10CS63

Sixth Semester B.E. Degree Examination, June/July 2018
Compiler Design

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO full questions from each part.**

PART – A

1   a. Explain with a diagram, the phases of compiler.   (08 Marks)
    b. Write the transition diagram for the following:
        i)   Identifier
        ii)   Unsigned number   (06 Marks)
    c. Write a program for look ahead code with sentinels.   (06 Marks)

2   a. Define left-recursive grammar. Eliminate left recursion from the following grammar:
        $E \rightarrow E + T \mid T$
        $T \rightarrow T * F \mid F$
        $F \rightarrow (E) \mid id.$ (05 Marks)
    b. Given the grammar
        $S \rightarrow AaAb \mid BbBa$
        $A \rightarrow \epsilon$
        $B \rightarrow \epsilon$
        i)   Compute First ( ) and Follow ( ) functions.
        ii)   Construct predictive parsing table.
        iii) Parse the input string w = ab.   (09 Marks)
    c. Show that the following grammar is ambiguous $E \rightarrow E + E \mid E * E \mid (E) \mid id$, write an
        equivalent unambiguous grammar for the same.   (06 Marks)

3   a. What is meant by handle pruning? Construct bottom-up parse tree for the input string
        $W = id * id$ using the grammar of Q. No. 2(a).   (06 Marks)
    b. Write the rules for First ( ) and Follow ( ) functions.   (06 Marks)
    c. Explain the working of shift reduce parser. Parse the input string id * id. Using the grammar
        of Q. No. 2(a).   (08 Marks)

4   a. Write an algorithm to construct SLR parsing table.   (06 Marks)
    b. Construct the parsing table for LR(1) parsing using the grammar.
        $S \rightarrow CC$
        $C \rightarrow c C$
        $c \rightarrow d$
        Draw the goto graph for LR (1) items.   (14 Marks)

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PART – B

5 a. Explain the concept of syntax directed definition. (04 Marks)

   b. Consider the context free grammar given below:

   $S \rightarrow EN$

   $E \rightarrow E + T \mid E - T \mid T$

   $T \rightarrow T * F \mid T \mid F \mid F$

   $F \rightarrow (E) \mid digit$

   $N \rightarrow ;$

   i) Obtain SDD for the above grammar.

   ii) Annotated parse tree for the input string $5 * 6 + 7$; (10 Marks)

   c. Define:

   i) Synthesized attribute

   ii) Inherited attribute. (06 Marks)

6 a. Construct DAG and three address code for the following expression:

   $a + a * (b - c) + (b - c) * d$. (08 Marks)

   b. Explain the following with an example:

   i) Quadruples

   ii) Triples. (08 Marks)

   c. Generate three address code for the following statement: $n = f(a[i])$;

   where a is an integer array and f is a function from integers to integers. (04 Marks)

7 a. With a neat diagram, describe the general structure of an activation record. (06 Marks)

   b. Explain in the strategy for reducing fragmentation in leap memory. (08 Marks)

   c. Explain briefly the performance metrics to be considered while designing a garbage collector. (06 Marks)

8 a. Discuss the various issues in the design of a code generator. (10 Marks)

   b. What are basic blocks and flow graphs? Write an algorithm to partition the three address instructions into basic blocks. (06 Marks)

   c. Explain code optimization methods:

   i) Local common subexpressions

   ii) Dead code elimination. (04 Marks)

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