Main.java

```java
/*******************************************************************************
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.Scanner;
import java.lang.Math;
abstract class solid{
    double a,b;
    abstract void printArea();
}

class cylinder extends solid{
    void getdata(double x, double y){
        a=x;
        b=y;
    }

    void printArea(){
        double sa = (2*3.14*a*b)+(2*3.14*a*a);
        System.out.println("Surface area of cylinder = " + sa);
        System.out.println("Volume of cylinder = " + (3.14*a*a*b));
    }
}

class cone extends solid{
    void getdata(double x, double y){
        a=x;
        b=y;
    }

    void printArea(){
        double sa = 3.14*a*(a+(Math.sqrt(b*b+a*a)));
        System.out.println("Surface area of cylinder = " + sa);
        System.out.println("Volume of cylinder = " + (3.14*a*a*b/3));
    }
}
```

```
}

class sphere extends solid{
    void getdata(double x){
        a=x;
    }

    void printArea(){
        double sa = 4*3.14*a*a;
        double v = 4*3.14*a*a*a/3;
        System.out.println("Area of sphere = " + sa);
        System.out.println("Volume of sphere = " + v);
    }
}

public class Main
{
    public static void main(String[] args) {
        Scanner scan = new Scanner(System.in);
        int ch;
        double r, h;
        cylinder cy = new cylinder();
        cone c = new cone();
        sphere s = new sphere();
        System.out.print("1. Cylinder\n2. Cone\n3. Sphere\nEnter your choice: ");
        ch = scan.nextInt();
        System.out.println();
        switch(ch){
            case 1: System.out.println("Enter radius and height: ");
                    r = scan.nextDouble();
                    h = scan.nextDouble();
                    cy.getdata(r,h);
                    cy.printArea();
                    break;
```

```
            case 2: System.out.println("Enter radius and height: ");
                    r = scan.nextDouble();
                    h = scan.nextDouble();
                    c.getdata(r,h);
                    c.printArea();
                    break;

            case 3: System.out.println("Enter radius: ");
                    r = scan.nextDouble();
                    s.getdata(r);
                    s.printArea();
                    break;

            default: System.out.println("Invalid Input");
        }
    }
}
```

```
1. Cylinder
2. Cone
3. Sphere
Enter your choice: 2

Enter radius and height:
3 6
Surface area of cylinder = 91.45128104414405
Volume of cylinder = 56.52


...Program finished with exit code 0
Press ENTER to exit console.
```

Main.java

```java
/*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.Scanner;
class person{
    String s;
    Scanner scan = new Scanner(System.in);

    void detail(){
        System.out.println("Enter the name of the person: ");
        s=scan.nextLine();
    }

    void print(){
        System.out.println();
        System.out.println("Name: "+s);
    }
}

class employee extends person{
    String i;

    void info(){
        System.out.println("Enter the name of the institution: ");
        i=scan.nextLine();
    }

    void print1(){
        System.out.println("Institution: "+i);
    }
}
```

```
}

class teaching extends employee{
    String dp;

    void subject(){
        System.out.println("Enter the department: ");
        dp = scan.nextLine();
    }

    void display(){
        System.out.println("Department: "+dp);
    }
}

class non_teaching extends employee{
    String w;

    void subject(){
        System.out.println("Enter their department: ");
        w = scan.nextLine();
    }

    void display(){
        System.out.println("Department: "+w);
    }
}

class student extends person{
    String in;

    void info(){
```

```
63      void info(){
64          System.out.println("Enter the name of the institution: ");
65          in=scan.nextLine();
66      }
67
68      void print3(){
69          System.out.println("Institution: "+in);
70      }
71  }
72
73  class ug extends student{
74      String n;
75
76      void subject(){
77          System.out.println("Enter the department: ");
78          n = scan.nextLine();
79      }
80
81      void display(){
82          System.out.println("Department: "+n);
83      }
84  }
85
86  class pg extends student{
87      String n;
88
89      void subject(){
90          System.out.println("Enter the department: ");
91          n = scan.nextLine();
92      }
93
94      void display(){
```

```
    void display(){
        System.out.println("Department: "+n);
    }
}

public class Main{
    public static void main(String [] args){
        int ch;
        System.out.println("1. Teaching Staff\n2. Non-Teaching Staff\n3. UG Student\n4. PG Student");
        System.out.print("Enter your choice: ");
        Scanner scan = new Scanner(System.in);
        ch = scan.nextInt();
        System.out.println();
        switch(ch){
            case 1: teaching t = new teaching();
                    t.detail();
                    t.info();
                    t.subject();
                    t.print();
                    t.print1();
                    t.display();
                    break;

            case 2: non_teaching nt = new non_teaching();
                    nt.detail();
                    nt.info();
                    nt.subject();
                    nt.print();
                    nt.print1();
                    nt.display();
                    break;
```

```
126                 case 3: ug u= new ug();
127                         u.detail();
128                         u.info();
129                         u.subject();
130                         u.print();
131                         u.print3();
132                         u.display();
133                         break;
134 
135                 case 4: pg p = new pg();
136                         p.detail();
137                         p.info();
138                         p.subject();
139                         p.print();
140                         p.print3();
141                         p.display();
142                         break;
143 
144                 default: System.out.println("Invalid Input");
145             }
146         }
147 }
```

input

```
1. Teaching Staff
2. Non-Teaching Staff
3. UG Student
4. PG Student
Enter your choice: 3

Enter the name of the person:
abc
```

```
1. Teaching Staff
2. Non-Teaching Staff
3. UG Student
4. PG Student
Enter your choice: 3

Enter the name of the person:
abc
Enter the name of the institution:
xyz
Enter the department:
cse

Name: abc
Institution: xyz
Department: cse


...Program finished with exit code 0
Press ENTER to exit console.
```