. Create a class with variable(s) and method(s) (all will be default accessed) under package pOne. Now create a class under package pTwo, which is subclass of firstly created class. In the method here (i.e. class of pTwo) call variable(s) and method(s) of previous class (i.e. class of pOne). If errors come, rectify them. Now from Main (under working directory) access second class's members.
4. Create an interface containing three methods, in a package 'pkgOne'. Implement the interface from a class under package pkgTwo. From main, under working directory, create object of the class and call methods of interface.

Assignment-7 (Two Days)

Objective:

The objective of this assignment is to learn **String** concept.

1. Take a sting from keyboard and convert into character array (new one).
2. Take a string from keyboard and a char array (of length 5). Now append the string to that char array.
3. Find length of a string taken from keyboard and also find the length of that string except front and end spaces.
4. Check if "Tech" presents in "University of Technology" or not. If yes return its position.
5. Write a program to take a sentence and convert it into string arrays and sort the words using any Sorting technique.
6. Generate password from initials of one's first_name, middle_name, last_name and with last four digit of your roll_no.(if middle name not presents ,it won't come)
7. Show that the String object is immutable but StringBuffer type object is mutable.
8. Write a program in Java which will read a string and rewrite it in the alphabetical order. For example, the word STRING should be written as GINRST.
9. Write a program in Java to extract a portion of a character string and print the extracted string. Assume that m characters are extracted, starting with the n-th character.
10. Write your own method called deleteMe(String str, int m) that returns the input string with the m-th element removed.
11. Write a program to do the following:
    (i) To output the question "Who is the inventor of Java"?
    (ii) To accept an answer.
    (iii) To print out "Good" and then stop, if the answer is correct.
    (iv) To output the message "Try Again" and then stop, if the answer is wrong.
    (v) To display the correct answer when the answer is wrong even at the third attempts and stop.

Assignment-8

Objective:

The objective of this assignment is to learn **File and JCF** concept.

1. Write a program in Java that converts a string vector (containing strings) into an array of strings and display them [use command-line argument].
2. Write a program in Java that accepts a shopping list of five items from the command line and stores them in a vector.
3. Modify the program of Question No. 2 to accomplish the following:
    - To delete an item in the list
    - To add an item at a specified location in the list.

- To add an item at the end of the list.
- To print the contents of the vector.

4. Write a program to read words from a text input file and print them over console.
5. Write a program to save the sentences to a file you type using keyboard on a console until you put 'eof' marker (say 'q').
6. Write a program to concatenate the contents of two files into third one.

Assignment-9

Objective:

The objective of this assignment is to learn **Exception Handling** concept.

1. Write a program to handle the ArithmeticException.
2. Write a program for multiple catch to fire ArrayIndexOutOfBoundsException and StringIndexOutOfBoundsException both.
3. Write a program to fire the NegativeArraySize exception.
4. Define an object reference and initialize it to null. Try to call a method through this reference. Now wrap the code in a try-catch clause to catch the exception.
5. Write a program to fire any checked exception manually using 'throw' keyword.
6. Write a program to create a user defined exception named PayOutOfBoundsException (provided the monthly salary of a person is less than Rs. 10,000 /-) and fire the exception.
7. Create a class with two methods, f( ) and g( ). In g( ), throw an exception of a new type that you define. In f( ), call g( ), catch its exception and, in the catch clause, throw a different exception (of a second type that you define). Test your code in main( ).
8. Write a program that takes one string and two integers as command line argument and prints the reverse of the substring of the string specified by the two numbers. The program should handle all possible exception that may arise due to bad input.
9. Write a demo program to illustrate 'throws' versus method overriding.

Assignment-10

Objective:

The objective of this Assignment is to learn **Multi-Threading** concept.

1. Inherit a class from Thread and override the run( ) method. Inside run( ), print name of thread , and then call sleep( ). Repeat this three times, then return from run( ). Put a start-up message in the constructor. Make your thread object and main thread run to see what happens.
2. Implement a class from Runnable and override the run( ) method. Inside run( ), print full qualified name of thread, and then call sleep( ). Repeat this three times, then return from run( ). Put a start-up message in the constructor. Make your thread object and main thread run to see what happens.
3. Make several threads (say 5) with names (by extending thread), set their priority and run them to see what happens.
4. Make several threads (say 5) with their names (implementing Runnable) set their priority and run them to see what happens.
5. Implement program of locking of common method by several threads. (Using the keyword 'synchronized').
6. Write a program to use join() and isAlive() in Multi-Threading.Inter thread communication :Consumer consumes item produced by Producer with proper synchronization.

Assignment-11

Objective:

The objective of this assignment is to learn **Applet** programming Concept.

1. Show phases of life cycle of applet using string message display both on console and applet.
2. Display your name at middle portion of applet.
3. Draw an oval with centre at middle of applet and radius is 200 pixels.
4. Draw a circle filled with blue color with centre at middle of applet and radius 200 pixel.
5. Generate a triangular wave on applet.
6. Display table of 2 using font Tahoma with size 25 and bold letters on a black rectangular area with white font.
7. Programs of implementing PARAM concept using Applet.
8. Display of banner using Applet.
9. Running Audio files (wav file) using Applet.
10. Implement a Calculator with Buttons using Applet.
11. Embedding of image files using Applet.
12. Display Sun beam from any corner of applet.

Assignment-12(Two Days)

Objective:

The objective of this Assignment is to learn **Swing** concept.

1. Write a program for simple calculator using swing.
2. Write a program to display system clock (digital) with time continuously updated per second.
3. Write a JAVA Program to create a Frame with Six Buttons representing your favorite six colors. When button is clicked, the background must be change to the corresponding colors.
4. Write a JAVA Program to create a window with four text fields for the Name, Street, City and Pincode with suitable labels. Also the window contains a button MyDetails. When the user types the Name, Street, City and Pincode and then clicks the button, the typed details must appear in Arial Font, size 30, Italics.
5. Write a JAVA Program to create a Frame with three text fields for Name, Age and Qualification and a text field of multiple lines for address.
6. Write a JAVA Program to create a window with a TextArea and two TextFields. The TextFields are called Find and Replace respectively. There is a button called Find and Replace. The user types a paragraph in the Text area, now types a word in the Text field Find and another text in the text field Replace. Now the users click the button. On pressing the button the paragraph in the text area is subject to the Find and Replace activity.
7. Write a JAVA Program to create a List Box with come colors in the items. When the color is selected, the background color must change accordingly. When the background color changes, the name of the color must also be displayed in the screen in Font Arial, 32, Bold + Italics.