FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERIG.
Fr. Agnel Ashram, Bandstand, Bandra (W) Mumbai 400050

PROGRAMMING ASSIGNMENT 2

Class: S.E. Computer (Division A and B)
Date of Assignment: 15-10-2023
Date of Submission: 25-10-2023

NOTE: Solve the following questions using Java. Submit code along with appropriate output cases.

CSL304.4	Implement the concept of inheritance, exception handling and multithreading

Q.	Description	CO mapping
Q1	Inheritance: Create a class 'Car' which contains members 'speed', 'noOfGear'. The class has a method drive () which is responsible to provide starting speed and noOfGears to a Car. Implement display () method which will display all attributes of Car class.The class 'SportCar' is derived from the class Car which adds new features AirBallonType. When the method is invoked, initial speed and gear status must be displayed on console. Override the display method which display all attribute of the SportCar. Make use of super class display() method.	CSL304.4
Q2	Write a Java Program to calculate the Result. Result should consist of name, seatno, date, center number and marks of semester three exam. Create a User Defined Exception class MarksOutOfBoundsException, If Entered marks of any subject is greater than 100 or less than 0, andthen program should create a user defined Exception of type MarksOutOfBoundsException and must have a provision to handle it.	CSL304.4
Q3	Multithreading: Write a java program to print first 20 prime numbers and 15 Fibonacci numbers by creating two child threads and print the total time taken by each thread for the execution.	CSL304.4

RUBRICS for Programming Assignment Grading:

Sr. No	Performance Indicator	Below average	Average	Good	Excellent	Marks

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1	On time Submission (2)	-	Submitted after deadline (1)	Early or on time submission(2)		
2	Test cases and output (4)	Incorrect output (1)	Expected output is verified only for few test cases (2)	Expected output is Verified for all test cases but is not presentable (3)	Expected output is obtained for all test cases. Presentable and easy to follow (4)	
3	Coding efficiency (2)	The code is not structured at all.(0)	The code is structured but not efficient (1)	The code is structured and efficient. (2)	-	
4	Knowledge(2)	Basic concepts not clear (0)	Understood the basic concepts (1)	Could explain the concept with suitable example (1.5)	Could relate the theory with real world application(2)	
Total Marks						10

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Q1

```
class Car {
    int speed, noOfGear;

    public void drive(int speed, int noOfGear) {
        this.speed = speed;
        this.noOfGear = noOfGear;
    }

    public void display() {
        System.out.println("Speed is : " + speed + " kmph");
        System.out.println("No. of Gears are : " + noOfGear);
    }
}

class SportCar extends Car {
    String airBallonType;

    public void drive(int speed, int noOfGear, String airBallonType) {
        super.drive(speed, noOfGear);
        this.airBallonType = airBallonType;
        System.out.println();
        System.out.println("Initial speed of Sport Car : " + speed +
"kmph");
```

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```
        System.out.println("Initial No. of Gears in Sport Car are : " +
noOfGear);
    }

    public void display() {
        System.out.println();
        System.out.println("Sport Car : ");
        super.display();
        System.out.println("The Air Balloon Type is : " +
airBallonType);
    }
}

public class Q1 {
    public static void main(String[] args) {
        Car car = new Car();
        car.drive(160, 4);
        System.out.println("Car : ");
        car.display();
        SportCar sportCar = new SportCar();
        sportCar.drive(400, 8, "Helium");
        sportCar.display();
    }
}
```

```
PS C:\Users\Mark Lopes\Desktop\college\java> javac Q1.java
PS C:\Users\Mark Lopes\Desktop\college\java> java Q1
Car :
Speed is : 160 kmph
No. of Gears are : 4

Initial speed of Sport Car : 400kmph
Initial No. of Gears in Sport Car are : 8

Sport Car :
Speed is : 400 kmph
No. of Gears are : 8
The Air Balloon Type is : Helium
PS C:\Users\Mark Lopes\Desktop\college\java>
```

Q2

```
class Result {
    private String name;
    private int seatno;
    private String date;
```

```
    private int marks;
    private int centerNo;

    public Result(String name, int seatno, String date, int centerNo,
int marks) throws MarksOutOfBoundsException {
        if (marks < 0 || marks > 100) {
            throw new MarksOutOfBoundsException("Marks cannot be less
than 0 or greater than 100");
        }
        this.name = name;
        this.seatno = seatno;
        this.date = date;
        this.centerNo = centerNo;
        this.marks = marks;
    }

    public void display() {
        System.out.println("Name of the student is : " + name);
        System.out.println("Seat Number of the student is : " +
                seatno);
        System.out.println("Date of the exam is : " + date);
        System.out.println("Center Number of the student is : " +
centerNo);
        System.out.println("Marks of the student is : " + marks);
    }
}

public class Q2 {
    public static void main(String[] args) {
        try {
            Result result = new Result("Mark", 157898, "24-10-2023",
9913, 99);
            result.display();
        } catch (MarksOutOfBoundsException e) {
            System.out.println("Error : " + e.getMessage());
        }
    }
}

class MarksOutOfBoundsException extends Exception {
    public MarksOutOfBoundsException(String message) {
```

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```
        super(message);
    }
}
```

```
PS C:\Users\Mark Lopes\Desktop\college\java> cd "c:\Users\Mark Lopes\Desktop\col
Name of the student is : Mark
Seat Number of the student is : 157898
Date of the exam is : 24-10-2023
Center Number of the student is : 9913
Marks of the student is : 99
PS C:\Users\Mark Lopes\Desktop\college\java>
```

Q3

```
class PrimeThread extends Thread {
    public void run() {
        long startTime = System.currentTimeMillis();
        int count = 0;
        boolean flag = false;

        System.out.println("Prime Numbers:");
        System.out.println("2");
        try {
            Thread.sleep(200);
        } catch (InterruptedException e) {
        }

        System.out.println("3");
        try {
            Thread.sleep(200);
        } catch (InterruptedException e) {
        }

        for (int n = 2; n < 500; n++) {
            for (int i = 2; i <= n / 2; i++) {
                if (n % i == 0) {
                    flag = false;
                    break;
                } else {
                    flag = true;
                }
            }
            if (flag) {
```

```
                System.out.println(n);
                count++;
            }
            if (count == 18) {
                break;
            }
            try {
                Thread.sleep(200);
            } catch (InterruptedException e) {
            }
        }

        long endTime = System.currentTimeMillis();
        System.out.println("Prime Thread execution time: " + (endTime -
startTime) + "ms");
    }
}

class FibonacciThread extends Thread {
    public void run() {
        long startTime = System.currentTimeMillis();
        System.out.println("Fibonacci:");
        System.out.println("0");
        try {
            Thread.sleep(200);
        } catch (InterruptedException e) {
        }

        int n = 0, m = 1, s;
        for (int i = 0; i < 14; i++) {
            s = n + m;
            System.out.println(s);
            n = m;
            m = s;
            try {
                Thread.sleep(200);
            } catch (InterruptedException e) {
            }
        }

        long endTime = System.currentTimeMillis();
```

```
        System.out.println("Fibonacci Thread execution time: " +
(endTime - startTime) + "ms");
    }
}

public class Q3 {
    public static void main(String[] args) {
        PrimeThread primeThread = new PrimeThread();
        FibonacciThread fibonacciThread = new FibonacciThread();

        primeThread.start();
        try {
            primeThread.join();
        } catch (InterruptedException e) {
        }
        fibonacciThread.start();
    }
}
```

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```
Prime Numbers:
2
3
5
7
11
13
17
19
23
29
31
37
41
43
47
53
59
61
67
71
Prime Thread execution time: 14274ms
Fibonacci:
0
1
2
3
5
8
13
21
34
55
89
144
233
377
610
Fibonacci Thread execution time: 3021ms
PS C:\Users\Mark Lopes\Desktop\college\java>
```