JAVA

Introduction to Java

Lab Exercise No: 1

Exercise Objective(s): *Simple java program*

Exercise: *Write a program with a class name "Welcome" and display a message as follows: "Welcome to the world of Java"*

Recommended duration: *10Mins*

Solution Guidance (if applicable): *NA*

Solution:
```java
//Simple Welcome to java program
public class Welcome
{
      public static void main(String[] args)
      {
             System.out.println("Welcome to the world of Java");
      }

}
```

Lab Exercise No: 2

Exercise Objective(s): *Compilation and execution from command line, Concept of object and class*

Exercise: *Write a program that takes a console input (Input given by the user while executing the program in command line) and prints the same.*

Recommended duration: *10Mins*

Solution Guidance (if applicable): *The input can be printed as follows.*
System.out.println ("Message: "+args [0]);

Solution:
```java
/*Steps:-
 * Run configurations->Java Application->CommandLineArg->Arguments->Program
Arguments->Hello!
 */
public class CommandLineArg
{
      public static void main(String[] args)
      {
             //Sending Message as Command Line Argument
             System.out.println("Message : "+args[0]);
      }
}
```

Lab Exercise No: 3

Exercise Objective(s): *Comments in java programs and java documentation*

Exercise: *Write a program with all the type of comments and execute it. User nested comments also.*

Recommended duration: *10Mins*

Solution Guidance (if applicable): *NA*

Solution:
```java
/*
 * Demo Comments
 */

//Welcome Class
public class Welcome
{
    //Main Function
    public static void main(String[] args)
    {
        //Print Message
        System.out.println("Welcome to the world of Java");
    }

}
```

JAVA

Basic elements of Java

Lab Exercise No: 4

Exercise Objective(s): *Primitive data types and their range, Variables, Constants and literals, Conventions*

Exercise: *Write a program which declares variables of int, float, double data types and a constant of long data type and displays all with an appropriate message. Follow the naming conventions for all the variables and literals.*

Recommended duration: *10Mins*

Solution Guidance (if applicable): *NA*

Solution:

```java
//Using different datatypes with proper values and naming conventions
public class DataTypes
{
      public static void main(String[] args)
      {
            int departmentId = 4;
            final long employeeId = 1833421000;
            double salary = 652100.98;
            float  taxPercent = 39.98f;

            System.out.println("Department ID ==> "+departmentId);
            System.out.println("Employee ID ==> "+employeeId);
            System.out.println("Salary ==> "+salary);
            System.out.println("Tax Percentage ==> "+taxPercent);

      }

}
```

Lab Exercise No: 5

Exercise Objective(s): *Simple operators*

Exercise: *Write a program to get two numbers as input through command line and swap the values of two numbers without using a temporary variable and display the same.*

Recommended duration: *20Mins*

Solution Guidance (if applicable): *a = a + b*
b = a − b
b = a - b

Solution:

```java
//Swapping of numbers using command line args
public class Swapping
{
        public static void main(String args[])
        {
                int num1=Integer.parseInt(args[0]);
                int num2=Integer.parseInt(args[1]);

                //calling swapNumbers function
                swapNumbers(num1,num2);
        }

        //function to swap two numbers
        public static void swapNumbers(int no1,int no2)
        {
                System.out.println("First Number => "+no1);
                System.out.println("Second Number => "+no2);

                //swapping the numbers
                no1=no1+no2;
                no2=no1-no2;
                no1=no1-no2;

                /*another logic for swapping the numbers
                 *      int temp=no1;
                        no1=no2;
                        no2=temp;
                */

                System.out.println("After Swapping the numbers ....."); 

                //displaying the swapped numbers
                System.out.println("First Number => "+no1);
                System.out.println("Second Number => "+no2);
        }
}
```

Lab Exercise No: 6

Exercise Objective(s): *Conditional statements*

Exercise: *Write a program to determine whether the given year is leap year or not(Get the input through command line).*

Recommended duration: *20Mins*

Solution Guidance (if applicable): *NA*

Solution:

```java
public class Year
{
        public static void main(String[] args)
        {
                int year = Integer.parseInt(args[0]);

                //condition to check if it's a leap year
                if(year%4 == 0)
                {
                        //condition successful display this message
                        System.out.println("It's a Leap Year !!");
                }
                else
                {
                        //condition fails display this message
                        System.out.println("It's not a Leap Year !!");
                }
        }

}
```

Lab Exercise No: 7

Exercise Objective(s): *Conditional statements*

Exercise: *Write a program to determine the largest of three numbers.*

Recommended duration: *20Mins*

Solution Guidance (if applicable): *NA*

Solution:
```java
import java.util.Scanner;
public class LargestNumber
{
      public static void main(String args[])
      {
            Scanner s = new Scanner(System.in);

            int num1,num2,num3;

            //accepting three numbers
            System.out.println("Fint out the Largets Numbers ....");
            System.out.println("Enter three numbers ==> ");
            num1=s.nextInt();
            num2=s.nextInt();
            num3=s.nextInt();

            //comparing num1 with other two numbers
            if(num1>num2 && num1>num3)
            {
                  //num1 is the largest num
                  System.out.println("Largest Number is "+num1);
            }
            //comparing num2 with num3
            else if(num2>num3)
            {
                  //num2 is the largest num
                  System.out.println("Largest Number is "+num2);
            }
            else
            {
                  //num3 is the largest num
                  System.out.println("Largest Number is "+num3);
            }
      }
}
```

Lab Exercise No: 8

Exercise Objective(s): *Loops*

Exercise: *Write a program to determine whether a number is a palindrome or not.*

Recommended duration: *20Mins*

Solution Guidance (if applicable): *NA*

Solution:
```java
import java.util.Scanner;
public class Palindrome
{
        public static void main(String[] args)
        {
                Scanner s = new Scanner(System.in);

                System.out.println("Enter a number ==> ");
                int num=s.nextInt();

                int remainder=0;
                int reverseNumber=0;
                int no;

                //making a copy of accepted number
                no=num;

                //loop to reverse the number
                while(no!=0)
                {
                        remainder=no%10;
                        no=no/10;
                        reverseNumber=reverseNumber*10+remainder;
                }

                //condition to check palindrome   number
                if(num == reverseNumber )
                {
                        System.out.println("The Number is Palindrome !!");
                }
                else
                {
                        System.out.println("The Number is not Palindrome !!");
                }

        }

}
```

Lab Exercise No: 9

Exercise Objective(s): *Loops*

Exercise: *Write a program to display the Fibonacci series starting from 0 till 200.*

Recommended duration: *20Mins*

Solution Guidance (if applicable): *NA*

Solution:

```java
//Fibonacci series from 0 to 200
public class Fibonacci
{
        public static void main(String[] args)
        {
            int num1=0; //default fibonacci number 1
            int num2=1; //default fibonacci number 2
            int num=0;

            System.out.println("Fibonacci series from 0 to 200 ....");
            //loop to generate fibonacci series till 200
            while(num<=200)
            {
                System.out.println(num);

                num1=num2;
                num2=num;
                num=num1+num2;
            }
        }

}
```

Lab Exercise No: 10

Exercise Objective(s): *Constants and literals, Loops*

Exercise: *Write a program to declare a set of 5 words and reverse each word and arrange the resulting words in alphabetical order and display the same.*

Recommended duration: *20Mins*

Solution Guidance (if applicable): *NA*

Solution:

```java
import java.util.Scanner;
import java.util.Arrays;

public class ArrangeWords
{
        public static void main(String[] args)
        {
                Scanner s = new Scanner(System.in);
                String[] reverseWords = new String[5];
                String[] words = new String[5];

                System.out.println("Enter five words ==>");
                for(int i=0;i<5;i++)
                {
                        words[i]=s.nextLine();
                }
                sortStrings(words);
        }

        public static void sortStrings(String[] str)
        {
                String[] newStr = new String[5];

                //reversing the strings
                for(int i=0;i<str.length;i++)
                {
                        char ch[]=str[i].toCharArray();
                        String rev="";
                        for(int j=ch.length-1;j>=0;j--)
                        {
                                rev+=ch[j];
                        }
                        newStr[i]=rev;
                }


                //Sorting the strings
                for(int i=0;i<newStr.length;i++)
                {
                        for(int j=i;j<newStr.length;j++)
                        {
                                if(newStr[i].compareTo(newStr[j])>0)
                                {
                                        String temp = newStr[i];
                                        newStr[i] = newStr[j];
                                        newStr[j] = temp;
                                }
                        }
                }

                //strings after sorting them alphabetically
                System.out.println("Strings in Sorted Order ==> ");
                for(int i=0;i<newStr.length;i++)
                {
                        System.out.println(newStr[i]);
                }

        }
}
```

Lab Exercise No: 11
Exercise Objective(s): *Constants and literals, Loops*
Exercise: *Write a program to arrange an array of elements in ascending order using selection sort algorithm.*
Recommended duration: *20Mins*
Solution Guidance (if applicable): *NA*

Solution:

```java
import java.util.Scanner;
public class SelectionSort
{
        public static void main(String[] args)
        {
                Scanner s = new Scanner(System.in);

                //accepting the array size
                System.out.println("Enter the size of array ==> ");
                int size=s.nextInt();

                int[] arr = new int[size];
                //accepting the array elements to be sorted
                System.out.println("Enter the array elements ==> ");
                for(int i=0;i<size;i++)
                {
                        arr[i]=s.nextInt();
                }
                selectionSort(arr);
        }

        //function to sort array in ascending order using selection sort
        public static void selectionSort(int[] numArray)
        {
            for(int i=0;i<numArray.length-1;i++)
            {
                //find minimum number in unsorted array
                int min= i;
                for (int j=i+1;j<numArray.length;j++)
                {
                    if (numArray[j] < numArray[min])
                    {
                        min = j;
                    }
                }

                //swap the minimum number with the first number
                int temp = numArray[min];
                numArray[min] = numArray[i];
                numArray[i] = temp;
            }

            //display the sorted list
            System.out.println("Sorted Numbers are ....");
            for(int i=0;i<numArray.length;i++)
            {
                    System.out.println(numArray[i]);
            }
        }
}
```

Lab Exercise No: 12
Exercise Objective(s): *Conditional statements, Loops*
Exercise: *A shopkeeper sells three products whose retail prices are as follows:*
      Product 1 - 22.50 ,Product 2 - 44.50,Product 3 - 9.98
      Write an application that reads a series of pairs of numbers as follows:
      a) Product number b) Quantity sold
      The application should use a switch statement to determine the retail price for each
product. It should calculate and display the total retail value of all products sold.
Recommended duration: *20Mins*
Solution Guidance (if applicable): *NA*
Solution:

```java
import java.util.Scanner;
public class RetailPricing
{
      public static void main(String[] args)
      {
          Scanner s = new Scanner(System.in);

          //displaying the product no along with the price
          System.out.println("Product No. |  Prices");
          System.out.println("  1          |  22.50");
          System.out.println("  2          |  44.50");
          System.out.println("  3          |  9.98");

          //select the product no. and the total quantity sold
          System.out.println("Enter the Product No. and the quantity sold =");
          int pno=s.nextInt();
          int quantity=s.nextInt();
          double price;

          switch(pno)
          {
            case 1: //calculate the total retail value for all sold product 1
                  price=22.50*quantity;
                  System.out.println("Total retail value of Product 1 sold
==>"+price);
                  break;

            case 2: //calculate the total retail value for all sold product 2
                  price=44.50*quantity;
                  System.out.println("Total retail value of Product 2 sold
==>"+price);
                  break;

            case 3: //calculate the total retail value for all sold product 3
                  price=9.98*quantity;
                  System.out.println("Total retail value of Product 23sold
==>"+price);
                  break;

            default: //display message if the product no. is not available in
the list
                  System.out.println("Invalid Product No.");
          }

      }
}
```

Lab Exercise No: 13

Exercise Objective(s): *Simple operators, Conditional statements, Loops*

Exercise: *Consider user has N eggs. Then display the no of eggs in gross (144 eggs make one gross) and no of eggs in dozen (12 eggs make one dozen) and the no of eggs that is left out remaining. The total no of eggs can be got as input through command line. The program should display how many gross, how many dozen, and how many left over eggs the user has.*

Recommended duration: *20Mins*

Solution Guidance (if applicable): *For example, if the input is 1342 eggs, then the program should respond with Your number of eggs is 9 gross, 3 dozen, and 10*

Solution:

```java
public class EggsDistribution
{
        public static void main(String[] args)
        {
                int numberOfEggs=Integer.parseInt(args[0]);

                //calculating the number of eggs in gross
                int grossEggs=numberOfEggs/144;

                //eggs remained after calculating the number of eggs in gross
                int grossEggsLeft=numberOfEggs%144;

                //calculating the number of eggs in dozen
                int dozenEggs=grossEggsLeft/12;

                //eggs remained after calculating the number of eggs in dozen
                int remainingEggs=grossEggsLeft%12;

                System.out.println("Your number of eggs is "+grossEggs+" gross, "+
dozenEggs+" dozen, and "+remainingEggs);
        }

}
```