

# Exam Modeling and Verification 2017

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Based on the two selected questions, you should coherently present the theory behind the concepts, when these concepts can be applied and illustrate them through well chosen examples. You are encouraged to pick up other concepts around your questions and use them to support your presentation and make connections to other topics of the course.

## 1 AADT : Syntax and Semantics

- Q 1 : 1.1 Definition of S-sorted set
- Q 2 : 1.2 Definition of AADT Signature
  - Role of the operations
  - Definition of terms (with variables)
- Q 3 : 1.3 Equations and conditional axioms definition
- Q 4 : 1.4 Examples (Set, Tables, Lists)
- Q 5 : 1.5 How to use Graceful presentations

## 2 AADT : Equational Proofs

- Q 6 : 2.1 What are Equational theories ?
- Q 7 : 2.2 What are Inductive theories ?
- Q 8 : 2.3 Hierarchies in Algebraic Abstract Data Types
  - Sufficient completeness
  - Hierarchical consistency
- Q 9 : 2.4 How to specify non determinism in implementation ?

## 3 AADT : Rewriting

- Q 10 : 3.1 Rewrite Systems, rewriting of terms, definition.
- Q 11 : 3.2 Properties of rewrite systems : proof of equalities, termination, confluence.
- Q 12 : 3.3 Operational view, definition of strategies.

## 4 CTL

- Q 13 : 4.1 CTL syntax of the operators
- Q 14 : 4.2 Correspondence of CTL operators and equivalence
- Q 15 : 4.3 CTL semantics of the operators
- Q 16 : 4.4 Philosophers example and CTL properties

## 5 CTL model checking

- Q 17 : 5.1 CTL model checking
  - Recursive definitions
- Q 18 : 5.2 Fixpoints
- Q 19 : 5.3 Operators implementation (algorithms)

## 6 Decision Diagrams

- Q 20 : 6.1 Definition of ROBDD
  - Build BDD
  - Factorize nodes / Remove useless nodes
- Q 21 : 6.2 Operations on ROBDD
- Q 22 : 6.3 Definition of SFDD
  - Build SFDD
  - Factorize nodes / Remove useless nodes
- Q 23 : 6.4 Operations on SFDD
- Q 24 : 6.5 SDD and  $\Sigma$ DD
  - Structures / Operations