WEEK-8-EXTRA PROGRAMS

1. **Write a program which has an abstract class Solid and implements cylinder, cone and sphere by inheriting from solid to find surface area and volume.**

```
import java.util.*;
import static java.lang.Math.sqrt;
abstract class Solid
{
double r,h;
abstract void areavolume();
}

class cylinder extends Solid
{
void areavolume()
{
Scanner ss=new Scanner(System.in);
System.out.println("Enter radius and height of the cylinder");
r=ss.nextInt();
h=ss.nextInt();
double surfacearea;
double volume;
surfacearea=(2*3.14*r*h)+(2*3.14*r*r);
volume=(3.14*r*r*h);
```

```
System.out.println("The surface area of cylinder is "+surfacearea);
System.out.println("The volume of cylinder is "+volume);
}
}
class cone extends Solid
{
void areavolume()
{
Scanner ss=new Scanner(System.in);
System.out.println("Enter radius and height of the cone");
r=ss.nextInt();
h=ss.nextInt();
double surfacearea;
double volume;
surfacearea=(3.14*r)*(r+sqrt((h*h)+(r*r)));
volume=(3.14*r*r*h)/3.0;
System.out.println("The surface area of cone is "+surfacearea);
System.out.println("The volume of cone is "+volume);
}
}
class sphere extends Solid
{
void areavolume()
{
Scanner ss=new Scanner(System.in);
System.out.println("Enter radius of sphere");
```

```
r=ss.nextInt();
double surfacearea;
double volume;
surfacearea=4*3.14*r*r;
volume=(4*3.14*r*r*r)/3.0;
System.out.println("The surface area of circle is "+surfacearea);
System.out.println("The volume of circle is "+volume);
}
}

class Solidmain
{
public static void main(String args[])
{
int ch;
Scanner ss=new Scanner(System.in);
cylinder cy=new cylinder();
cone co=new cone();
sphere sp=new sphere();
while(true){
System.out.println("Enter the choice of shape whose surface area and volume has to be calculated");
System.out.println("1.Cylinder\n2.Cone\n3.Sphere\n4.Exit");
ch=ss.nextInt();
switch(ch)
{
case 1:
```

```
cy.areavolume();
break;
case 2:
co.areavolume();
break;
case 3:
sp.areavolume();
break;
case 4:
System.exit(0);
break;
default:
System.out.println("Invalid choice!");
}
}
}
}
```

```
C:\Users\win10\Documents\Java lab programs>javac Solidmain.java

C:\Users\win10\Documents\Java lab programs>java Solidmain
Enter the choice of shape whose surface area and volume has to be calculated
1.Cylinder
2.Cone
3.Sphere
4.Exit
1
Enter radius and height of the cylinder
3 5
The surface area of cylinder is 150.72
The volume of cylinder is 141.29999999999998
Enter the choice of shape whose surface area and volume has to be calculated
1.Cylinder
2.Cone
3.Sphere
4.Exit
2
Enter radius and height of the cone
6 9
The surface area of cone is 316.82575808922473
The volume of cone is 339.11999999999995
Enter the choice of shape whose surface area and volume has to be calculated
1.Cylinder
2.Cone
3.Sphere
4.Exit
3
Enter radius of sphere
4
The surface area of circle is 200.96
The volume of circle is 267.94666666666666
Enter the choice of shape whose surface area and volume has to be calculated
1.Cylinder
2.Cone
3.Sphere
4.Exit
4
```

2. Develop a Java program to implement the hierarchy given below. Include atleast one appropriate member in each of these classes. Set and display details in each of the class and create objects of the leaf members in the hierarchy.

```
import java.util.*;
class Person
{
String n;
void display(String name)
{
n=name;
System.out.println("\nThe details of the person is as below:\nName:"+n);
}
}
class Employee extends Person
{
int id;
void display(String name,int i)
{
id=i;
n=name;
System.out.println("\nThe details of the employee is as
below:\nName:"+n+"\nEmployee id:"+id);
}
}
```

```
class Student extends Person
{
int usn;
void display(String name,int u)
{
usn=u;
n=name;
System.out.println("\nThe details of the student is as
below:\nName:"+n+"\nUSN no:"+usn);
}
}
class Teaching extends Employee
{
String j;
void display(String name,int i,String job)
{
id=i;
j=job;
n=name;
System.out.println("\nThe details of the teaching employee is as
below:\nName:"+n+"\nEmployee id:"+id+"\nJob:"+j);
}
}
class NonTeaching extends Employee
{
```

```
String j;
void display(String name,int i,String job)
{
id=i;
j=job;
n=name;
System.out.println("The details of the non-teaching employee is as
below:\nName:"+n+"\nEmployee id:"+id+"\nJob:"+j);
}
}

class UG extends Student
{
int age;
void display(String name,int u,int a)
{
usn=u;
n=name;
age=a;
System.out.println("\nThe details of the UG student is as
below:\nName:"+n+"\nUSN no:"+usn+"\nAge:"+a);
}
}
class PG extends Student
{
int age;
void display(String name,int u,int a)
```

```
{
usn=u;
n=name;
age=a;
System.out.println("The details of the PG student is as
below:\nName:"+n+"\nUSN no:"+usn+"\nAge:"+a);
}
}
class Personmain
{
public static void main(String[] args)
{
Person p=new Person();
Employee e=new Employee();
Student s=new Student();
Teaching t=new Teaching();
NonTeaching nt=new NonTeaching();
UG u=new UG();
PG pp=new PG();
p.display("Aakash");
e.display(p.n,123);
t.display(p.n,e.id,"Professor");
nt.display(p.n,e.id,"Doctor");
s.display(p.n,777777);
u.display(p.n,s.usn,18);
pp.display(p.n,s.usn,22);
}
```

}

```
C:\Users\win10\Documents\Java lab programs>javac Personmain.java

C:\Users\win10\Documents\Java lab programs>java Personmain

The details of the person is as below:
Name:Aakash

The details of the employee is as below:
Name:Aakash
Employee id:123

The details of the teaching employee is as below:
Name:Aakash
Employee id:123
Job:Professor
The details of the non-teaching employee is as below:
Name:Aakash
Employee id:123
Job:Doctor

The details of the student is as below:
Name:Aakash
USN no:777777

The details of the UG student is as below:
Name:Aakash
USN no:777777
Age:18
The details of the PG student is as below:
Name:Aakash
USN no:777777
Age:22
```