國立交通大學試題紙

九十七學年度第一次
博士班資格考

科目：編譯器設計(A)　　日期：98 年 2 月 6 日　第 1 頁 共 1 頁

請"✓"明　✓不可看書　可看書

* 請將答案依題號順序寫入答案卷

答題時字跡需工整，否則不予計分。Write your answers legibly; otherwise you will get zero score.

1. (15 points) Why do we say that an LL(1) parser is *predictive* and *top-down*? Why is it a linear-time parser? You need to describe the LL(1) parser first and explain why.

2. (15 points) Is the following grammar LR(1)? If yes, compute its parse tables. Otherwise, explain why not.

S → a X
X → b c
X → b d
X → Y b
Y → e X
Y → c

3. (20 points) Find a nondeterministic finite automaton, deterministic finite automaton, and a minimum deterministic finite automaton for the following regular expression:

(bc*)+a* | a(c*b)b+

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1. LL/LR Parsers, Action Symbols, and Syntax-directed Translation (5% each)

甲、Explain briefly how to extend LL parsers to support action symbols. You should outline an LL(1) parser driver in pseudo code and indicate the part related to action symbol processing.

乙、Following 甲, what adjustment is needed when using action symbols with LR parsers? Why?

丙、Following 乙, indicate the necessary changes to the following grammar to make it work with LR parser:

<program> -> #start **begin** <statememt list> **end**

丁、What are action-controlled semantic stacks and parser-controlled semantic stacks? Also point out the main advantage of the latter over the former.

戊、Consider the following grammar for if statements, where <bool expr> and <stmts> represent Boolean expressions and statement lists, respectively, and are not elaborated further:

<if stmt> -> **if** <bool expr> **then** <stmts>
<else part> **end if;**
<else part> -> **else** <stmts>
<else part> -> λ

Describe the layout of tuples a *typical* compiler will generate for

the if statement above. Use instructions with suitable tuple representation. Specifically, make sure you use two variations of branch instructions: conditional and unconditional jumps. (8%)

己、Following 戊, augment the if statement grammar with proper action symbols and indicate what their corresponding semantic routines do, so that together they generate the tuples in the layout you describe in 戊.

庚、Similar to 戊 and 己, write down an action symbol-augmented grammar for while loops, the generated tuple layout, as well as the short description for the involved semantic routines.

2. Block-Structured Symbol Tables (15%)

甲、Describe briefly the set of *visibility rules* commonly seen in modern block-structured programming languages supporting nested name scopes. (5%)

乙、There are two common approaches to implementing block-structured symbol tables: an individual table for each scope or a single, global table. Outline the data structure used and describe how names are searched for each approach. (5% each)