USN | | | | | | | | | | CS664

Sixth Semester B.E. Degree Examination, December 2010
Compiler Design

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FIVE full questions.*
2. Any missing data may be suitably assumed.

1   a.   Explain the different phases of a compiler, with a neat diagram.   (08 Marks)
     b.   Explain the token generators and token recognizers, with a simple example.   (04 Marks)
     c.   Write a Lex program to recognize the string $a^n b$.   (08 Marks)

2   a.   Define the following, with examples :
        i) Ambiguous grammar
        ii) Derivation tree.   (06 Marks)
     b.   Show that the following grammar is ambiguous
        $S \rightarrow i\ C\ t\ S \mid i\ C\ t\ S\ c\ S \mid a$
        $C \rightarrow b$
        Write the unambiguous grammar for the same.   (08 Marks)
     c.   Explain with an example, the recursive descent parser with backtracking.   (06 Marks)

3   a.   Bring out the differences between top-down and bottom-up parsing methods.   (03 Marks)
     b.   Compute FIRST ( ) and FOLLOW ( ) symbols for the following grammar and find if the grammar is LL(1)
        $E \rightarrow TE'$
        $E' \rightarrow + TE' \mid \in$
        $T \rightarrow FT'$
        $T' \rightarrow * FT' \mid \in$
        $F \rightarrow (E)/ id.$ (08 Marks)
     c.   Given the following precedence relation table, parse the string id + id * id

	id	+	*	$
id		·>	·>	·>
+	<·	·>	<·	·>
*	<·	·>	·>	·>
$	<·	<·	<·	

        (09 Marks)

4   a.   Explain with an example, the stack implementation of a shift reduce parser.   (10 Marks)
     b.   Define the following, with examples.
        i)   Synthesized attribute
        ii)   Inherited attribute
        iii)   Annotated parse tree
        iv)   Dependency graph.   (10 Marks)

5 a. What is an activation record? Explain the purpose of different fields in an activation record.
(10 Marks)

b. Explain the following storage allocation strategies.
i) Static allocation
ii) Heap allocation.
(10 Marks)

6 a. Define 3-address statement and list the types of 3-address statement. (08 Marks)

b. Define the terms quadruples, triples and indirect triples. Give their representation for the assignment statement A = B * (C + D) by generating an appropriate 3-address code.
(12 Marks)

7 a. Explain the issues in the deisgn of a code generator. (12 Marks)

b. Generate the code for the following three address statement, using the code generation algorithm

t = a − b
u = a − c
v = t + u
d = v + u

with d live at the end. (08 Marks)

8 a. Optimize the following code
Product = 0
i = 1
do
product = product + A[i] *B[i]
i = i + 1
while (i < = 20). (12 Marks)

b. Write an algorithm to construct a DAG from a basic block. (08 Marks)

* * * * *