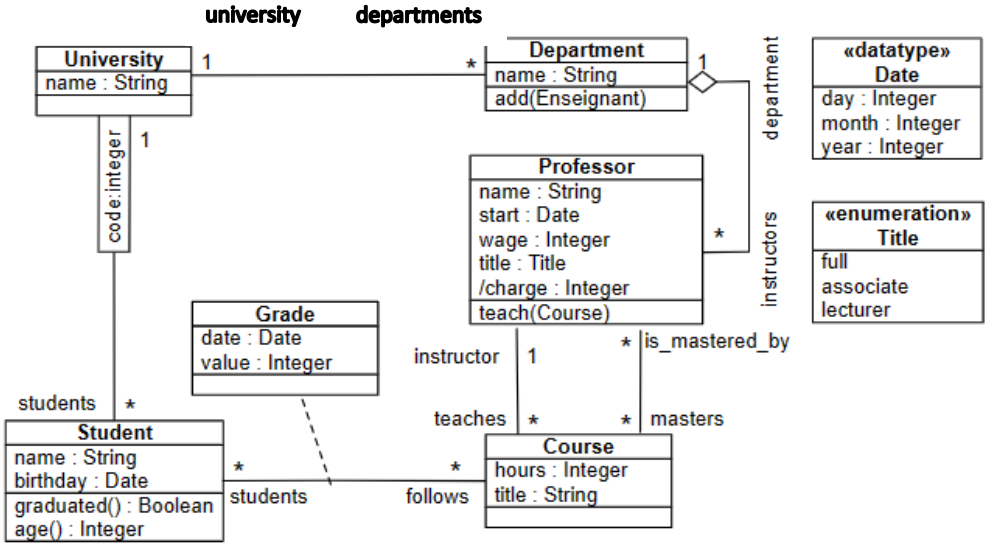
Quiz # 3(Section B)

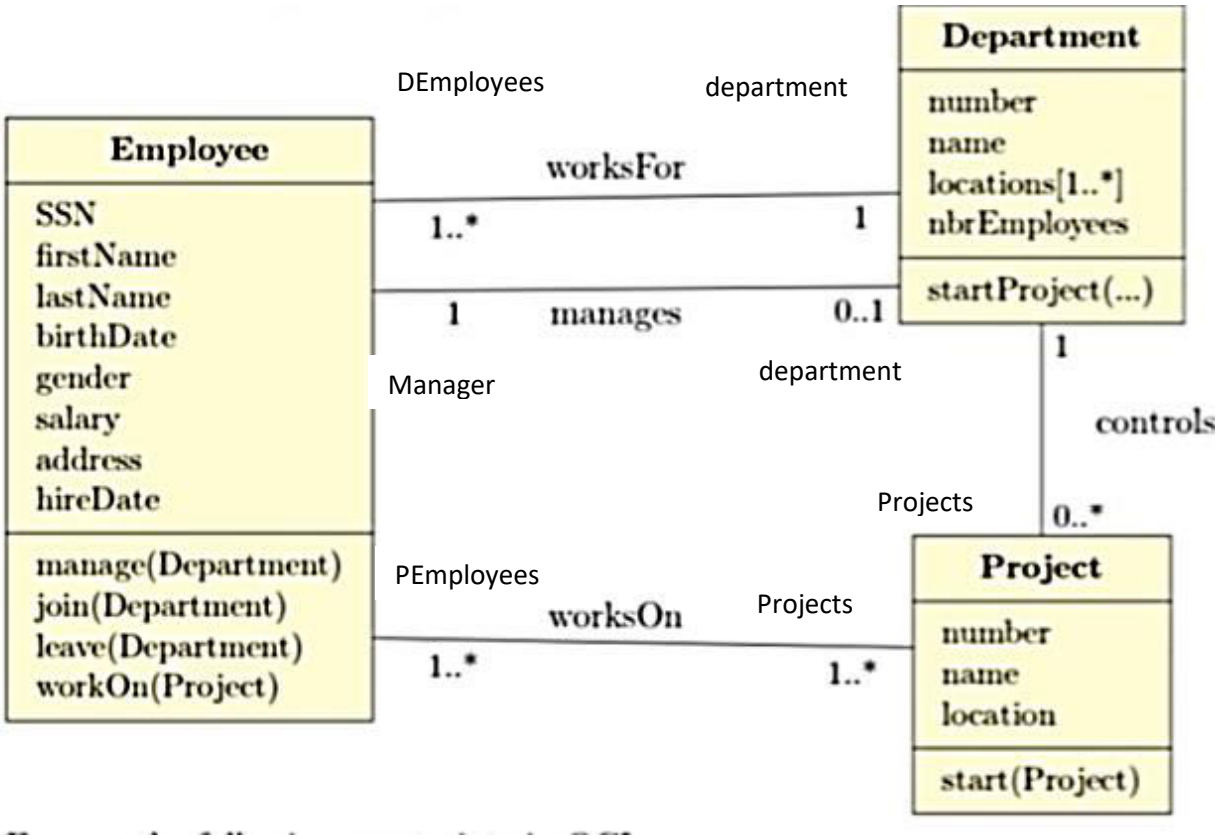
Formal Methods 20/3/2025

Name: ---------- Roll No:----------

For the following UML Class Diagram, write down constraints in OCL. (Total Points= 16, 2 points each)



1. **A department's university should not be null.**
2. **A university must have at least one department**
3. **A student average grade is always greater than 4:**
4. **There is at least one student named 'Ali' in the university**
5. **If the title of the Professor is ‘full’ he teaches at least three courses.**
6. **The wage of all instructors in a departments is at least 100,000 PKR.**
7. **A student cannot follow more then three courses at a time**



1. Precondition for the startProject of a department is that it has at least 5 employees in including a manager.
2. The SSN of each employee is unique
3. Total number of employees in a department are equal to the sum of all employees working on different projects controlled by that department.
4. The post condition for join(Department) is that nbrEmployees is increased by 1 and dEmployees is also updated.
5. The location of the project belongs to the locations of its concerned department.

Quiz # 5-Section B

Formal Methods 2nd May, 2024

Dr. Wafa Basit

1. Program Verification versus Conventional Testing Techniques, give two reasons why we should use formal methods of verification? (3 points)

2. Formal methods were deployed to specify and refine AAMP Microprocessors. This project was not successful, Why? (3 points)

3. What is more powerful, theorem prover or model checker?Give reasons (3 points)

4. What is SCADE – Safety Critical Application Development Environment and what are its usages and elements? (3 points)

5. Define as well as differentiate between CTL and LTL? (3 points)

6. What is the problem with explicit state model checking and which other model checking technique addresses that issue? (3 points)

7. Give three reasons a verification might fail. (3 points)

8. How does a VC Generator work? Draw Diagram (4 points)

Quiz # 5-Section A

Formal Methods 2nd May, 2024

Dr. Wafa Basit

1. Formal methods were deployed to specify and refine AAMP Microprocessors. This project was not successful, Why? (3 points)

2. According to Wasira what are the reasons of lack of use of Formal Methods in the software industry? (3 points)

3. What is more powerful, theorem prover or model checker? Give reasons (3 points)

4. A technical report produced by Rushby aimed to explain to NASA stakeholders the benefits or adopting formal methods in the development and certification of critical systems in the aerospace domain, the report concluded that academicians saw formal methods as inevitable, but practitioners did not agree,why? (3 points)

5. Define as well as differentiate between CTL and LTL? (3 points)

6. What is SPIN and its supporting language? (3 points)

7. Which types of bugs are and are not identified by the static analysis? (3 points)

8. How does a theorem prover work? Draw Diagram (4 Points)