

Roll No: _____

CS3300 Compiler Design
IIT Madras, Quiz 2 October 14, 2015

Total Marks: 25

Duration: 50 minutes

1. Fill in the blanks. Do not explain. [3 marks]

(a) Number of derivations for a parse tree wherein we first recursively derive the second child (if present), then fifth child (if present) and then the remaining children from left to right is _____

(b) Postfix SDTs (actions appearing at the end of the productions only) can be implemented by using _____ attributes.

(c) For a production $A \rightarrow B C$, if an action is $\{ B.a = C.b \}$, which of the following is/are true?

1. C.b is an inherited attribute.
2. B.a is an inherited attribute.
3. The SDD is S-attributed.
4. The SDD is L-attributed.

2. For the following grammar, (a) find first and follow sets. [4 marks]

$S \rightarrow A a \mid b$
 $A \rightarrow A c \mid S d \mid \epsilon$

	FIRST	FOLLOW

(b) Now construct a predictive parsing table using the above information. [4 marks]

3. The following SDT computes the value of a string of 0s and 1s interpreted as a positive, binary integer.

$B \rightarrow B_1 0 \quad \{ B.val = 2 * B_1.val \}$
 $\quad \mid B_1 1 \quad \{ B.val = 2 * B_1.val + 1 \}$
 $\quad \mid 1 \quad \quad \{ B.val = 1 \}$

Rewrite the SDT so the underlying grammar is not left-recursive, and yet the same value of B.val is computed for the entire input string. [5 marks]

4. Draw the GOTO graph (the big graph over itemsets) for LALR parsing for the following grammar: $S \rightarrow S S + \mid S S * \mid a$. [5 marks]

5. Remove left recursion from the following grammar. [4 marks]
 $S \rightarrow (B) \mid S () \mid ($ $B \rightarrow B () \mid \epsilon$