National University of Computer and Emerging Sciences
Lahore Campus

Formal Methods (SE2003)

Sessional-I Exam

Date: 3rd May , 2024

Course Instructor(s)

Dr.Wafa Basit

Total Time: 1 Hour

Total Marks: 35

Total Questions: **3**

_____ _____ _____ _____

Student Name Roll No Section Student Signature

Instructions

- All questions should be solved on the question paper.
- Make assumptions where necessary
- In case of multiple solutions, mention the final one
- Use of lead pencil is not allowed.

Question # 1: Fill in the blanks (8 Points)

1. Opdyke presented preconditions for twenty-three ----------refactorings.
2. ----------is a constraint that must always be met by all instances of the class.
3. Basic data types used in OCL expressions are ----------,---------- ,---------- and ----------.
4. Most navigations/associations on OCL return ---------- rather than single elements.
5. The ---------- operation results in true if there is at least one element in the collection for which a given expression is true

Question # 2: Explain (3 points each,9 Points)

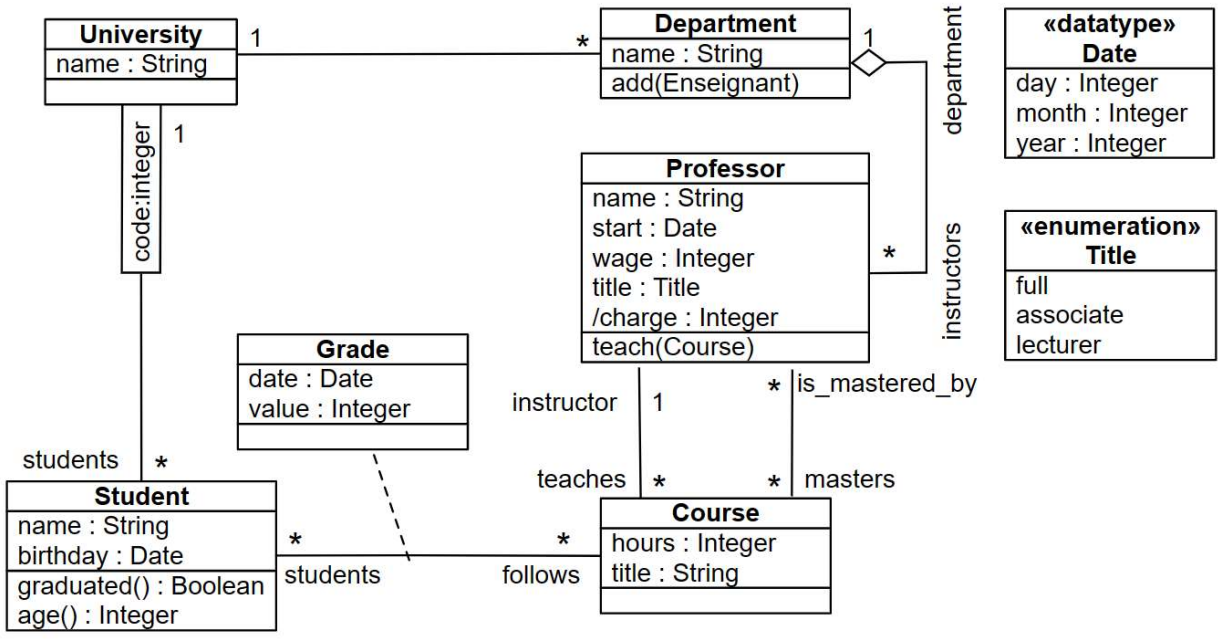
1. Optimization versus Refactoring

2. Divergent change versus Feature Envy

3. Floss versus Root Canal Refactoring

Question # 3: (18 Points)

This excerpt contains information about the university, departments, instructors and students.



Write down OCL constraints for the following (3 points each)

1. Define the derived variable **charge** as the product of wage and the number of courses he teaches using the appropriate syntax.

2. Write an invariant which ensure that all instructors in computer science department are associate or full professors.

3. The passing **grade value** is at least 3 for all courses.

4. A **graduated student** can **follow** 5 courses.

5. Write the pre-conditon for **teach** method in the **professor** class. which ensures that he is not teaching 3 courses already.

6. Write the post-condition of **add(Enseignant)** method in **Department** class which ensures that after the method is executed the list of instructors includes the newly added instructor.

-------Good Luck-----