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PROGRAMMING LAB – II(JAVA)

ASSIGNMENT - 2

1. Explain difference between method overloading and method overriding.

| Method Overloading | Method Overriding |
|---|---|
| • Method overloading is a compile-time polymorphism. | • Method Overriding is a runtime polymorphism. |
| • It increases the readability of the program. | • It is used to grant the specific implementation of the method which is already provided by the parent class or base class. |
| • It occurs within the class. | • It is performed in 2 class in inheritance relationship. |
| • It do not need inheritance | • It need to be in between inheritance relationship. |
| • In this, the return type can or cannot be same but we have to change parameter(s). | • In this, the return type must be same or co-varient. |

2. Implement all string functions in java.
   Program:

```java
import java.util.*;
import java.lang.*;

public class Strings{

    public static void main(String[] args){
        String str1 = "Hello";
        String str2 = new String("World");
        System.out.println(str1 + " " + str2);
        //StringBuffer
```

```
        StringBuffer str3 = new StringBuffer("Walchand
College");
        System.out.println(str3);
        //StringBuilder
        StringBuilder str4 = new StringBuilder();
        str4.append(str3 + " says " + str1 + " " + str2);
        System.out.println(str4);

        //String Constructors
        //1. byte array to string
        byte[] byt = {119,97,108,99,104,97,110,100};
        String byt_str = new String(byt);
        System.out.println(byt_str);

        //2. char array to string
        char[] ch = {'W','a','l','c','h','a','n','d'};
        String ch_str = new String(ch);
        System.out.println(ch_str);

        //length
        System.out.println(str4.length());

        //indexOf
        System.out.println(str3.indexOf(ch_str));

        //charAt
        System.out.println(str3.charAt(4));

        //replace
        System.out.println(str3.replace(0, 3, str2));

        //toLowerCase
        System.out.println(str1.toLowerCase());

        //toUpperCase
        System.out.println(str1.toUpperCase());

        //Compare
```

```
        System.out.println(str1.compareTo(str2));

        //Concat
        System.out.println(str1.concat(str2));

        //equalto
        System.out.println(str1.equals(str2));

        //substring
        System.out.println(str3.substring(2,4));
    }
}
```

Output:

```
ive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)\" ; if ($?) { javac Strings.java } ; if ($
?) { java Strings }
Hello World
Walchand College
Walchand College says Hello World
walchand
Walchand
33
0
h
Worldchand College
hello
HELLO
-15
HelloWorld
false
rl
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)>
```

3. Implement all stringbuffer functions in java.
   Program:

```
public class StringBuff {
    public static void main(String[] args) {
        //StringBuffer
        StringBuffer str1 = new StringBuffer("Walchand
College");
        System.out.println(str1);

        //Append
        System.out.println(str1.append(" of
Engineering"));
```

```
        //insert
        System.out.println(str1.insert(0,"The "));

        //Delete
        System.out.println(str1.delete(0, 4));

        //Reverse
        System.out.println(str1.reverse());

        //Replace
        System.out.println(str1.replace(0, 3, "THE"));

        //Length
        System.out.println(str1.length());

        //subString
        System.out.println(str1.substring(4));

        //indexOf
        System.out.println(str1.indexOf("laW"));

        //subSequence
        System.out.println(str1.subSequence(0, 7));

    }
}
```

Output:

```
PS C:\Users\HP\OneDrive\D> cd "c:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)\" ; if ($?)
javac StringBuff.java } ; if ($?) { java StringBuff }
Walchand College
Walchand College of Engineering
The Walchand College of Engineering
Walchand College of Engineering
gnireenignE fo egelloC dnahclaW
THEreenignE fo egelloC dnahclaW
31
eenignE fo egelloC dnahclaW
28
THEreen
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)>
```

4. Explain with example declaration of string using string literal and new keyword.

String can be created by string literals,
String s=”Aman”;
And String can also be created with new Key word like,
String s=new String(“Aman”);

5. Create a class named 'Shape' with a method to print "This is This is shape". Then create two other classes named 'Rectangle', 'Circle' inheriting the Shape class, both having a method to print "This is rectangular shape" and "This is circular shape" respectively. Create a subclass 'Square' of 'Rectangle' having a method to print "Square is a rectangle". Now call the method of 'Shape' and 'Rectangle' class by the object of 'Square' class.
Program:

```
class Shape{
    public void print_sh(){
        System.out.println("This is a Shape");
    }
}
class Rectangle extends Shape{
    public void print_rect(){
        System.out.println("This is rectangular
shape");
    }
}

class Circle extends Shape{
    public void print_circle(){
        System.out.println("This is circular shape");
    }
}
class Square extends Rectangle{
    public void print_square(){
        System.out.println("Square is a rectangle");
    }
}


public class PrintShape {
    public static void main(String[] args){
```

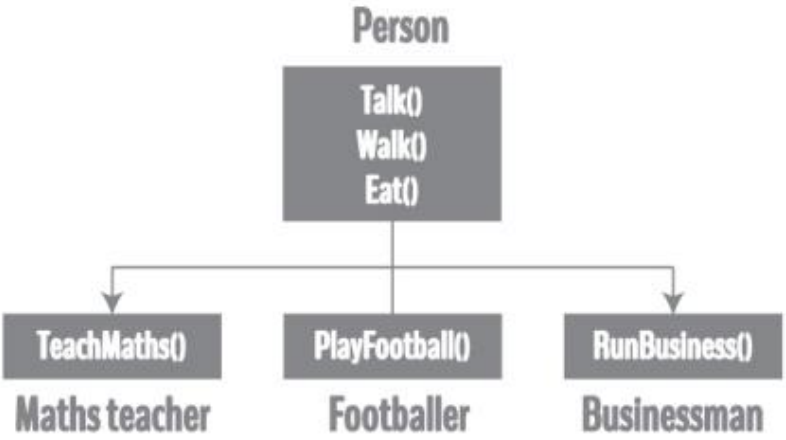
```
        Square sq = new Square();
        sq.print_rect();
        sq.print_sh();
    }
}
```

Output:

```
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)> cd "c:\Users\HP\OneDr
ive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)\" ; if ($?) { javac PrintShape.java } ; if
 ($?) { java PrintShape }
This is rectangular shape
This is a Shape
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)>
```

6. Create game characters using the concept of inheritance. Suppose, in your game, you want three characters - a maths teacher, a footballer and a businessman. Since, all of the characters are persons, they can walk and talk. However, they also have some special skills. A maths teacher can teach maths, a footballer can play football and a businessman can run a business. You can individually create three classes who can walk, talk and perform their special skill as shown in the figure below.


In each of the classes, you would be copying the same code for walk and talk for each character. If you want to add a new feature - eat, you need to implement the same code for each character. This can easily become error prone (when copying) and duplicate codes. It'd be a lot easier if we had a Person class with basic features like talk, walk, eat, sleep, and add special skills to those features as per our characters. This is done using inheritance.




Using inheritance, now you don't implement the same code for walk and talk for each class. You just need to inherit them. So, for Maths teacher (derived class), you inherit all features of a Person (base class) and add a new feature TeachMaths. Likewise, for a footballer, you inherit all the features of a Person and add a new feature PlayFootball and so on.
Program:

```
class Person{

    public void talk()
    {
        System.out.println("He can talk.");
    }
    public void walk()
    {
        System.out.println("He can walk.");
    }
    public void eat(){
        System.out.println("He can eat.");
    }
}

class MathTeacher extends Person{

    public void tachMath()
```

```
        {
            System.out.println("He can teach
maths.");
        }

}
class FootBaller extends Person{
    public void playFootBall(){
        System.out.println("He can play
football.");
    }
}

class Buisnessman extends Person{
    public void doBuisness()
    {
        System.out.println("He can do buisness.");
    }
}

class Ass3_6{
    public static void main(String[] args) {

        MathTeacher teacher=new MathTeacher();
        teacher.eat();
        teacher.walk();
        teacher.talk();
        teacher.tachMath();

        Buisnessman man=new Buisnessman();
        man.eat();
        man.walk();
        man.talk();
        man.doBuisness();
```

```
        FootBaller footBaller=new FootBaller();
        footBaller.eat();
        footBaller.walk();
        footBaller.talk();
        footBaller.playFootBall();
    }
}
```

Output:

```
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)> cd "c:\Users\HP\OneDr
ive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)\" ; if ($?) { javac Ass3_6.java } ; if ($?
) { java Ass3_6 }
He can eat.
He can walk.
He can talk.
He can teach maths.
He can eat.
He can walk.
He can talk.
He can do buisness.
He can eat.
He can walk.
He can talk.
He can play football.
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)>
```

7. WAP to manage the employee allowance from a specific department by creating class structure as follow,
   InheritanceEx2
   |
   |
   InheritanceEx2Main.java
   |
   |- dept | Deparment.java
   |
   |
   |
   |- emp | Employee.java extends Department
   |
   |
   |
   |- allowance | Allowance.java extends Employee
   |

| [Multilevel Inheritance]

Program:

```
import java.util.Scanner;

class Department {

    protected String departmentName;
    protected int department_no;



}

class Employee extends Department {

    protected int emp_id;
    protected String employeeFirstName;
    protected String employeeLastName;
    protected String gender;
    protected byte age;
    protected int experience;

    Employee()
    {

        Scanner sc=new Scanner(System.in);
        System.out.print("Enter employee id:-");
        emp_id=sc.nextInt();
        System.out.print("Enter employee's first name:-
");
        employeeFirstName=sc.next();
        System.out.print("Enter employee's last name:-
");
        employeeLastName=sc.next();
        System.out.print("Enter gender of the
employee:-");
        gender=sc.next();
```

```
        System.out.print("Enter he's/her age:-");
        age=sc.nextByte();
        System.out.print("Enter he's/her experience:-
");
        experience=sc.nextInt();
        System.out.println("1)Buisness\n2)Marketing\n3)
DESIGNING\n4)MAINTAINENCE");
        System.out.println("Chosse your depatment no");
        department_no=sc.nextInt();
        switch(department_no)
        {
            case 1:departmentName="BUISNESS";
            break;
            case 2:departmentName="MARKETING";
            break;
            case 3:departmentName="DESIGNING";
            break;
            case 4:departmentName="MAINTAINENCE";
            break;

            default:departmentName="null";
        }



        sc.close();
    }

}

class Allowance extends Employee {

    protected int homeAllowance=0;
    protected int healthAllowance=0;
    protected int travellAllowance=0;
    private int totalAllowance = 0;

    Allowance()
```

```
    {
        super();
    }

    public void calculateateAllowance() {
        if (departmentName == "BUISNESS") {
            homeAllowance = 20000;
            healthAllowance = 25000;
            travellAllowance = 50000;
        } else if (departmentName == "MARKETING") {
            homeAllowance = 18000;
            healthAllowance = 25000;
            travellAllowance = 35000;
        } else if (departmentName == "DESIGNING") {
            homeAllowance = 16000;
            healthAllowance = 23000;
            travellAllowance = 30000;
        } else if (departmentName == "MAINTAINENCE") {
            homeAllowance = 15000;
            healthAllowance = 20000;
            travellAllowance = 25000;
        }
        else{
            System.out.println("SOMETHING WRONG!");

        }

        totalAllowance = homeAllowance +
healthAllowance + travellAllowance;
    }

    public int getAllowance() {

        System.out.println("Total allowance is :-");
        return this.totalAllowance;
    }
}
```

```java
public class Ass3_7 {
    public static void main(String[] args) {

        Allowance allowance=new Allowance();
        allowance.calculateateAllowance();
        System.out.println(allowance.getAllowance()+"/-
");
    }
}
```

Output:

```
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)> cd "c:\Users\HP\OneDr
ive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)\" ; if ($?) { javac Ass3_7.java } ; if ($?
) { java Ass3_7 }
Enter employee id:-3
Enter employee's first name:-Aman
Enter employee's last name:-Agrawal
Enter gender of the employee:-Male
Enter he's/her age:-20
Enter he's/her experience:-2
1)Buisness
2)Marketing
3)DESIGNING
4)MAINTAINENCE
Chosse your depatment no
1
Total allowance is :-
95000/-
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)>
```

8. Write a Java Program to demonstrate StringBuilder class methods.
   Program:

```java
public class Ass3_8 {
    public static void main(String[] args) {
        StringBuilder s = new StringBuilder();
        s.append("AMAN");
        System.out.println(s);
        System.out.println(s.capacity());
        System.out.println(s.indexOf("M"));
        System.out.println(s.charAt(2));
        System.out.println(s.lastIndexOf("A"));
```

```
        System.out.println(s.delete(0, 1));
        System.out.println(s.reverse());
        System.out.println(s.length());
        System.out.println(s.substring(2));
        System.out.println(s.replace(0, s.length(),
"KAMBLE"));
    }

}
```

Output:

```
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)> cd "c:\Users\HP\OneDr
ive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)\" ; if ($?) { javac Ass3_8.java } ; if ($?
) { java Ass3_8 }
AMAN
16
1
A
2
MAN
NAM
3
M
KAMBLE
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)>
```

9. Write a Java Program to demonstrate Method overriding.( create class Result with method result(). Override method result() in UGResult and PGResult class)

Program:

```
class Result {

    public void result() {
        System.out.println("This is Result class");
    }
}

class UGResult {

    public void result() {

        System.out.println("This is UGResult class.");
```

```
    }
}

class PGResult {

    public void result()
        {
            System.out.println("This is PGResult
class.");

        }
}

public class Ass3_9{
    public static void main(String[] args) {
                    PGResult pgResult=new PGResult();
            pgResult.result();

        }
}
```

Output:

```
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)> cd "c:\Users\HP\OneDr
ive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)\" ; if ($?) { javac Ass3_9.java } ; if ($?
) { java Ass3_9 }
This is PGResult class.
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)>
```

10. Write a java program to create a class called STUDENT with data members PRN, Name and age. Using inheritance, create a classes called UGSTUDENT and PGSTUDENT having fields as semester, fees and stipend. Enter the data for at least 5 students. Find the semester wise average age for all UG and PG students separately.

Program:

```
class Result {

    public void result() {
        System.out.println("This is Result class");
    }
}
```

```java
class UGResult {
    public void result() {

        System.out.println("This is UGResult class.");
    }
}

class PGResult{
        public void result()
        {
            System.out.println("This is PGResult
class.");

        }
    }

public class Ass2_10{
    public static void main(String[] args) {
        PGResult pgResult = new PGResult();
        pgResult.result();

    }
}
```

Output:

```
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)> cd "c:\Users\HP\OneDr
ive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)\" ; if ($?) { javac Ass2_10.java } ; if ($
?) { java Ass2_10 }
This is PGResult class.
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)>
```

11. Implement hybrid inheritance using all access specifiers (public, private, protected).

Program:

```java
class Animal{
            private String animalType;

            public void setAnimalType(String type)
```

```
            {
                this.animalType=type;
            }
            public String getAnimalType() {
                return animalType;
            }

        }
        class Dog extends Animal{

            protected String breedName;
            protected String gender;

            Dog()
            {
                setAnimalType("Dog");
            }

            public void setBrideName(String brideName)
{
                this.breedName = brideName;
            }
            public void setGender(String gender) {
                this.gender = gender;
            }
            public String getBrideName() {
                return breedName;
            }

            public String getGender() {
                return gender;
            }


        }

        class GermenShefred extends Dog{
```

```
        public String name;
            public String color;

            GermenShefred()
            {
            setBrideName("GermenShfred");
            }

            public void setName(String name) {
                this.name = name;
            }
            public void setColor(String color) {
                this.color = color;
            }

            public String getName() {
                return name;
            }
            public String getColor() {
                return color;
            }
        }
        class Cat extends Animal{

            protected String brideName;
            protected String gender;

            Cat()
            {
                setAnimalType("Cat");
            }
            public void setBrideName(String brideName)
{
                this.brideName = brideName;
        }
        public void setGender(String gender) {
            this.gender = gender;
        }
```

```java
}
class Persian extends Cat{

    public String name;
    public String color;

        Persian()
        {
            setBrideName("Persian");
        }

        public void setName(String name) {
            this.name = name;
        }
        public void setColor(String color) {
            this.color = color;
        }

        public String getName() {
            return name;
        }
        public String getColor() {
            return color;
        }
        public String getBreedeName() {
            return null;
        }
    }

    public class Ass2_11 {
        public static void main(String[] args) {
            GermenShefred dog=new GermenShefred();
            Persian cat=new Persian();

            dog.setName("Max");
            dog.setColor("Black");
```

```
                cat.setName("XYZ");
                cat.setColor("Orange");

        System.out.println(dog.getAnimalType()+":-
\n"+dog.getBrideName()+"\n"+dog.getName()+"\n"+dog.getC
olor()+"\n");
        System.out.println(cat.getAnimalType()+":-
\n"+cat.getBreedeName()+"\n"+cat.getName()+"\n"+cat.get
Color());
    }
}
```

Output:

```
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)> cd "c:\Users\HP\OneDr
ive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)\" ; if ($?) { javac Ass2_11.java } ; if ($
?) { java Ass2_11 }
Dog:-
GermenShfred
Max
Black

Cat:-
null
XYZ
Orange
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)>
```

12. Write a program to implement a class Teacher contains two fields Name and Qualification. Extend the class to Department, it contains Dept. No and Dept. Name. An Interface named as College it contains one field Name of the College. Using the above classes and Interface get the appropriate information and display it.

Program:

```
interface College{
    String name="Walchand College Of Enggineering
Sangli";
}

class Departmet{
   public int dept_no;
    public String dept_name;
}
```

```
class Teacher extends Departmet implements College{
    String name;
    String qualification;

    void setInfo(String name,String qualification,int
dept_no,String dept_name)
    {
            this.name=name;
            this.dept_name=dept_name;
            this.dept_no=dept_no;
            this.qualification=qualification;
    }

    void displyData()
    {
        System.out.println("College name:-
"+College.name);
        System.out.println("Teacher name"+name);
        System.out.println("Qualification:-
"+qualification);
        System.out.println("Department no.:-"+dept_no);
        System.out.println("Department name:-
"+dept_name);
    }

}

 class Ass2_12{
    public static void main(String[] args) {

        Teacher t=new Teacher();
        t.setInfo("Aman","B.tech",1,"COMPUTER
SCIENCE");

        t.displyData();
    }
}
```

Output:

```
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)> cd "c:\Users\HP\OneDr
ive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)\" ; if ($?) { javac Ass2_12.java } ; if ($
?) { java Ass2_12 }
College name:-Walchand College Of Engginearing Sangli
Teacher nameAman
Qualification:-B.tech
Department no.:-1
Department name:-COMPUTER SCIENCE
PS C:\Users\HP\OneDrive\Desktop\College work\Sy Notes\SEM 4\PL(JAVA)>
```