E1:Code

```java
import java.util.Scanner;

abstract class solid
{
    double surfaceArea,volume;
    abstract void surfaceArea();
    abstract void volume();
    void display()
    {
        System.out.printf("\n Surface Area =%.3f ",surfaceArea);
        System.out.printf("\n Voulume = %.3f \n",volume);
    }
}

class cylinder extends solid
{
    double baseRadius,height;
    Scanner get = new Scanner(System.in);

    void getInfo()
    {
        System.out.printf("\n Enter the Base radius And Height of Cylinder: ");
        baseRadius=get.nextDouble();
        height=get.nextDouble();
    }
    void surfaceArea()
    {
        surfaceArea=2*3.14*baseRadius*(baseRadius+height);
    }
    void volume()
    {
        volume=3.14*Math.pow(baseRadius, 2)*height;
    }
}

class cone extends solid
{
    double baseRadius,slantHeight,height;
    Scanner get = new Scanner(System.in);

    void getInfo()
    {
        System.out.printf("\n Enter the Base radius And Height of Cone: ");
        baseRadius=get.nextDouble();
        height=get.nextDouble();
        slantHeight=Math.sqrt(Math.pow(height, 2)+(Math.pow(baseRadius, 2)));
    }
    void surfaceArea()
    {
```

```java
    void surfaceArea()
    {
        surfaceArea=3.14*baseRadius*(baseRadius+slantHeight);
    }
    void volume()
    {
        volume=3.14*Math.pow(baseRadius, 2)*height/3;
    }
}

class sphere extends solid
{
    double radius;
    Scanner get = new Scanner(System.in);

    void getInfo()
    {
        System.out.printf("\n Enter the Radius of Sphere: ");
        radius=get.nextDouble();
    }
    void surfaceArea()
    {
        surfaceArea=4*3.14*Math.pow(radius, 2);
    }
    void volume()
    {
        volume=4*(3.14/3)*Math.pow(radius, 3);
    }
}


class solidMain
{

    public static void main(String[] args)
    {
        int c1;
        Scanner get = new Scanner(System.in);
        cylinder cy=new cylinder();
        cone co=new cone();
        sphere sp=new sphere();

        do
        {
            System.out.printf("\n <-----Enter the Choices -----> ");
            System.out.printf("\n 1.Cylinder\n 2.Cone\n 3.Sphere\n 4.Exit\n Choice: ");
            c1=get.nextInt();
```

```java
            System.out.printf("\n 1.Cylinder\n 2.Cone\n 3.Sphere\n 4.Exit\n Choice: ");
            c1=get.nextInt();
            switch(c1)
            {
                case 1: cy.getInfo();
                        cy.surfaceArea();
                        cy.volume();
                        cy.display();
                        break;

                case 2: co.getInfo();
                        co.surfaceArea();
                        co.volume();
                        co.display();
                        break;

                case 3: sp.getInfo();
                        sp.surfaceArea();
                        sp.volume();
                        sp.display();
                        break;

                case 4: System.out.printf("\n <-----x-----> ");
                        System.exit(0);

                default:System.out.printf("\n Error Input! Try Again ");

            }

        }while(true);
    }

}
```

E1:Output

```
<-----Enter the Choices ----->
1.Cylinder
2.Cone
3.Sphere
4.Exit
Choice: 1

Enter the Base radius And Height of Cylinder: 10 10

Surface Area =1256.000
Voulume = 3140.000

<-----Enter the Choices ----->
1.Cylinder
2.Cone
3.Sphere
4.Exit
Choice: 2

Enter the Base radius And Height of Cone: 10 10

Surface Area =758.063
Voulume = 1046.667

<-----Enter the Choices ----->
1.Cylinder
2.Cone
3.Sphere
4.Exit
Choice: 4

<-----x----->
```

```java
1   import java.util.Scanner;
2
3   class person
4   {
5       String name;
6       Scanner get = new Scanner(System.in);
7
8       person()
9       {
10          System.out.printf("\n Name: "); name=get.nextLine();
11      }
12      void putPersonInfo()
13      {
14          System.out.printf("\n Name: %s",name);
15
16      }
17
18  }
19  class employee extends person
20  {
21      String empId;
22      double salary;
23      Scanner get = new Scanner(System.in);
24
25      employee()
26      {
27          System.out.printf(" Employee ID: "); empId=get.nextLine();
28          System.out.printf(" Salary: "); salary=get.nextDouble();
29      }
30      void putEmpInfo()
31      {
32          System.out.printf("\n Employee ID: %s ",empId);
33          System.out.printf("\n Salary: %.2f",salary);
34
35      }
36  }
37  class teaching extends employee
38  {
39      String courseHandled;
40      Scanner get = new Scanner(System.in);
41
42      teaching()
43      {
44          System.out.printf(" Course Handling: "); courseHandled=get.nextLine();
45      }
46      void putTechInfo()
47      {
48          System.out.printf("\n Course Handling: %s",courseHandled);
49          System.out.printf("\n <----End Of Teching Staff Details---->\n");
```

```java
49          System.out.printf("\n <----End Of Teching Staff Details---->\n");
50
51      }
52  }
53  class nonTeaching extends employee
54  {
55      String role;
56
57      nonTeaching()
58      {
59          System.out.printf(" Role: "); role=get.next();
60      }
61
62      void putNonTechInfo()
63      {
64          System.out.printf("\n Role: %s ",role);
65          System.out.printf("\n <----End Of Non-Teching Staff Details---->\n");
66
67      }
68  }
69
70  class student extends person
71  {
72      String studentId;
73      String course;
74      Scanner get = new Scanner(System.in);
75
76      student()
77      {
78          System.out.printf(" Student ID: "); studentId=get.nextLine();
79          System.out.printf(" Course: "); course=get.nextLine();
80      }
81      void putStudInfo()
82      {
83          System.out.printf("\n Student ID: %s ", studentId);
84          System.out.printf("\n Course: %s",course);
85
86      }
87  }
88  class ug extends student
89  {
90      int sem;
91      Scanner get = new Scanner(System.in);
92
93      ug()
94      {
95          System.out.printf(" Sem: "); sem=get.nextInt();
96      }
97      void putUGInfo()
```

```java
97      void putUGInfo()
98      {
99          System.out.printf("\n Sem: %d ",sem);
100         System.out.printf("\n <----End Of UG Student Details---->\n");
101
102     }
103 }
104 class pg extends student
105 {
106     int yearOfUGCompletion;
107     Scanner get = new Scanner(System.in);
108
109     pg()
110     {
111         System.out.printf(" UG Completion Year: ");  yearOfUGCompletion=get.nextInt();
112     }
113     void putPGInfo()
114     {
115         System.out.printf("\n UG Completion Year: %s",yearOfUGCompletion);
116         System.out.printf("\n <----End Of PG Student Details---->\n");
117
118     }
119 }
120 class personMain
121 {
122     public static void main(String[] args)
123     {
124         System.out.printf("\n <-----Enter the Teching Staff Details----->");
125         teaching t1=new teaching();
126         System.out.printf("\n <-----Enter the Non-Teaching staff Details----->");
127         nonTeaching t2=new nonTeaching();
128         System.out.printf("\n <-----Enter the UG Student Details----->");
129         ug s1=new ug();
130         System.out.printf("\n <-----Enter the PG Student Details----->");
131         pg s2=new pg();
132         System.out.printf("\n <-----The Details of Teching Staff Are ----->");
133         t1.putPersonInfo();
134         t1.putEmpInfo();
135         t1.putTechInfo();
136         System.out.printf("\n <-----The Details of Non-Teaching staff Are ----->");
137         t2.putPersonInfo();
138         t2.putEmpInfo();
139         t2.putNonTechInfo();
140         System.out.printf("\n <-----The Details of UG Student Are ----->");
141         s1.putPersonInfo();
142         s1.putStudInfo();
143         s1.putUGInfo();
144         System.out.printf("\n <-----The Details of PG Student Are ----->");
145         s2.putPersonInfo();
```

```
144                System.out.printf("\n <-----The Details of PG Student Are ----->");
145            s2.putPersonInfo();
146            s2.putStudInfo();
147            s2.putPGInfo();
148      }
149   }
```

E2:Output

```
<-----Enter the Teching Staff Details----->
Name: Silvia
Employee ID: AR13GH23
Salary: 80000
Course Handling: Mathematics

<-----Enter the Non-Teaching staff Details----->
Name: Srinivas
Employee ID: NS15JH26
Salary: 50000
Role: CS PG Lab

<-----Enter the UG Student Details----->
Name: Amarnath
Student ID: 1BM14CS008
Course: IS
Sem: 4

<-----Enter the PG Student Details----->
Name: Prakash
Student ID: 1BM17CS889
Course: ACS
UG Completion Year: 2014

<-----The Details of Teching Staff Are ----->
Name: Silvia
Employee ID: AR13GH23
Salary: 80000.00
Course Handling: Mathematics
<----End Of Teching Staff Details---->
<-----The Details of Non-Teaching staff Are ----->
Name: Srinivas
Employee ID: NS15JH26
Salary: 50000.00
Role: CS
<----End Of Non-Teching Staff Details---->
<-----The Details of UG Student Are ----->
Name: Amarnath
Student ID: 1BM14CS008
Course: IS
Sem: 4
<----End Of UG Student Details---->
```

```
<----End Of UG Student Details---->
<-----The Details of PG Student Are ----->
Name: Prakash
Student ID: 1BM17CS889
Course: ACS
UG Completion Year: 2014
<----End Of PG Student Details---->
```