

2000 Paper 4 Question 4

Compiler Construction

Consider the grammar

$$\begin{aligned} S &\rightarrow E \langle \text{eof} \rangle \\ E &\rightarrow T + E \\ E &\rightarrow T \\ T &\rightarrow x \end{aligned}$$

where S is the starting symbol, $\langle \text{eof} \rangle$ is a special token marking end of input and x is a terminal.

Explain and find the left, right and follow sets for all non-terminals in the grammar. [5 marks]

Suppose that an SLR parser for this grammar is required. One stage on the way to constructing the parsing tables is to create the *characteristic finite state machine* (sometimes known as the LR(0) states). Do this, explaining your working clearly. You do not need to complete the SLR parsing tables. [10 marks]

Now, assuming that the parsing tables have been constructed, show what values will be placed on a stack and comment about internal state while an SLR parser using this grammar processes the input text $x+x+x\langle \text{eof} \rangle$. [5 marks]