Assignments:

1. Create a “circle” class & a “point” class. The coordinates of the circle are given and used within the “circle” class as object of the “point” class. Display the area of circle.

```
import java.io.*;
import java.util.*;
class circle
{
	double area(double radius)
	{
		return (3.14 * radius * radius);
	}
}
class point
{
	double x,y,radius;
	point(double x,double y)
	{
		this.x = x;
		this.y = y;
	}
	double getradius(point p2)
	{
		x =x - p2.x;
		y =y - p2.y;
		radius = Math.sqrt(x * x + y * y);
		return radius;
	}
}
class Test
{
	public static void main(String args[])
	{
		point p1 = new point(4,3);
		point p2 = new point(8,3);
		circle  p3=new circle();
		double radius = p1.getradius(p2);
		double area = p3.area(radius);
		System.out.println("The area is :" + area);
	}
}
```

2. Create a class called Time, which has three private instance variables – hour, min and sec. It contains a method called add( ) which takes one Time object as parameter and print the added value of the calling Time object and passes Time object. In the main method, declare two Time objects and assign values using constructor and call the add() method.

```
import java.io.*;
import java.util.*;
class Time
{
	private double hr,min,sec;
	Time(double hr,double min,double sec)
	{
		this.hr = hr;
		this.min = min;
		this.sec =sec;
	}
	void add(Time t2)
```

```
	{
		hr = hr + t2.hr;
		sec = sec + t2.sec;
		min = min + t2.min;
		while(sec >= 60)
		{
			min++;
			sec = sec - 60;
		}
		while(min >= 60)
		{
			hr++;
			min = min - 60;
		}
	}
	void display()
	{
		System.out.println("The time is : " + hr + ":" + min + ":" +sec);
	}
}
class Test
{
	public static void main(String args[])
	{
		Time t1 = new Time(10,40,50);

		Time t2 = new Time(20,50,50);
		t1.display();
		t2.display();
		t1.add(t2);
		t1.display();
	}
}
```

3. Create a class called Complex, which has three private instance variables –real and imaginary. It contains a method called add( ) which takes one Complex object as parameter and print the added value of the calling Complex object and passes Complex object. In the main method, declare two Complex objects and assign values using constructor and call the add() method.

```
import java.io.*;
import java.util.*;
class Complex
{
	private double real,img;
	Complex(double real,double img)
	{
		this.real = real;
		this.img = img;
	}
	void add(Complex c2)
	{
		real = real + c2.real;
		img = img + c2.img;
	}
	void display()
	{
		System.out.println("The complex number is : " + real + " + " + img + "i");
	}
}
```

```
class Test
{
	public static void main(String args[])
	{
		Complex c1 = new Complex(15,33);

		Complex c2 = new Complex(125,233);

		c1.display();
		c2.display();
		c1.add(c2);
		c1.display();
	}
}
```

4. Write a program to define a class having one 3-digit number, num as data member. Initialize and display reverse of that number.

```
import java.io.*;
import java.util.*;
class Number
{
	private int num;
	Number(int num)
	{
		this.num = num;
	}
	void reverse()
	{
		int a,sum = 0;
		a = num;
		while(a != 0)
		{
			int r = a % 10;
			sum = sum * 10 +r;
			a = a/10;
		}
		num = sum;
	}
	void display()
	{
		System.out.println("The number is : " + num);
	}
}
class Test
{
	Number n1 = new Number(123);
	n1.display();
	n1.reverse();
	n1.display();
}
```

5. Write a program to define a class Student with four data members such as name, roll no., sub1, and sub2. Define appropriate methods to initialize and display the values of data members. Also calculate total marks and percentage scored by student.

```
import java.io.*;
import java.util.*;
class Student
```

```
{
	String name;
	int roll;
	double sub1,sub2;
	Student(String name,int roll,double sub1,double sub2)
	{
		this.name = name;
		this.roll = roll;
		this.sub1 = sub1;
		this.sub2 = sub2;
	}
	void display()
	{
		System.out.println("The name of the student is : " + name + "and roll

number : " + roll + "scored " + sub1 +" in Maths  and " + sub2 + " in Physics");
	}
	double total()
	{
		return (sub1+sub2);
	}
	double percentage()
	{
		return (total()/200)*100;
	}
}
class Test
{
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter the name :");
		String name = sc.nextLine();
		name = sc.nextLine();
		System.out.println("Enter the roll :");
		int roll = sc.nextInt();
		System.out.println("Enter the marks in subject 1:");
		double sub1 = sc.nextDouble();
		System.out.println("Enter the subject 2 :");
		double sub2 = sc.nextDouble();
		Student s1 = new Student(name,roll,sub1,sub2);
		s1.display();
		System.out.println("The total is :" + s1.total());
		System.out.println("The percentage is :" + s1.percentage());
	}
}
```

6. Write a program to define a class Employee to accept emp_id, emp _name, basic_salary from the user and display the gross_salary.

```
import java.io.*;
import java.util.*;
class Employee
{
	String emp_name;
	int emp_id;
	double basic_salary;
	Employee(String emp_name,int emp_id,double basic_salary)
	{
		this.emp_id = emp_id;
```

```
                this.emp_name = emp_name;
                this.basic_salary= basic_salary;
        }
        void display()
        {
                System.out.println("The name of the employee is : " + emp_name + "and

employee id : " + emp_id + "with basic salary of Rs "+basic_salary );
        }
        double gross_salary()
        {
                return (basic_salary + (basic_salary *5)/100);
        }
}
class Test
{
        public static void main(String args[])
        {
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter the name :");
                String emp_name = sc.nextLine();
                System.out.println("Enter the roll :");
                int emp_id = sc.nextInt();
                System.out.println("Enter the basic salary:");
                double basic_salary = sc.nextDouble();
                Employee s1 = new Employee(emp_name,emp_id,basic_salary);
                s1.display();
                System.out.println("The  gross salary is :" + s1.gross_salary());
        }
}
```

7. Write a program to define a class Fraction having data members numerator and denominator. Initialize three objects using different constructors and display its fractional value.

```
import java.io.*;
import java.util.*;

class Fraction
{
        private int num,den;
        Fraction(int num,int den)
        {
                this.num = num;
                this.den = den;
        }
        void display()
        {
                System.out.println("The Fractional value of :" + num + "/" + den + "is :" + (num/den));
        }
}
class Test
{
        public static void main(String args[])
        {
                Scanner sc = new Scanner(System.in);
                Fraction obj[] = new Fraction[3];
                for(int i = 0;i <= 2;i++)
                {
                        System.out.println("Enter the numerator:");
```

```
                        int num = sc.nextInt();
                        System.out.println("Enter the denominator :");
                        int den = sc.nextInt();
                        obj[i] = new Fraction(num,den);
                        obj[i].display();
                }
        }
}
```

12. Write a program which will accept an integer from the user and pass the value to a method called PrintNumberInWord that will print "ONE", "TWO",... , "NINE", "ZERO" if the integer variable "number" is 1, 2,... , 9, or 0, respectively.

```
import java.io.*;
import java.util.*;
class Number1
{
        private int num;
        Number1(int num)
        {
                this.num = num;
        }
        void display()
        {
                String arr[] =
{"","ONE","TWO","THREE","FOUR","FIVE","SIX","SEVEN","EIGHT","NINE","ZERO"};
                String s = (num == 0)?arr[10]:arr[num];
                System.out.print("The Number " + num + " in words :" + s);
        }
}
class Test
{
        public static void main(String args[])
        {
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter the number:");
                int num = sc.nextInt();
                Number1 obj = new Number1(num);
                obj.display();
        }
}
```

13. Design a class named Account that contains:

I. A private int data field named id for the account (default 0).
II. A private double data field named balance for the account (default 0).
III. A private double data field named annualInterestRate that stores the cur-rent interest rate (default 0). Assume all accounts have the same interest rate.
IV. A private Date data field named dateCreated that stores the date when the account was created.
V. A no-arg constructor that creates a default account.
VI. A constructor that creates an account with the specified id and initial balance.
VII. The accessor and mutator methods for id,balance, and annualInterestRate.
VIII. The accessor method for dateCreated.
IX. A method named getMonthlyInterestRate() that returns the monthly interest rate.

X. A method named getMonthlyInterest() that returns the monthly interest.
XI. A method named withdraw that withdraws a specified amount from the account.
XII. A method named deposit that deposits a specified amount to the account.

```
import java.io.*;
class Account {
   private int id;
   private double balance;
   private static double annualInterestRate;
   private java.util.Date dateCreated;
   Account()
         {
                  id = 0;
                  balance = 0.0;
                  annualInterestRate = 0.0;
      dateCreated = new java.util.Date();
   }
         Account(int id, double balance)
         {
                  this();
      this.id = id;
      this.balance = balance;
   }
   int getId() {
      return this.id;
   }
         double getBalance()
         {
      return this.balance;
}
         double getAnnualInterestRate()
         {
   return annualInterestRate;
}
         String getDateCreated()
         {
   return this.dateCreated.toString();
}
void setId(int id)
         {
   this.id = id;
}
         void setBalance(double balance)
         {
   this.balance = balance;
}
         void setAnnualInterestRate(double annualInterestRate)
         {
   this.annualInterestRate = annualInterestRate;
}
         double getMonthlyInterestRate()
         {
   return (annualInterestRate / 100) / 12 ;
}
         double getMonthlyInterest()
         {
   return balance * getMonthlyInterestRate();
}
         void withdraw(double amount)
```

```
        {
    this.balance -= amount;
  }
        void deposit(double amount)
        {
    this.balance += amount;
  }
}
class Test
{
  public static void main(String[] args)
        {
    Account acc = new Account(1122, 20000);
    acc.setAnnualInterestRate(4.5);
    acc.withdraw(2500.0);
    acc.deposit(3000.0);
    System.out.println("Balance: Rs" + acc.getBalance());
    System.out.println("Monthly Interest: " + acc.getMonthlyInterest());
    System.out.println("Date Created: " + acc.getDateCreated());

  }
}
```

14. Write a test program that prompts the user to enter the investment amount (e.g., 1000) and the interest rate (e.g., 9%), and print a table that displays future value for the years from 1 to 30, as shown below:

```
The amount invested: 1000
Annual interest rate: 9%
Years Future Value
1 1093.8
2 1196.41
...
29 13467.25
30 14730.57

import java.util.*;
class invest
{
        private double amt,rate;
        invest(double amt,double rate)
        {
                this.amt = amt;
                this.rate = rate;
        }
        void calculate(int i)
        {
                System.out.println(i +  " = " + (amt = (amt + (amt * rate)/100)));
        }
}
class Test
{
        public static void main(String args[])
        {
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter the amount:");
```

```
                double amt = sc.nextDouble();
                System.out.println("Enter the rate:");
                double rate = sc.nextDouble();
                invest obj = new invest(amt,rate);
                for(int i = 1;i <= 30;i++)
                        obj.calculate(i);
        }
}
```

15. Write method headers for the following methods:

a. Computing a sales commission, given the sales amount and the commission rate.
b. Printing the calendar for a month, given the month and year.
c. Computing a square root.
d. Testing whether a number is even, and returning true if it is.
e. Printing a message a specified number of times.
f. Computing the monthly payment, given the loan amount, number of years, and annual interest rate.

```
import java.io.*;
import java.util.*;
class Method_ex
{
	double getCommission(double salesAmount, double commissionRate)
	{
		double result = salesAmount + (salesAmount * commissionRate)/100;
		return result;
	}
	void printCalendar(int month, int year)
	{
		System.out.println("The Month : "+ month + " and year : " + year);
	}
	double sqrt(double value)
	{
		return(Math.sqrt(value));
	}
	boolean isEven(int value)
	{
		if(value % 2 == 0)
			return true;
		else
			return false;
	}
	void printMessage(String message, int times)
	{
		while(times != 0)
		{
			System.out.println(message);
			times--;
		}
	}
	double monthlyPayment(double loan, int numberOfYears, double annualInterestRate)
	{
		return ((loan * numberOfYears* annualInterestRate)/100);
	}
}
class Test
{
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter the choice:");
		int ch = sc.nextInt();
		Method_ex obj = new Method_ex();
		switch(ch)
		{
			case 1:
				System.out.println("The Commission: " + obj.getCommission(1000,10));
```

```
                                        break;
                                case 2:
                                        obj.printCalendar(10,2001);
                                        break;
                                case 3:
                                        System.out.println("The square root :" + obj.sqrt(13));
                                        break;
                                case 4:
                                        System.out.println("The number is even :" + obj.isEven(44));
                                        break;
                                case 5:
                                        obj.printMessage("Rohan is a Good Boy",10);
                                        break;
                                case 6:
                                        System.out.println("The Monthy payment :" + obj.monthlyPayment(1000,10,5));
                                        break;
                                default:
                                        System.out.println("Sorry Wrong Choice.");
                        }
                }
}
```

16. Write a program that reads ten numbers, computes their average, and finds out how many numbers are above the average. [Use this keyword]

```
import java.io.*;
import java.util.*;
class check
{
        private int n;
        private int a[];;
        check(int n,int a[])
        {
                this.n = n;
                this.a = a;
        }
        int avg()
        {
                float sum = 0;
                for(int i = 0;i <= n-1;i++)
                {
                        sum = sum + a[i];
                }
                sum /= n;
                int c = 0;
                for(int i = 0;i <= n-1;i++)
                {
                        if(sum < a[i])
                                c++;
                }
                return c;
        }
}
class Test
{
        public static void main(String args[])
        {
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter the size:");
```

```
                int n = sc.nextInt();
                int a[] = new int[n];
                System.out.println("Enter the elements of the array:");
                for(int i = 0;i <= n-1;i++)
                        a[i] = sc.nextInt();
                check obj = new check(n,a);
                System.out.println("The no. of element above average: " + obj.avg());
        }
}
```

17. Write a program that reads ten integers and displays them in the reverse of the order in which they were read.

```
import java.io.*;
import java.util.*;
class rev
{
        private long n;
        rev(long n)
        {
                this.n = n;
        }
        long sum_array()
        {
                long sum = 0;
                while(n != 0)
                {
                        int r = n % 10;
                        sum = sum * 10 + r;
                        n = n / 10;
                }
                return sum;
        }
}
class Test
{
        public static void main(String args[])
        {
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter the number:");
                int n = sc.nextInt();
                rev obj = new rev(n);
                System.out.println("The reverse of number " + n + " is :" + obj.sum_array());
        }
}
```

18. Write a program to demonstrate use of 'this' keyword.

```
import java.io.*;
class Student
{
        int rollno;
        String name;
        Student(int rollno,String name)
        {
                this.rollno=rollno;
                this.name=name;
        }
        void display()
        {
```

```
                System.out.println(rollno+" "+name);
        }
}
class Test
{
        public static void main(String args[]){
        Student s1=new Student(07,"Rohan");
        s1.display();
        }
}
```

19. Write a program to demonstrate use of 'static' keyword.

```
class Student
{
        int rollno;
        String name;
        static String college ="UEM";
        Student(int rollno,String name)
        {
                this.rollno = rollno;
                this.name = name;
        }
        void display ()
        {
                System.out.println(rollno+" "+name+" "+college);
        }
}
class Test
{
        public static void main(String args[]){
        Student s1 = new Student(1,"Rohan");
        Student         s2 = new Student(2,"Sujal");
        s1.display();
        s2.display();
        }
}
```

20. Write a program to accept value of apple sales for each day of the week (using array of type float) and then, calculate the average sale of the week.

```
import java.io.*;
import java.util.*;
class sales
{
        private int n;
        private float a[];
        sales(int n,float a[])
        {
                this.n = n;
                this.a = a;
        }
        float avg()
        {
                float sum = 0;
                for(int i = 0;i <= n-1;i++)
                {
                        sum += a[i];
                }
                return (sum / n);

        }
```

```
}
class Test
{
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter the size:");
		int n = sc.nextInt();
		float a[] = new float[n];
		System.out.println("Enter the elements of the array:");
		for(int i = 0;i <= n-1;i++)
			a[i] = sc.nextFloat();
		sales obj = new sales(n,a);
		System.out.println("The average of the sales:" + obj.avg());
	}
}
```

21. Write program, which finds the sum of numbers formed by consecutive digits. Input : 2415 output : 24+41+15=80.

```
import java.io.*;
import java.util.*;
class Sum_func
{
	private int n;
	Sum_func(int n)
	{
		this.n = n;
	}
	int sum_array()
	{
		int sum = 0,n1 = n;
		do
		{
			int r1 = n % 100;
			sum = sum + r1;
			n = n / 10;
			n1 = n / 10;
		}while(n1 != 0);
		return sum;
	}
}
class Test
{
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter the number:");
		int n = sc.nextInt();
		Sum_func obj = new Sum_func(n);
		System.out.println("The sum of number " + n + " formed by consecutive digits :" +
obj.sum_array());
	}
}
```