



United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

CSE 1116: Object Oriented Programming Laboratory - Mid Examination (L)

Marks: 20

Answer all the parts of the question

You are required to design and implement a **Student Management System** in Java.

1. Create a class **Student**

- **Attributes:**
 - **name** (String): Name of the student.
 - **rollNumber** (int): Unique roll number of the student.
 - **marks1, marks2, marks3** (int): Marks in three subjects.
 - **cpga** (double): The CGPA of the student, calculated as the average marks divided by 30.
- All these attributes must not be directly accessible and changed from outside. Take necessary steps.
- Write the necessary constructors to initialize the fields.
- **calculateCGPA()**: Calculates and updates the CGPA based on the marks.
- **getDetails()**: Prints the student's name, roll number, marks, and CGPA.

2. Create a class **GraduateStudent** that inherits the class **Student**.

- **Attributes:**
 - **researchTopic (String): Research topic of the graduate student.**
- Write a constructor that only takes **researchTopic** as a parameter. Take necessary measures to initialize the **name**, **rollNumber**, **marks1**, **marks2**, **marks3** and **cpga** of the student.
- Override **getDetails()** to print the student details including the **researchTopic**.

3. Create a class **StudentOperations**: This class contains the following methods:

 - o **calculateAverage(Student student)**: A method that calculates and returns the average marks of a single student.
 - o **calculateAverage(Student student1, Student student2)**: A method that calculates and returns the average marks of two students. For example, add all marks of two students and divide by 6.
4. In the **Main** class, perform the following:

 - o Create at least **5 students** (3 **Student** and 2 **GraduateStudent** objects).
 - o **Add the students** to an array.
 - o Print the student details using a **foreach** loop.
 - o Call all the methods from the **Main** class.