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Courses » Embedded Systems-- Design Verification and Test

Announcements **Course** Ask a Question Progress Mentor FAQ

Unit 6 - Temporal Logic

Course outline

How to access the portal

Introduction and Modeling

Modeling and Synthesis issues

Architectural Synthesis of Hardwares

System-level Design

Temporal Logic

Introduction and Basic Operators of Temporal Logic

Syntax and Semantics of CTL

Quiz : Assignment-5

Model Checking

BDD and Symbolic Model Checking

Introduction to

Assignment-5

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2018-09-12, 23:59 IST.**

1) Verification process checks: **1 point**

- For the faults after manufacturing
- Whether the manufactured device matches the design
- Whether the manufactured device matches the specification
- Whether the system design matches the specification

No, the answer is incorrect.
Score: 0

Accepted Answers:
Whether the system design matches the specification

2) Which are the inputs to a particular model checking / verification tool? **1 point**

- Model and Error Trace
- Specification and Error Trace
- Model and Specification
- Model, Error Trace, and Specification

No, the answer is incorrect.
Score: 0

Accepted Answers:
Model and Specification

3) Given a model M and for a temporal formula ϕ , where $(M, S_j) \models \phi$, which of the following is FALSE? **1 point**

- ϕ does not strictly hold statically in a model M.

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φ holds for all states in the model M.

4) What does the temporal formula $P \rightarrow GQ$ indicates? 1 point

- If Q is TRUE in a state, then P is TRUE for all of its future states
- Q is TRUE for all the future states
- P and Q are TRUE for all the future state
- If P is TRUE in a state, then Q is TRUE for all of its future states

No, the answer is incorrect.

Score: 0

Accepted Answers:

If P is TRUE in a state, then Q is TRUE for all of its future states

5) If p is an atomic proposition, express the following in temporal logic. p is true in the next state but not in the next to next state. 1 point

- $Xp \vee !XXp$
- $Xp \wedge XXp$
- $Xp \wedge !XXp$
- $Xp \vee XXp$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$Xp \wedge !XXp$

6) What does the temporal formula $P \rightarrow \text{Previous}(Q)$ mean? 1 point

- If P holds in a state then its previous state holds Q
- If Q holds in a state then its next state holds P
- If P holds then Q holds eventually
- If P holds then eventually in the past Q holds

No, the answer is incorrect.

Score: 0

Accepted Answers:

If P holds in a state then its previous state holds Q

7) Given a Model M. What does $(M, S_j) \models \text{Globallyinpast}(\varphi)$ indicates? 1 point

- For all k, $k > j$, $(M, S_k) \models \varphi$
- For all k, $k \geq j$, $(M, S_k) \models \varphi$
- For all k, $k < j$, $(M, S_k) \models \varphi$
- For all k, $k \leq j$, $(M, S_k) \models \varphi$

No, the answer is incorrect.

Score: 0

Accepted Answers:

For all k, $k \leq j$, $(M, S_k) \models \varphi$

8) What does the temporal formula $(\text{Previous}(Q) \wedge Q) \vee GQ$ mean? 1 point

- Q holds in the previous, present, and the future states
- Q holds either in the present and previous states or in all the future states
- Q holds either in the previous or in the present state.

Q holds either in the previous or in all the future states.

No, the answer is incorrect.

Score: 0

Accepted Answers:

Q holds either in the present and previous states or in all the future states

9) Which of the following is FALSE? 1 point

- $P \vee XQ \Leftrightarrow$ Either P holds in a state or Q holds in the next state.
- $XP \vee XXP \Leftrightarrow$ P is TRUE in the next state or the next but one.
- $GFP \Leftrightarrow$ P is infinitely often TRUE.
- $(P \wedge (Q \cup R)) \Leftrightarrow$ P holds in a state and R holds until Q holds

No, the answer is incorrect.

Score: 0

Accepted Answers:

$(P \wedge (Q \cup R)) \Leftrightarrow$ P holds in a state and R holds until Q holds

10) Which of the following statements is a strict condition for a CTL formula? 1 point

- Every path quantifier of a CTL formula should be followed by a logic operator
- Every path quantifier of a CTL formula should be preceded by a temporal operator
- Every temporal operator of a CTL formula should be preceded by a path quantifier
- Every temporal operator of a CTL formula should be followed by a path quantifier

No, the answer is incorrect.

Score: 0

Accepted Answers:

Every temporal operator of a CTL formula should be preceded by a path quantifier

11) Which of the following is FALSE? 1 point

- $AGp \Leftrightarrow$ p Holds Globally in all paths
- $EFp \Leftrightarrow$ There exists some path where p holds in future
- $AXp \Leftrightarrow$ In all paths, p holds in the next state
- $AFp \Leftrightarrow$ In all paths, p holds in all the future states

No, the answer is incorrect.

Score: 0

Accepted Answers:

$AFp \Leftrightarrow$ In all paths, p holds in all the future states

12) Which of the following is not a CTL Formula? 1 point

- $AF EG p$
- $A [p \cup A[q \cup r]]$
- $EFGr$
- $EGp \vee E(q \cup r)$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$EFGr$

13) Which of the following is a CTL Formula? 1 point

- AEFr
- F [r U q]
- AG ¬(p ∧ q)
- A [p U q U r]

No, the answer is incorrect.

Score: 0

Accepted Answers:

AG ¬(p ∧ q)

14) A Kripke Structure consists of

1 point

- A finite set of states S
- A transition relation ->
- A labelling function L, and a finite set of states S
- A finite set of states S, a transition relation ->, and a labelling function L

No, the answer is incorrect.

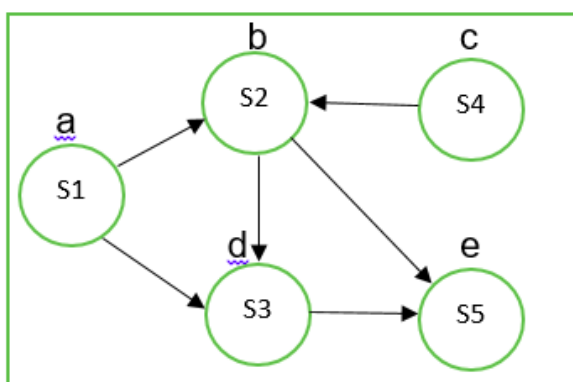
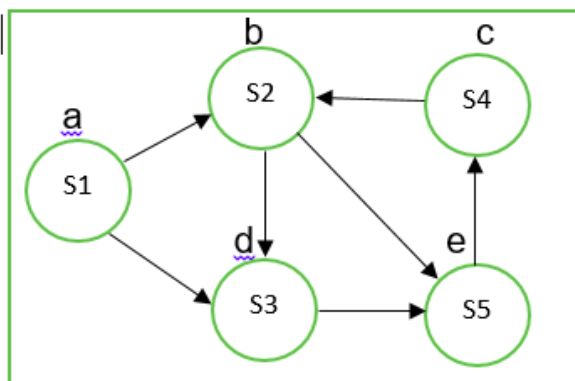
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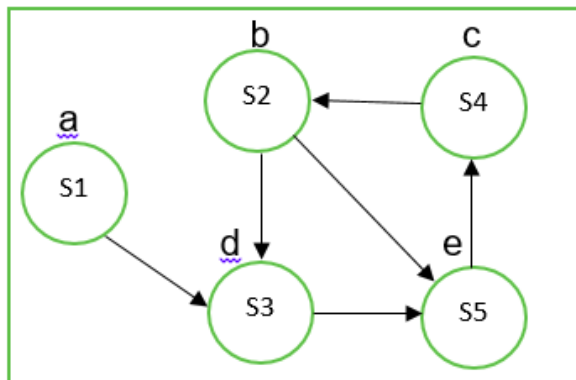
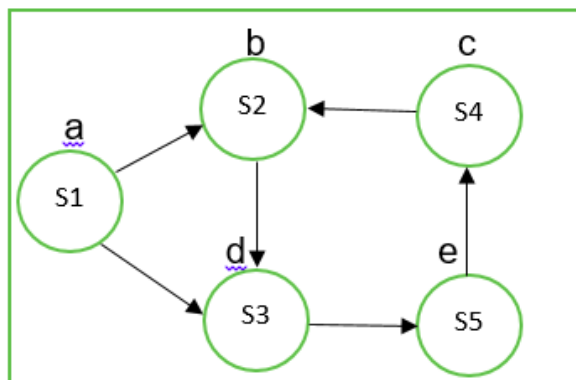
Accepted Answers:

A finite set of states S, a transition relation ->, and a labelling function L

15) Which of the following is not a Kripke Structure?

1 point

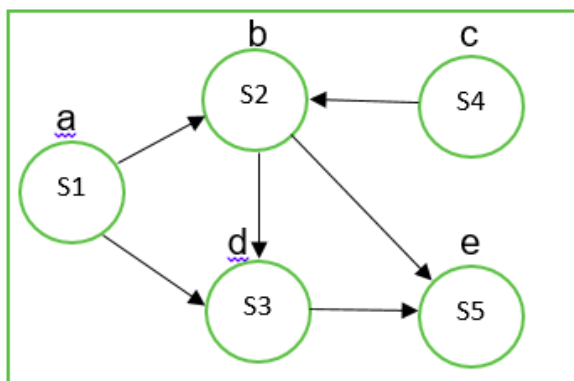




No, the answer is incorrect.

Score: 0

Accepted Answers:

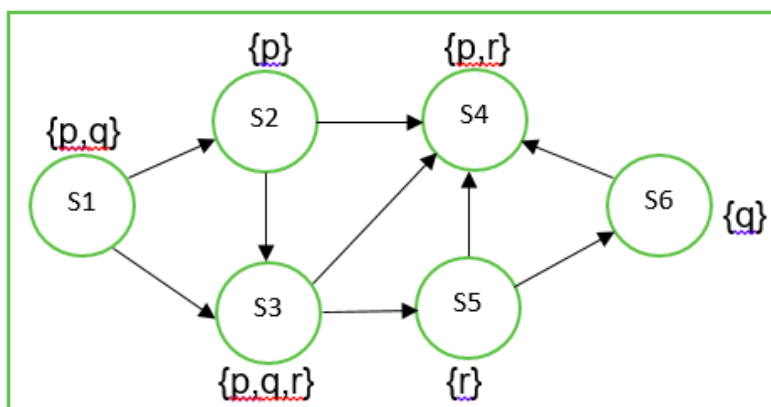
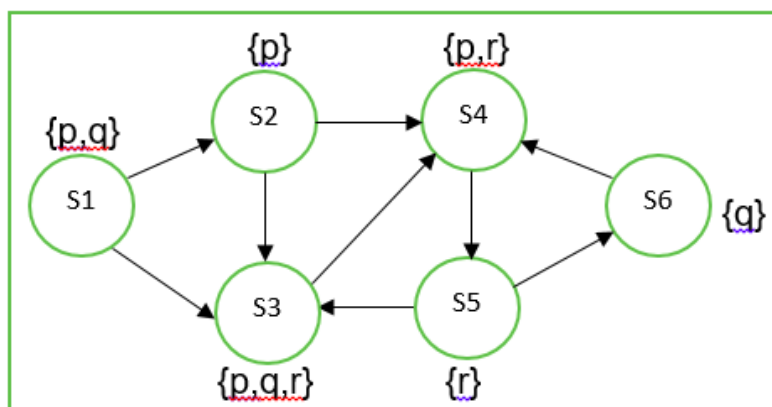
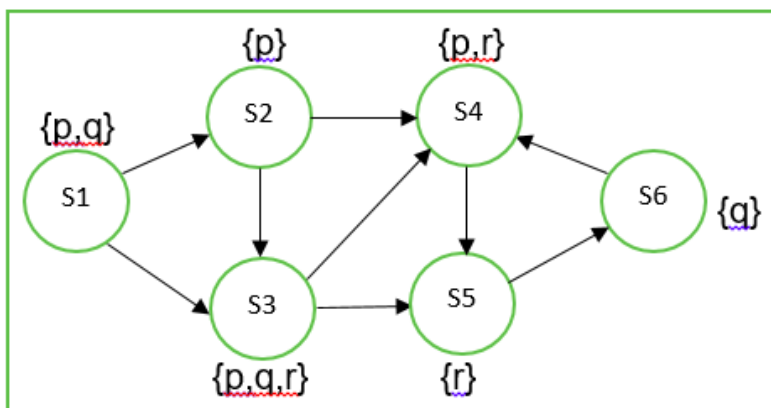
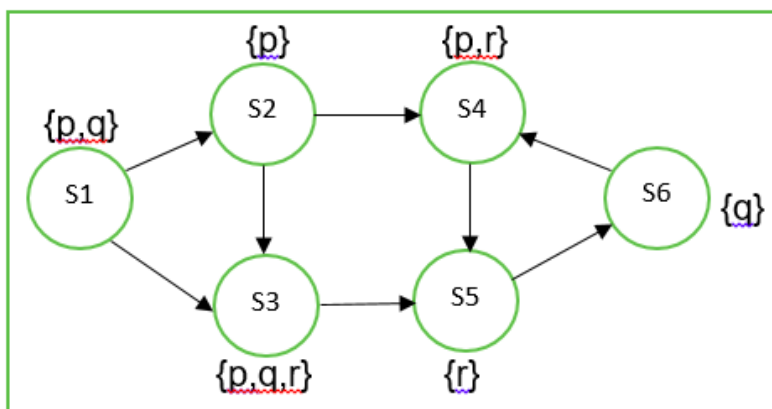


16) Which one of the following state transition diagrams represents the given Kripke structure **1 point**
 < S, -, L > specified below?

S = {s1, s2, s3, s4, s5, s6}

-> = { {s1, s2}, {s1, s3}, {s2, s3}, {s2, s4}, {s3, s4}, {s3, s5}, {s4, s5}, {s5, s6}, {s6, s4} }

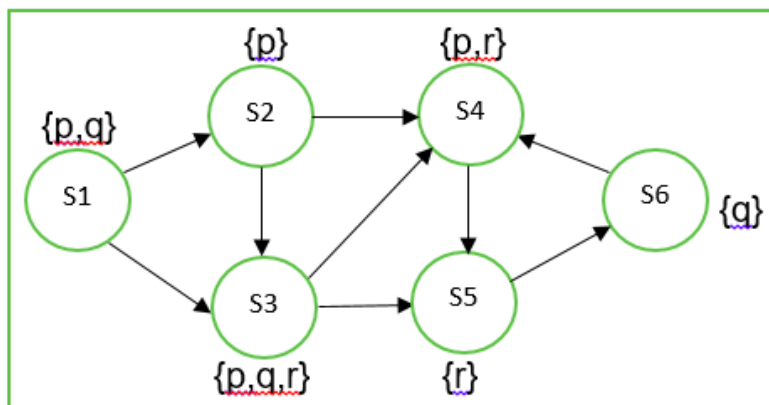
L: L(s1) = {p, q}, L(s2) = {p}, L(s3) = {p, q, r}, L(s4) = {p, r}, L(s5) = {r}, L(s6) = {q}



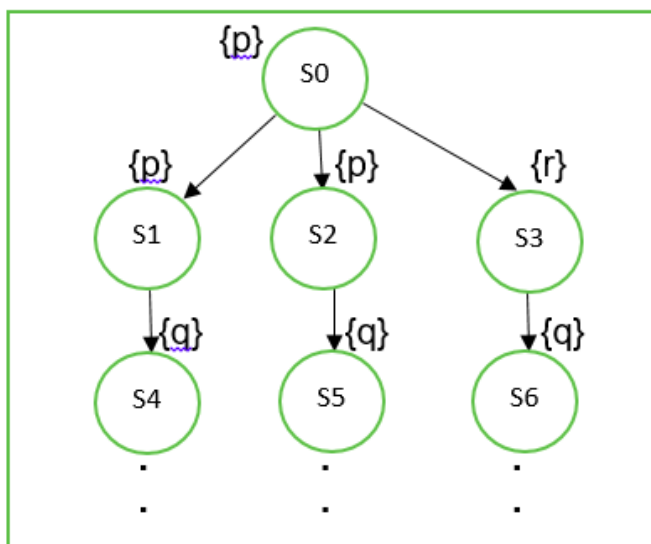
No, the answer is incorrect.

Score: 0

Accepted Answers:



17) Which satisfaction relation(s) is/are true in the following Kripke structure 1 point



- [M, S0] |= A[p U q]
- [M, S0] |= E[p U r]
- [M, S0] |= E[p U q]
- Both b and c

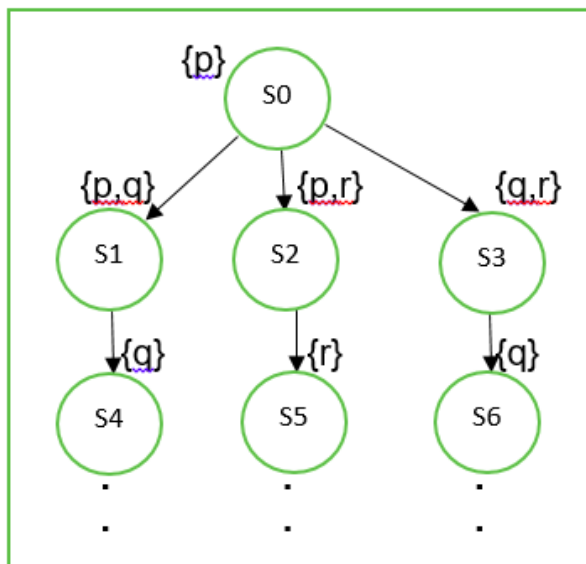
No, the answer is incorrect.

Score: 0

Accepted Answers:

Both b and c

18) For the following state transition diagram, which of the following options hold TRUE value 1 point for the states {S0,S1,S2,S3}?



- $q \vee r$
- $p \wedge q$
- $p \vee r$
- $p \wedge r$

No, the answer is incorrect.

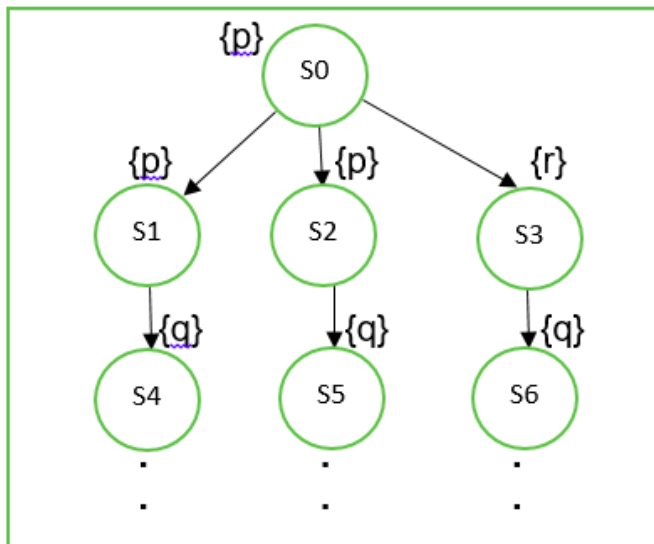
Score: 0

Accepted Answers:

$p \vee r$

19) For the below diagram, which of the states have TRUE value for A ($p \cup q$)?

0 points



- $\{S_0\}$
- $\{S_1\}$
- $\{S_0, S_1\}$
- $\{S_1, S_3, S_4, S_6\}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$\{S_1, S_3, S_4, S_6\}$

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