Computer Science 330 Language Implementation

Test Information

6.30-8.00pm Thursday 10th April 2003

Start reading 6.20p.m. Write your name on all sheets of your answer book. Start writing your answers at 6.30pm. Stop writing at 8.00p.m.

Remove the staple fastening the question sheets to the answer book, but do not remove the staples from the answer book. Read the questions carefully. Hand in your answer book at the front of the class. Always show your working - most marks are for showing you know what you are doing, rather than just getting the right answer. Attempt all questions. Questions total 100 marks. The test counts for 20% of the total mark.

Question 1 — 15 Marks

Write regular expressions to match the following tokens. **Read the specifications carefully! They are not necessarily the same as in the assignment or lecture notes.**

(a) (5 marks)

(b) (5 marks)

(c) (5 marks)

Question 2 — 65 marks

Consider the following CUP grammar.

(a) Using the information provided in the appendix, perform a shift-reduce LALR(1) parse of the input

…

Show both the symbols and states on the stack, the current token, and the action performed at each stage.

(20 marks)

(b) Draw the full parse tree, showing all rules used in the above shift-reduce LALR(1) parse. (7 marks)

(c) (i) Note that … is nullable.

(ii) Draw the first graph, and compute the first sets for this grammar.

(iii) Draw the follow graph, and compute the follow sets for this grammar. (20 marks)

(d) Indicate an appropriate action to evaluate the rule

…

(8 marks)

(e) State … is

(i) Write down the set of items for goto(state …, …).

(ii) Write down the set of items for goto(state …, …) (a variant of state …, without merging it with other variants with the same core). Make sure you take the closure.

(10 marks)

Question 3 — 20 marks

Write a grammar to parse …, with the specified syntax. You do not have to write any actions.
