

CS606 Compiler Construction

Mid Term Examination – Spring 2005

Time Allowed: 90 Minutes

Maximum Time Allowed: (1.5 Hour)

Please read the following instructions carefully before attempting any of the questions:

1. The duration of this examination is 90 Mins.
2. This examination is closed book, closed notes, closed neighbors.
3. Do not ask any questions about the contents of this examination from anyone.
 - a. If you think that there is something wrong with any of the questions, attempt it to the best of your understanding.
 - b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.
4. Some of the examination consists of multiple-choice questions.

Choose only one choice as your answer.

 - a. If you believe that two (or more) of the choices are correct for a particular question, choose the best one.
 - b. On the other hand, if you believe that all of the choices provided for a particular question are wrong then select the one that appears to you as being the least wrong.

****WARNING: Please note that Virtual University takes serious action against unfair means. Anyone found involved in cheating will get an `F` grade in this course.**

Total Marks: 55

Total Questions: 4

Question No. 1

Marks : 20

Given the following grammar and input string "bool id , id , id"

- | | | | |
|------------------|--------------------------|--------------------|----------------|
| 1. <i>Decl</i> | <input type="checkbox"/> | <i>Type IdList</i> | |
| 2. <i>Type</i> | <input type="checkbox"/> | bool int | float |
| 3. <i>IdList</i> | <input type="checkbox"/> | <i>IdList , id</i> | id |

- show the leftmost derivation of the input string
- show the parse tree of the input string
- create a new equivalent grammar that has left recursion removed
- show the parse tree for the above input string on the new grammar

Question No. 2

Marks : 10

Find the First and Follow sets for the following grammars:

- | | | |
|-------------------|--------------------------|--|
| 1. <i>Exp</i> | <input type="checkbox"/> | – <i>Exp</i> (<i>Exp</i>) <i>Var ExpTail</i> |
| 2. <i>ExpTail</i> | <input type="checkbox"/> | – <i>Exp</i> Σ |
| 3. <i>Var</i> | <input type="checkbox"/> | id <i>VarTail</i> |
| 4. <i>VarTail</i> | <input type="checkbox"/> | (<i>Exp</i>) Σ |

Question No. 3

Marks : 15

Consider the following grammar of lists. Note that there are four different terminals: "(", ")", "a", and ",",

- | | | |
|-------------|--------------------------|---------------------|
| 1. <i>S</i> | <input type="checkbox"/> | () |
| 2. | | a |
| 3. | | (<i>A</i>) |
| 4. <i>A</i> | <input type="checkbox"/> | <i>S</i> |
| 5. | | <i>A</i> , <i>S</i> |

- Show that the grammar is not LL(1) hint: you should be able to do this by computing some of the FIRST sets
- Rewrite the grammar so that it is suitable for recursive decent parsing
- If you were going to build a table driven top-down parser for this grammar from (b), how big would the table be? (how many entries would it have)

Question No. 4

Marks : 10

Use the subset construction to create a DFA that is equivalent to the following NFA that uses the alphabet **a,b**. Show your work.

Note: The states with '*' are final states.

	a	b	ϵ
1	-	-	2
2	2	3,4	5
3	5	-	-
4	-	4	1,5
5*	-	-	-
