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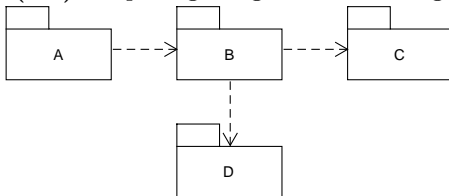
The exam lasts 60 minutes.

Write the answers to questions 1–12 into the table. In multiple-choice questions only one choice is correct. Only the answers in the table will be considered (without the work out). Each correct answer has the value as indicated in the question.

Answer question 13 on the additional sheet you have received.

Mark clearly possible corrections. An answer that is incorrect, ambiguous, or incomplete will be graded with 0 points. Only an undamaged paper will be accepted.

1. (2 b) A package diagram in UML is given:



Name all the packages within which a change can be expected if the C package changes.

2. (1 b) In agile software development, with respect to use cases it holds that

- (a) it's necessary to know all use cases before any kind of implementation starts
- (b) use cases can't be employed
- (c) it's necessary to know the majority of use cases before any kind of implementation starts
- (d) it's necessary to know just those use cases that are going to be implemented
- (e) only use case diagrams for the orientation in the planned functionality are employed

3. (1 b) In UML, a use case realization can be abstractly represented by a

- (a) collaboration
- (b) component
- (c) sequence diagram
- (d) class
- (e) activity diagram

4. (2 b) From the perspective of an extended use case, the extending use case flow has the character of external

- (a) auxiliary flow
- (b) main flow
- (c) extension point
- (d) inheritance
- (e) alternative flow

5. (3 b) The algebraic specification of a banking account has to be extended with the ability of an account to be blocked. Credit or debit operations can't be performed upon a blocked account. Select everything necessary and only that what's necessary to achieve this (answer with a list of corresponding numbers):

- 1. add an attribute expressing that an account is blocked
- 2. adjust preconditions of the credit and debit operations
- 3. add an operation to check the state of blocking
- 4. adjust postconditions of the credit and debit operations
- 5. add an operation for account blocking
- 6. adjust postconditions of the credit and debit operations

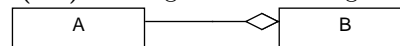
6. (2 b) Is it possible for one use case in a given system with one user interface to have several realizations in this user interface?

- (a) yes, but only if it includes other use cases
- (b) yes, but only if it has several flows
- (c) yes, regardless of the number of its flows and relationships
- (d) no
- (e) yes, but only if it's extended by other use cases

7. (1 b) The DCI approach (Data, Context and Interaction) separates how are use cases expressed from the domain (the data part) by having oddeľuje vyjadrenie prípadov použitia od domény (údajovej časti) tým, že

- (a) domain objects play roles in use cases
- (b) domain objects be a part of roles, which, in turn, are a part of use cases
- (c) roles be a part of domain objects, which, in turn, are a part of use cases
- (d) domain objects act directly in use cases
- (e) use cases act in different roles along with domain objects

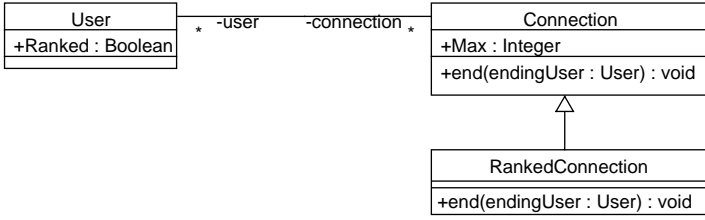
8. (2 b) A diagram in UML is given:



For the diagram to be correct, the following should be added:

- (a) an attribute of the A type into the B class
- (b) nothing
- (c) an attribute of the B type into the A class
- (d) an arrow to the edge at the A class side
- (e) an attribute of the A type into the B class and an attribute of the B type into the A class

9. (3 b) In a UML model of a communication tool, a common connection between users is represented by the **Connection** class (only the elements relevant to this question are depicted):



The **RankedConnection** class, which implements the connection that takes into account the user rank (expressed by the **Ranked** attribute) is devised from the **Connection** class. The **end()** operation is overridden in the **RankedConnection** class. The following OCL expression is added:

```

context RankedConnection::end(endingUser : User) : void
pre RankedUser:
  endingUser.Ranked
  
```

No other OCL expressions relevant to this question are defined. Answer the following partial questions by selecting the one of the provided answers (in this format: *partial question number: answer*):

1. By this, the preconditions of the **end()** operation are being weakened, strengthened, or remain the same? [possible answers: weaken / strengthen / remain the same]
2. Is deriving the **RankedConnection** class from the **Connection** class correct? [possible answers: yes / no]
3. By this, the postconditions of the **end()** operation are being weakened, strengthened, or remain the same? [possible answers: weaken / strengthen / remain the same]

10. (2 b) For a specification of abstract data types in the Z language it holds that

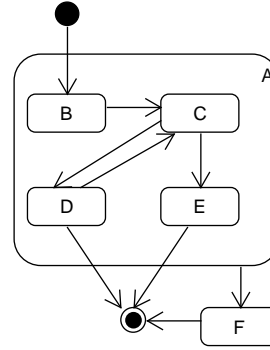
- (a) contrary to an algebraic specification, it doesn't enable to express the result of an operation
- (b) it's equally abstract as an algebraic specification
- (c) contrary to an algebraic specification, it doesn't enable to express preconditions and postconditions
- (d) it's based on the same mathematical means
- (e) contrary to an algebraic specification, it enforces expressing the inner structure

11. (3 b) A conference system enables to submit and review papers. The process starts by submitting a paper. The program committee chair assigns reviewers and starts off the reviewing. The paper reviewing ends by the program committee chair accept or reject decision. If necessary (a mistake, complaint, and such), the program committee chair can restart the reviewing of a rejected paper. The author can withdraw the paper at any time, including a rejected paper.

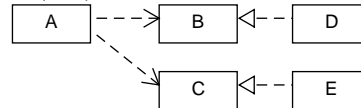
Assign the states from the following list to the states in the depicted diagram so that the life cycle of a paper in the conference system is captured correctly:

1. Taken
2. Reviewed
3. Withdrawn
4. Assigned
5. Repeatedly Reviewed
6. Worked Out
7. In the Process
8. Saved
9. Rejected
10. Loaded
11. Accepted
12. Submitted
13. Canceled

Provide your answer as a string **Aa Bb Cc Dd Ee Ff**, with lower case letters representing the numbers of the states.



12. (3 b) A UML diagram is given:



The elements in this diagram are hidden: they are just labeled with letters, so that you can refer to them in your answer. Answer (in the format *the number of the partial question: element label*) which element

1. represents an interface
2. realizes an interface
3. uses an interface

**Software Modeling 2015/16**

doc. Ing. Valentino Vranić, PhD., ÚISI FIIT STU

Exam – regular term – January 15, 2016

<b>Last name:</b>	
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**13. (5 b)** One of the operations in the information system of an organization is creating a work group. Included employees are being notified of the change in their working position (with no change description) by system internal messages. There are several such operations in the system with which the employees are being notified of the changes in their working position. Identify two main use cases that imply from this system characterization and write their relevant flows. Depict the corresponding use case diagram. Ensure that creating a work group would have no dependencies on notifying employees.

30 b

1 B

2 d

3 a

4 e

5 2 3 5

6 c

7 a

8 b

9 1: weakened, 2: no, 3: remain the same

10 e

11 A7 B12 C2 D9 E11 F3

12 1: B a C; 2: D a E; 3: A

13 the two main use cases could be named *Create Work Group* and *Notify Employees of Change*, with the *Notify Employees of Change* extending the *Create Work Group* use case.