



SEMESTER 1 EXAMINATIONS 2019/2020

MODULE: CA314 - OO Analysis and Design

PROGRAMME(S):

CASE BSc in Computer Applications (Sft.Eng.)
ECSAO Study Abroad (Engineering & Computing)

YEAR OF STUDY: 3,O

EXAMINER(S):

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TIME ALLOWED: 2 Hours

INSTRUCTIONS: Answer all questions.

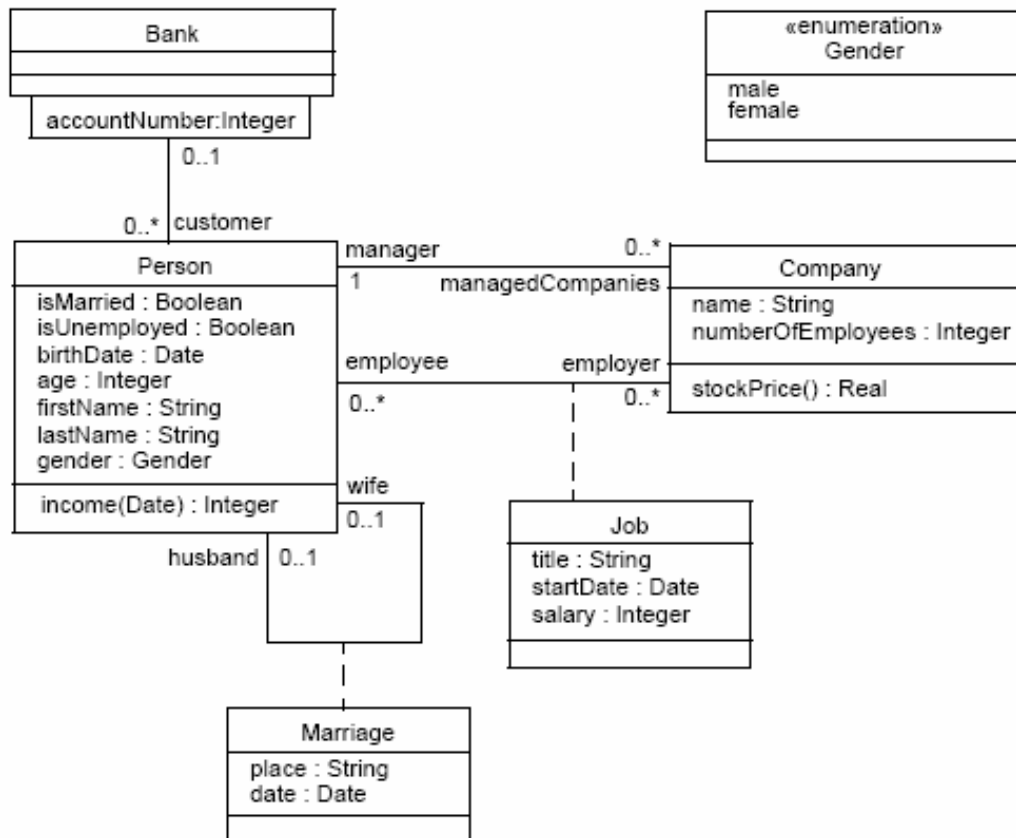
PLEASE DO NOT TURN OVER THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO.

The use of programmable or text storing calculators is expressly forbidden.

There are no additional requirements for this paper.

Q 1(a)**[10 Marks]**

Explain the main syntactical elements of the following class diagram.

**Q 1(b)****[10 Marks]**

Draw a Sequence Diagram using the above Classes to model the Use Case: *Join the company*. Utilise the main features of UML Sequence Diagrams including highlighting when an object is computing, depiction of time constraints, return of values, creation and deletion of objects, representation of conditional behaviour and of iteration, and modelling of several threads of control.

[End of Question 1]

QUESTION 2**[TOTAL MARKS: 20]****Q 2(a)****[10 Marks]**

Explain, using the example of a FILE object, the main elements of protocol state machines. Explain also the differences between ordinary (behavioural) state machines and protocol state machines.

Q 2(b)**[6 Marks]**

Write brief notes to explain how Use Case modelling can be used to capture requirements, plan iterations of development and validate systems.

Q 2(c)**[4 Marks]**

Explain, with the aid of a simple example, why Cockburn has a VARIATIONS and an EXTENSIONS section to describe his UML Use Cases.

[End of Question 2]**QUESTION 3****[TOTAL MARKS: 20]****Q 3(a)****[7 Marks]**

Explain what Design Patterns *are* and *are not* and what the typical headings should be for their description.

Q 3(b)**[7 Marks]**

Show with an example such as an Order, how Components can have both required and provided interfaces. And explain the benefit of their use.

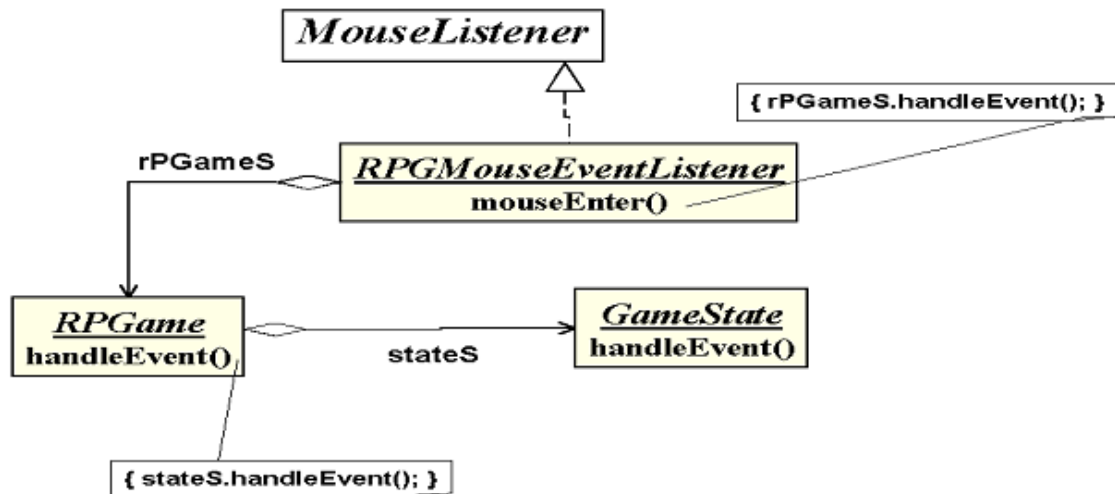
Q 3(c)**[6 Marks]**

Show with examples how Packages provide Name-Space visibility. Use Public, Private, Protected and Package (default) to illustrate your answer.

[End of Question 3]

QUESTION 4**[TOTAL MARKS: 20]****Q 4(a)****[10 Marks]**

The following diagram depicts the detailed design of the *RolePlayingGame* package.



Using this diagram to illustrate, write a brief description of the **State** Design Pattern.

Q 4(b)**[10 Marks]**

Explain the benefits of Frameworks, in particular describe how they might be developed, when they are appropriate and what they are based on.

[End of Question 4]

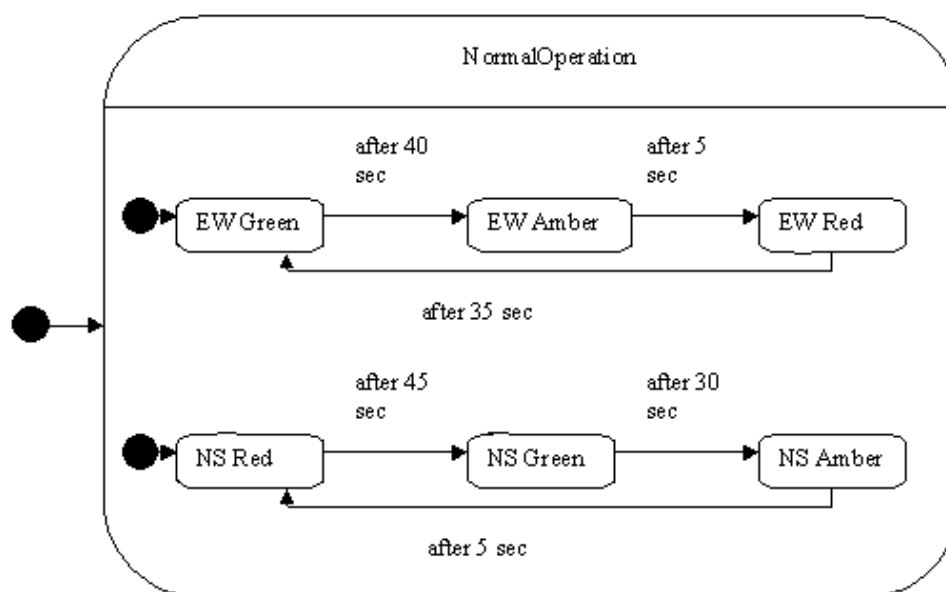
QUESTION 5**[TOTAL MARKS: 20]****Q 5(a)****[10 Marks]**

The Liskov Substitution Principle states that subclasses should be able to substitute for their base classes. Describe, with the aid of a simple example, how this principle may be expressed in terms of rules involving parameters, class invariants and operation pre- and post-conditions.

In what way might the Liskov Substitution Principle conflict with the Open/Closed Principle?

Q 5(b)**[6 Marks]**

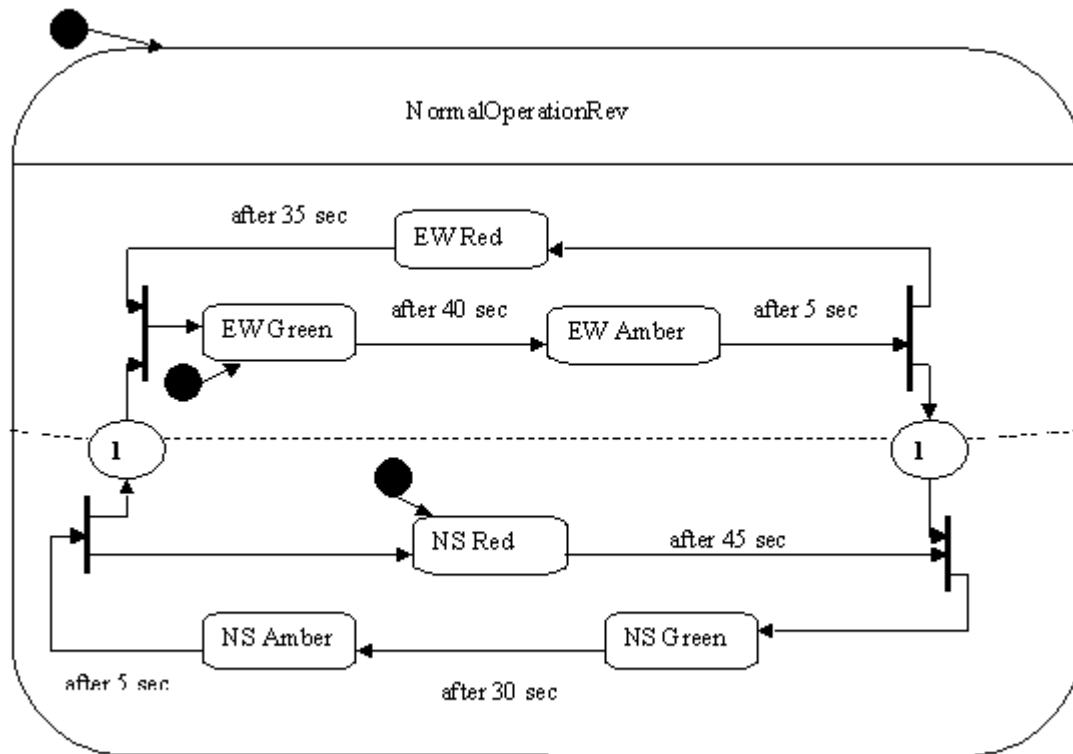
Identify each element of UML state diagram syntax that is depicted in the diagram. Write a precise interpretation of what is portrayed in the diagram.



Q 5(c)

[4 Marks]

The diagram is now modified as shown below. Explain the impact of the modifications made.



[End of Question 5]

[END OF EXAM]