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10IS662

Sixth Semester B.E. Degree Examination, July/August 2022
Complier Design

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. Explain the various phases of a compiler. Show the translation for an assignment statement.
$c = a + b * 120;$
Clearly indicate the output of each phase.   **(12 Marks)**

   b. Define regular expression definition. Write a regular expression for unsigned numbers. Also write the transition algorithm.   **(08 Marks)**

2 a. What is left recursion? Eliminate left recursion from the following grammar
$E \rightarrow E + T \mid T$, $T \rightarrow T * F \mid F$, $F \rightarrow (E) \mid id$.   **(06 Marks)**

   b. Given the grammar $S \rightarrow a \mid (L)$, $L \rightarrow L, S \mid S$
      (i) Do the necessary changes to make it suitable for LL(1) Parser.
      (ii) Check whether the resultant grammar is LL(1) or not.   **(08 Marks)**

   c. Briefly explain the problem associated with top-down parsers.   **(06 Marks)**

3 a. Given the grammar
$E \rightarrow E + T \mid T$
$T \rightarrow T * F \mid F$
$F \rightarrow (E) \mid id$
      i)   Make the necessary changes to make it suitable for LL(1) parsing.
      ii) Construct FIRST and FOLLOW sets.
      iii) Construct the predictive parsing table.
      iv) Show the moves made by the predictive parser on the input.   **(12 Marks)**

   b. What is Handle Pruning? Explain with an example.   **(08 Marks)**

4 a. Compare the relative merits and demerits of LALR, SLR and LR(1).   **(06 Marks)**

   b. Write the algorithm for constructing a canonical sets of LR(1) items for grammar G. Apply the above algorithm to compute the canonical sets of LR(1) items for the following grammar.
$S \rightarrow CC$
$C \rightarrow eC \mid d$.   **(14 Marks)**

PART – B

5 a. Explain the concept of syntax-directed definition with example.   **(06 Marks)**

   b. Assuming suitable syntax directed definition, construct a syntax tree for the expression $a - 4 + e$.   **(10 Marks)**

   c. Write the annotated parse tree for $3 * 5 + 4n$.   **(04 Marks)**

6 a. Construct DAG for the expression,
$$\big((x+y)-\big((x+y)*(x-y)\big)\big)+\big((x+y)*(x-y)\big)$$
Give the sequence of steps for the same. (08 Marks)

   b. Explain with examples quadruples, triples and indirect triples. (12 Marks)

7 a. Explain in detail the different storage allocation strategies. (08 Marks)

   b. Write a short note on the following terms :
i) Garbage collection
ii) Activation tree and activation record
iii) Displays. (12 Marks)

8 a. Explain the code generation algorithm and generate code for the following expression,
$$X = (a-b)+(a+c).$$ (10 Marks)

   b. What are the basic blocks and how do you partition a three address code in the basic block. (05 Marks)

   c. Discuss the issue in the design of code generator. (05 Marks)

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