Exam Modeling and Verification 2019

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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 AADT Signature
— Definition of S-sorted set
— Role of the operations
— Definition of terms (with variables)

Q 2 : 1.2 Equations and conditional axioms definition
— How to use Graceful presentations

Q 3 : 1.3 Examples (Set, Tables, Lists)

2   AADT : Equational Proofs

Q 4 : 2.1 What are Equational theories ?

Q 5 : 2.2 What are Inductive theories ?

Q 6 : 2.3 Hierarchies in Algebraic Abstract Data Types
— Sufficient completeness
— Hierarchical consistency

3   AADT : Rewriting

Q 7 : 3.1 Rewrite Systems, rewriting of terms, definition.

Q 8 : 3.2 Properties of rewrite systems : proof of equalities, termination, confluence.

Q 9 : 3.3 Operational view, definition of strategies.

4 CTL

Q 10 : 4.1 CTL syntax of the operators

Q 11 : 4.2 Correspondence of CTL operators and equivalence

Q 12 : 4.3 CTL semantics of the operators

Q 13 : 4.4 Philosophers example and CTL properties

5 CTL model checking

Q 14 : 5.1 CTL model checking
        — Recursive definitions

Q 15 : 5.2 Fixpoints

Q 16 : 5.3 Operators implementation (algorithms)

6 Decision Diagrams

Q 17 : 6.1 Definition of SFDD
        — Build SFDD
        — Factorize nodes / Remove useless nodes

Q 18 : 6.2 Canonicity

Q 19 : 6.3 Efficient implementations

Q 20 : 6.4 Operations on SFDD

Q 21 : 6.5 Model checking with SFDD

7 Test

Q 22 : 7.1 What is testing ?
        — limits and targets
        — Testing vocabulary

Q 23 : 7.2 Structural testing
        — Path testing
        — Data flow testing

Q 24 : 7.3 Functional testing
        — Boundary values
        — Equivalence class testing