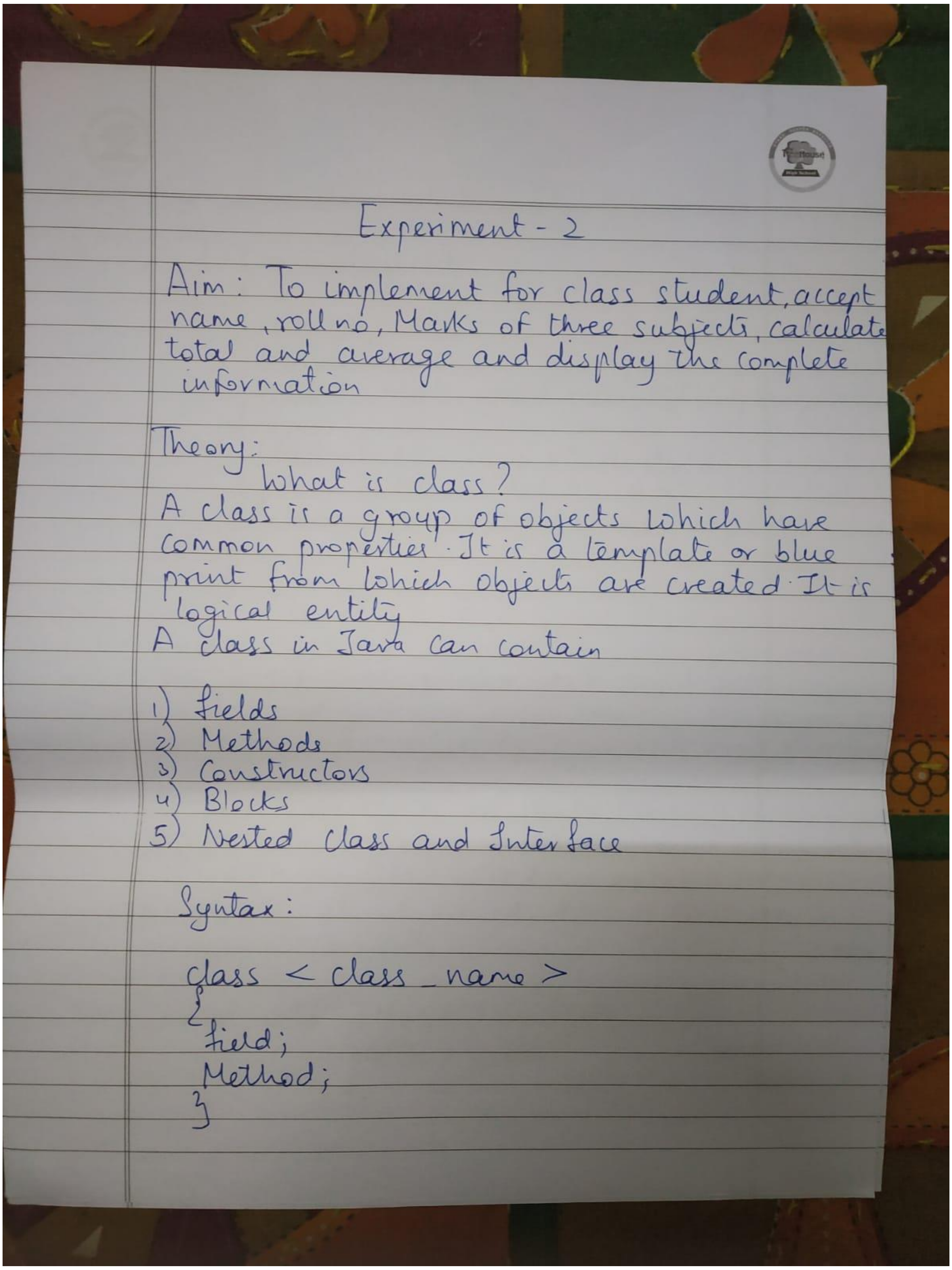
Name: Gaurav Amarnani. Class: CMPN DSE. OOPM Lab 02.



Experiment - 2

Aim: To implement for class student, accept name, roll no, Marks of three subjects, calculate total and average and display the complete information

Theory:

What is class?

A class is a group of objects which have common properties. It is a template or blue print from which objects are created. It is logical entity

A class in Java can contain

1) fields
2) Methods
3) Constructors
4) Blocks
5) Nested class and Interface

Syntax:

```
class < class _ name >
{
 field;
 Method;
}
```

Eg:

```
  Class student
  {
   int id;
   String name:
   Public static void main(string args[])
  {
   Student S1 = new students();
  System out print ln( S1. id);
  System out print ln( S1. name);
  }
 }
```

What is object

An entity that has state and behaviour is known as an object. It can be physical or logical. An object has three characteristics

1) state: represents the data (value) of an object
2) Behavior: represent the behavior of an object such as deposit, withdraw, etc.
3) Identity: An object identity is typically implemented via a unique id. The value of the ID is not visible to the external user. It is used internally by the JVM

How to create an object ?

```
A a1 = new A( );
```

Conculusion:

The implemented program has two classes, student and student demo. The variable are initialized using a parametrized constructor. Two method getmarks and calculate marks are used for gathering and calculating the marks. The object s is intialized in the main function of class student demo.

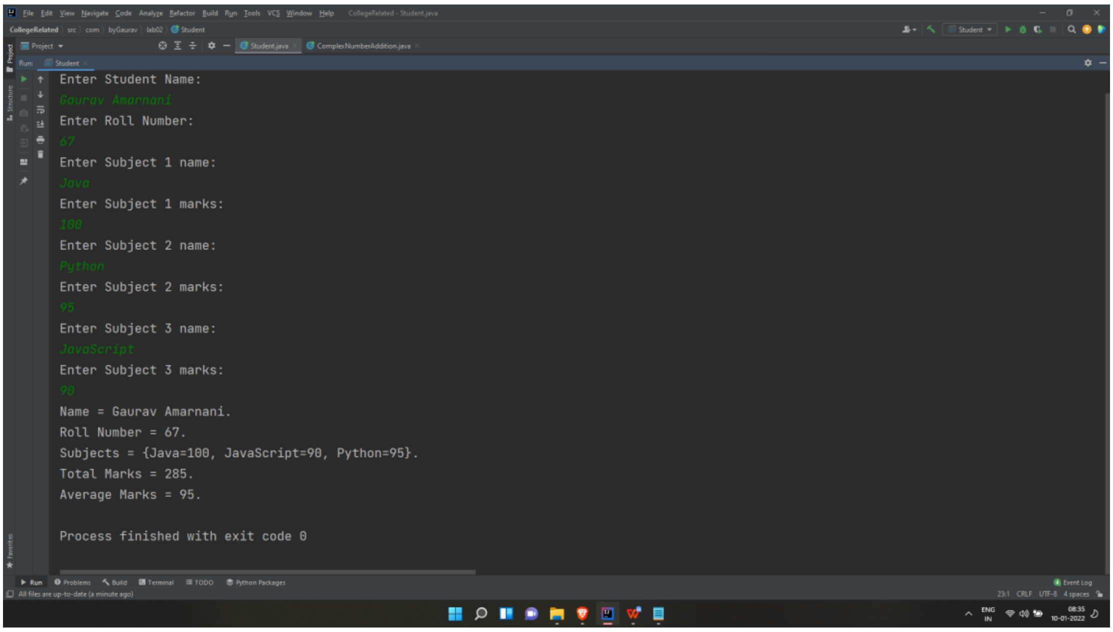
Programs:

Program 1: **Write a program for class Student, accept name, roll no,marks of three subjects, Calculate total and display the complete information. use Constructor.**

```
package com.byGaurav.lab02;

import java.util.HashMap;
import java.util.Scanner;
import java.util.Set;

import static java.lang.System.*;

/**
 * @author  Gaurav Amarnani.
 */

public class Student {

   private String name;
   private Integer rollNumber;
   private HashMap<String, Integer> subjectMarks;

   Student(String name, Integer rollNumber, HashMap<String, Integer>
subjectMarks) {
       this.name = name;
       this.rollNumber = rollNumber;
       this.subjectMarks = subjectMarks;
   }

   public static void main(String...args) {
       Student student = takeInput();
       out.println(student);
   }

   public static Student takeInput() {
       Scanner scanner = new Scanner(in);
       out.println("Enter Student Name: ");
       String name = scanner.nextLine();
       out.println("Enter Roll Number: ");
       Integer rollNumber = scanner.nextInt();
       HashMap<String, Integer> subjectMarks = new HashMap<>();
       for(int i = 1; i < 4; i++) {
           out.println("Enter Subject " + i + " name: ");
           String subjectName = scanner.next();
           out.println("Enter Subject " + i + " marks: ");
           Integer marks = scanner.nextInt();
```

```
            subjectMarks.put(subjectName, marks);
        }
        scanner.close();
        return new Student(name, rollNumber, subjectMarks);
    }

    public Integer calculateMarks(HashMap<String, Integer> subjectMarks) {
        Integer total = 0;
        Set<String> keySet = subjectMarks.keySet();
        for(String key : keySet)
            total += subjectMarks.get(key);
        return total;
    }

    @Override
    public String toString() {
        Integer totalMarks = calculateMarks(subjectMarks);
        Integer averageMarks = totalMarks/3;
        return "Name = " + name + ".\nRoll Number = " + rollNumber +
".\nSubjects = " + subjectMarks + ".\nTotal Marks = " + totalMarks +
".\nAverage Marks = " + averageMarks + ".";
    }
}
```

Output:



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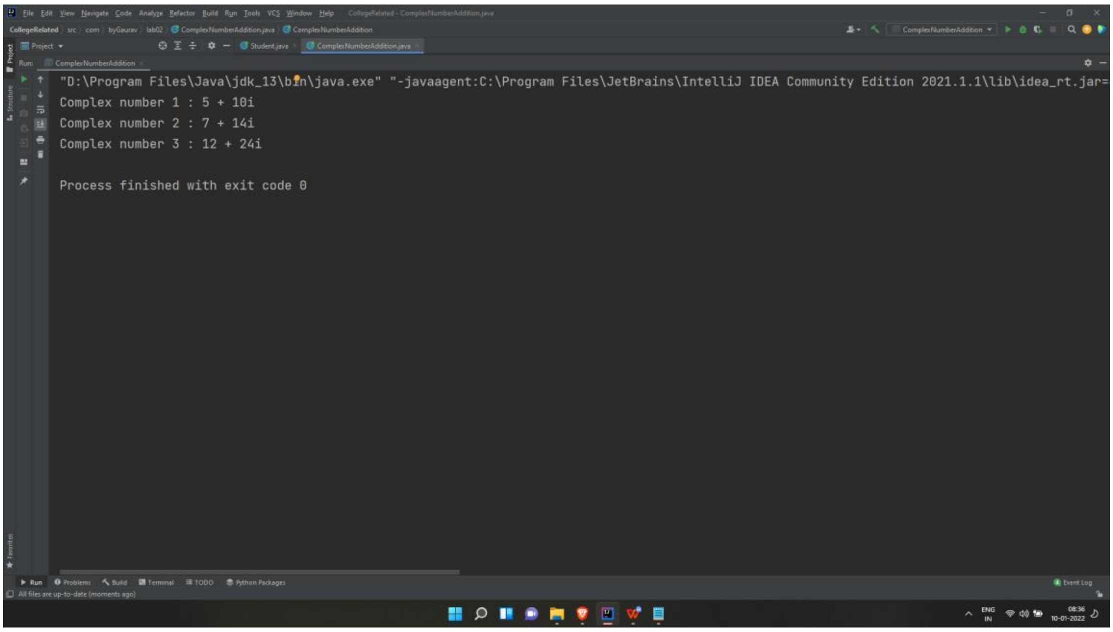
CollegeRelated - Student.java
CollegeRelated src com byGaurav lab02 Student
Project
Student.java
ComplexNumberAdditionJava.java
Run: Student
Run
Problems
Build
Terminal
TODO
Python Packages
All files are up-to-date (a minute ago)
Event Log

```
Enter Student Name:
Gaurav Amarnani
Enter Roll Number:
67
Enter Subject 1 name:
Java
Enter Subject 1 marks:
100
Enter Subject 2 name:
Python
Enter Subject 2 marks:
95
Enter Subject 3 name:
JavaScript
Enter Subject 3 marks:
90
Name = Gaurav Amarnani.
Roll Number = 67.
Subjects = {Java=100, JavaScript=90, Python=95}.
Total Marks = 285.
Average Marks = 95.

Process finished with exit code 0
```

Program 2: Write a Program for Complex Number addition using Constructor.

```
package com.byGaurav.lab02;

import static java.lang.System.out;

/**
 * @author  Gaurav Amarnani.
 */

public class ComplexNumberAddition {
    public static void main(String...args) {
        Complex complex1 = new Complex(5, 10);
        Complex complex2 = new Complex(7, 14);
        Complex complex3 = new Complex(complex1, complex2);
        out.println("Complex number 1 : " + complex1.getReal() + " + " +
complex1.getImaginary() + "i");
        out.println("Complex number 2 : " + complex2.getReal() + " + " +
complex2.getImaginary() + "i");
        out.println("Complex number 3 : " + complex3.getReal() + " + " +
complex3.getImaginary() + "i");
    }
}

class Complex {

    private Integer real;
    private Integer imaginary;

    public Complex() {}

    public Complex(Integer real, Integer imaginary) {
        this.real = real;
        this.imaginary = imaginary;
    }

    public Complex(Complex complex1, Complex complex2) {
        this.real = complex1.real + complex2.real;
        this.imaginary = complex1.imaginary + complex2.imaginary;
    }

    public Integer getReal() {
        return real;
    }

    public void setReal(Integer real) {
        this.real = real;
    }
    public Integer getImaginary() {
        return imaginary;
    }

    public void setImaginary(Integer imaginary) {
        this.imaginary = imaginary;
    }
}
```

Output:



```
"D:\Program Files\Java\jdk_13\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1.1\lib\idea_rt.jar=
Complex number 1 : 5 + 10i
Complex number 2 : 7 + 14i
Complex number 3 : 12 + 24i

Process finished with exit code 0
```

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
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ENG IN
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