USN ☐☐☐☐☐☐☐☐☐☐ **10CS63**

Sixth Semester B.E. Degree Examination, June/July 2019
Compiler Design

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART - A

1   a.   Write a brief note on Language Processing System.   **(04 Marks)**
    b.   Explain with a neat diagram, the phases of compiler.   **(10 Marks)**
    c.   Construct the transition diagram to recognize the tokens given below :
       i)   Relational operation   ii)   Unsigned number.   **(06 Marks)**

2   a.   Define Left recursion and Left factoring and apply the same for the Grammar
       $E \rightarrow E * T / T$; $T \rightarrow id + T / id$ **(06 Marks)**
    b.   Given the Grammar
       $S \rightarrow XS \mid dS \mid \in$
       $X \rightarrow Y \mid Zb \mid aY$
       $Y \rightarrow cZ$
       $Z \rightarrow e$
       i)   Construct FIRST and FOLLOW sets.
       ii)   Construct the Predictive parsing table.
       iii)   Show the moves made by the predictive parser on the input "dace".   **(10 Marks)**
    c.   How to verify whether grammar is LL(1) or not, show that
       $S \rightarrow |AB| \in$
       $A \rightarrow |AC|OC$
       $B \rightarrow OS$
       $C \rightarrow 1$ is LL(1) without constructing any table.   **(04 Marks)**

3   a.   What is handle pruning? Explain with the help of the grammar
       $S \rightarrow (L) \mid a$
       $L \rightarrow L, S \mid S$ and input string (a , (a, a)).   **(04 Marks)**
    b.   Explain the conflicts that may occur during shift reduce parsing , consider dangling – else grammar.   **(04 Marks)**
    c.   Given the grammar
       $S \rightarrow (S) S|\in$ or can be written as
       $S \rightarrow (S) S$
       $S \rightarrow \in$
       i)   Find LR(0) items
       ii)   Construct SLR(1) parsing table and show the parsing steps for the input ( ) ( ) $.   **(12 Marks)**

4   a.   Given the grammar $S \rightarrow CC$; $C \rightarrow cC|d$
       i)   Construct sets of LR(1) items.
       ii)   Construct Canonical LR(1) Parsing table.   **(14 Marks)**
    b.   Write the face specification of a simple desk calculator with the following grammar for arithmetic expressions
       $E \rightarrow E + T \mid T$
       $T \rightarrow T * F \mid F$
       $F \rightarrow (E) \mid digit.$ **(06 Marks)**

PART - B

5 a. Write annotated parse tree for 3 * 5 + 4n using top down approach. Write semantic rules for each. **(08 Marks)**
   b. Write a brief note on dependency graph. **(04 Marks)**
   c. Construct a dependency graph for the declaration float id_1 , id_2 , id_3 , **(08 Marks)**

6 a. What is DAG? Construct a DAG for the following expression
      $a + a * (b - c) + (b - c) * d$ **(05 Marks)**
   b. Write annotated parse tree for $C + a$ [i] [j] and derive 3 – address code for the same expression. **(08 Marks)**
   c. Write S.D translation for Switch statement. **(07 Marks)**

7 a. Explain run – time storage scheme for C++ language. Give the structure of activation record and explain the purpose of each item. **(10 Marks)**
   b. What are access links? Explain how are access links determined for finding non local data, what is its drawback. **(06 Marks)**
   c. Discuss the performance metrics to be considered while designing a garbage collector. **(04 Marks)**

8 a. Discuss the issues in the design of a code - generator. **(10 Marks)**
   b. Apply the Code – Generation algorithm to translate the basic block shown below
      t = a – b
      u = a – c
      v = t + u
      a = d
      d = v + u
      Assume t , u , v are temporaries , local to the block while a , b ,c , d are variables that are line on exit from the block. **(10 Marks)**

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