United International University
Dept. of Computer Science & Engineering
Course Code: CSE 1116
Course Title: Object Oriented Programming Laboratory
Section: **Marks: 20**
                                                                 Time:

You are asked design a simple software system for an **online educational platform** that handles three types of users: **Students**, **Teachers** and **Administrators**. Each user type shares some common information and performs specific tasks.

System Description:

1. **Common Information for All Users:**
   - **name** (string)
   - **email** (string)

2. **Specific Roles and Responsibilities:**
   - **Students:**
     - Enroll in courses (enrollCourse(courseName)).
     - View grades (viewGrades()).
   - **Teachers:**
     - Create courses (createCourse(courseName)).
   - **Administrators:**
     - Manage users (addUser(userName) and deleteUser(userName)).

3. **Key Behaviors:**
   - All users should have a method called performRole() that behaves differently for each type of user:
     - For a **Student**, it should display the courses they are enrolled in.
     - For a **Teacher**, it should display the courses they teach.
     - For an **Administrator**, it should display a summary of user management activities.

4. **Sensitive Information:**
   - Students' grades should be kept private and accessible only through methods provided by the class.

Questions:

1. **Design the Classes:**
   - Create a base class User with shared attributes (name and email).
   - Create three subclasses: Student, Teacher, and Administrator.
   - Include methods for the specific responsibilities of each user type.

2. **Demonstrate Polymorphism:**
    - o Implement the performRole() method in each subclass to reflect the specific role of that user.
    - o Write a program to create a list of User objects containing Student, Teacher, and Administrator instances.
    - o Loop through the list and call the performRole() method for each user.

3. **Apply Encapsulation:**
    - o Make grades private in the Student class.
    - o Add methods to securely set and get grades.

4. **Test the System:**
    - o Create and test instances of Student, Teacher, and Administrator.
    - o Show how each user performs their role.