

國立交通大學試題紙

九十六學年度第二次
博士班資格考

科目：編輯器設計(A)

日期：97 年 7 月 25 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) Define the *Last* set of a nonterminal A as the set of terminals that may appear as the last symbol in the string derived from A . Give an algorithm to compute the *Last* set of a nonterminal and use an example to explain your answer.

2. (15 points) Find a nondeterministic finite automaton, deterministic finite automaton, and a minimum deterministic finite automaton for the following regular expression:

$$(a(a|b)^*|bc^*ab^+)$$

3. (20 points) Please find a context-free grammar that is LALR(1) but not LL(1). You need to explain your answer.

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科目：編輯器設計 (B)

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1. Syntax-directed Translation (38%)

Consider the following grammar:

```
<statements> -> <statement> { <statement> }  
<statement> -> <id> := <expression> ;  
<expression> -> <primary> { <op> <primary> }  
<primary> -> <number>  
<primary> -> <id>  
<op> -> PLUS  
<op> -> MINUS  
<number> -> NUMBER  
<id> -> IDENTIFIER
```

甲、Write a recursive descent parser for the grammar above with reasonable details (*Note: readable pseudo code is OK*). (6%)

乙、Consider the program below:

```
A := A - 10 + B;
```

Define an instruction set for a three-address machine, and write down the corresponding instruction sequence for the program above. Note that variables cannot be accessed before declaration. (6%)

丙、Insert suitable action symbols into the grammar above so that after the program is parsed, the instruction sequence in (乙) will be generated. Give short description about what the semantic routine behind each action symbol does. Explain why the generation is correct (e.g. by showing the execution order of semantic subroutines for this particular program). (8%)

丁、Define necessary semantic records (in C, C++, or Java) used by the semantic routines outlined in (丙), then write down the semantic routines in more details. For example, it must be clear from your description how semantic records are used and/or passed. (8%)

戊、Modify the recursive descent parser in (甲) to incorporate the action symbols defined above. That is, insert calls to the semantic routines at some proper places in the parser, with semantic records passed correctly). (6%)

己、Following (丁), point out where and how the symbol table is accessed by the semantic routines (if you have not done so there). (4%)

2. Stack Allocation (12%)

Consider the subprogram shown below:

```
procedure p(a : integer) is
  b : real;
  c : array(1..10) of real;
  d : array(1..N) of integer;
  procedure q(m : real) is
    c(1) = m;
  end
  procedure r(m : real) is
    c(2) = m;
  end
begin
  b := 2 * c(a) * d(a);
  q(b);
  r(b);
end;
```

- 甲、Describe the Activation Record for procedure **p** before and immediately after *elaborization*. You need to describe in detail about all the entries in the activation record, including necessary explanation for each term you introduce. (5%)
- 乙、Following (甲), describe related information stored in the symbol table for procedure **p**. (4%)
- 丙、Assume the main program calls **p** immediately and displays are used. Show the content of the display right before **p** reaches the statement **q(b)**. Also show the content of the display during the execution of **q** and **r**, respectively. (3%)