1) What is data abstraction? Differentiate between data and procedural abstraction. Write Inheritance heerarchy for the super class Quadrilateral, Parallelogram, Square and rectangle. Calculate area of Square, rectangle and parallelogram.

Ans Abstraction is a process of hiding the implementation details (like functions, data etc) and showing only essential things to the users. Abstraction can be achieved in two way by using Abstract classes (or) Interface. Abstraction can be defined in two way i.e, Data Abstraction and procedural abstraction.

Data Abstraction:

In data abstraction the abstraction process is more focused on the data than the operations and procedures (methods). data abstraction follows the object orientation principle. Example of the data abstraction is queue data and the associated operations add() and delete(). The advantage of data abstraction is that data and the associated operations get specified together.

Procedural Abstraction:

This mechanism Abstraction for operations, and its procedure as well. procedural Abstraction are normally characterized in a programming language as "function/sub-function" or "procedure". Example for the procedural Abstraction is the debit, credit operations in which the procedure and operations performed during transaction (debit, credit) is completely Abstracted from the users.

Hierarical Inheritance

```
import java.util.Scanner;
class QuadrilateralTest{
    double x;
    double y;
    Scanner sc = new Scanner(System.in);
}
class Parallelogram extends QuadrilateralTest{
    double a=60; // default angle
    Public void input(){
        System.out.println("Enter the Side1 value of parallelogram");
        x = sc.nextDouble();
        System.out.println("Enter the sides value of Parallelogram");
        y = sc.nextDouble();
    }
    Public double area(){
        System.out.println("Area is calculated when angle is "+a+"o");
        return a*x*y;
    }
    Public void changeAngle(){
        System.out.println("Enter the new angle of the parallelogram");
        a = sc.nextDouble();
    }
}
Class Rectangle extends QuadrilateralTest{
    public void input(){
        System.out.println("Enter the Side1 of the Rectangle");
        x = sc.nextDouble();
        System.out.println("Enter the side2 of Rectangle");
        y = sc.nextDouble();
    }
    public double area(){
        return x*y;
    }
}
```

```
Class Square extends QuadrilateralTest{
    Public void input(){
        System.out.println("Enter the side value of the Square");
        x = sc.nextDouble();
    }
    public double area(){
        return x*x;
    }
}
Public class Quadrilateral{
    public static void main(String args[]){
        Parallelogram ob1 = new Parallelogram();
        Rectangle ob2 = new Rectangle();
        Square ob3 = new Square();
        ob1.input();
        System.out.println("\n Area of Parallelogram "+ ob1.area());
        ob2.input();
        System.out.println("\n Area of Rectangle "+ ob2.area());
        ob3.input();
        System.out.println("\nArea of Square "+ ob3.area());
    }
}
```

2) What is importance of the constructor? write a java program to perform constructor overloading. Describe the usage of static members and nesting members with suitable example programs in java.

Ans) In Java constructor is used to initialize objects. which are called when the instance of the objected is created. constructor is a special type of method. The main advantage of a constructor is that it can provide a fully initialised object. when values of the instance variables inside a constructor is passed, during object creation itself the variables get initialised.

Constructor overloading can be performed by constructors, different number of times with number of parameters included in it.

Eg:

```
Public class Bank {
    String name, accountId, branch;
    Public Bank() { }
    public Bank (String name, String accountId) {
        this.name = name;
        this.accountId = accountId;
    }
    Public Bank (Stringname, String account Id, String branch)
    { this.name = name;
      this.accountId = accountId;
      this. branch = branch;
    }
    Public void display () {
        System.out.println (name+" "+accountId+" "+branch);
    }
}
Public class Account {
    public static void main (String args[]) {
        Bank AC1 = new Bank (C1, a1;2k3);
        Bank ac2 = new Bank (C2, A125X, Guntur);
        AC1.display(); ac2.display(); }
```

Output:

(1, ali213, null
(2, A125X, Guntur

Static members : In Java static memebers are those which belongs to the class and you can access these members without instantiating the class (These are constants)

The Static Keyword can be use with methods, fields, classes (inner/nested), blocks.

Eg:
```
Public class Myclass{
    public static void main (String args[]){
        Public static int data= 60;    // static variable
        Static{                        // static block
            System.Out.println ("Static block");
        }
        Public static void sample() {  // static method
            System.out. println ("static method");
        }
}
```

Nested Members: The classes within the another class are called nested classes they are of two types (static & non-static)

Eg:
```
Public class Myclass{
    Public static class sample1{
        System.out. println ("nested static class");
    }
    Private class sample2{
        System.out.println ("innerclass");
    }
    Public static void main (String args[]) {
    }
}
```

3) Define a class name BookFair with following description:

String Bname:-(name of the books), double price:-(Price of the book), BookFair() :-(constructor), void Input() :- (Input and store name and price), void calculate() :- (price after discount), void display() :- (to display name & price of the books after discount).

Discount details

Price	Discount (of the price)
<₹1000 /-	2%
>₹1000 and <=₹3000	10%
>₹3000	15%

Ans

```
import java.util.Scanner;
class BooksFair {
    String Bname;
    double price;
    Scanner sc = new Scanner(System.in);

    Public BooksFair(){}
    // Public BooksFair()
    Public void Input(){
        System.out.println("Enter the name of the book");
        Bname = sc.nextLine();
        System.out.println("Enter the price of the book");
        Price = sc.nextDouble();
        }
    Public void calculate(){
        if (Price <= 1000.00)
            Price = price-(Price*0.02);
        else if (price > 1000.00 && Price <= 3000.00){
            Price = price-(Price*0.1);
        else if (Price > 3000.00)
            Price = price-(price*0.15);
    }
```

```
    Public void display(){
        System.out.println("Name of the book = "+Bname);
        System.out.println("price after discount = "+price);
    }
}// closing tag of BookFair class.

Public class BKFair{
    Public static void main(String args[]){
        BooksFair book1;
        book1 = new BooksFair();
        book1.Input();
        book1.calculate();
        book1.display();
    }
}
```

4 Write a programme to find out wheather the given string is a palindrome, special word (starting and ending letters are same) (or) None of the both.

Ans

```
import java.util.Scanner;
Public class Palindrome{
    Public static void main(String args[]){
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter a string")
        String str = in.nextLine();
        String rev = "";
        int len = str.length();
        for (int i= len-1 ; i >=0 ; i--){
            rev= rev + str.charAt(i); }
```

```
System.out.println ("reverse of the string "+rev);
if (str.equals(rev))
        System.out.println (str+" is a palindrome");
else if (str.substring (0,1).equals(str.substring (len-1)))
        System.out.println (str+" is a special word");
else
    System.out.println('str+" is not a palindrome & specialword");
    }
}
```