

SUBJECT: LANGUAGE PROCESSORS (CS 244)

(BRANCH: CS)

Friday, 21 APRIL 2017

Time: 3 Hours

Max. Marks: 100

- ✓ Answer ANY FIVE full Questions.
- ✓ Missing data, if any, may be suitably assumed
- 1A. Illustrate the translation of the assignment statement: position = initial + rate * 60 in each phase of a compiler.
- 1B. Obtain the regular expressions fori) Relational operators
 - ii) Signed real numbers (eg: 77.777E-7)
- 1C. Name a lexical analyzer generator. Discuss in detail, the program structure of the tool along with necessary block diagram showing the generation of lexical analyzer from the tool.

(6+4+10)

- 2A. Write the grammar for the if statement and draw the parse tree for the string: if (x<10) y = 23
- 2B. Is the dangling else grammar ambiguous? Justify your answer with help of parse tree.
- 2C. Explain the input buffering schemes for scanning the source program. How the use of sentinels can improve its performance? Describe in detail with algorithm for each.
 (5+5+10)

(5+5+10)

- 3A.Write the algorithm to compute the FOLLOW sets of a nonterminal. Also, compute FIRST and FOLLOW sets of the following grammar after removal of left recursion. $A \rightarrow A \text{ or } B/B$ $B \rightarrow B \text{ and } C/C$ $C \rightarrow (A)/d$
- 3B. What is an LL(1) grammar? Illustrate the same for dangling else grammar.

(8+12)

- 4A.Obtain the NFA for the regular expression $a(\epsilon/b)$?b using Thompson's construction. Also obtain DFA using subset algorithm.
- 4B. Given the grammar E→E+E| E*E|id and the input string id+id *id, show the working of stack driven Shift Reduce Parser. (15+5)

5A. Given the grammar

G→C C→Cab|ab

a) Construct the Collection of sets of LR(0) items. Also, draw the DFA for viable prefixes.

b) Construct the SLR parsing table.

5B. Explain LR parsing algorithm and give the structure of LR parse table.

(10+10)

- 6A. Translate the following expression into three address statements and represent using triple, indirect triple and quadruple: $p=(x+y)^*(x-z)+(x+y+z)$
- 6B. What is a type expression? Explain any four type constructors used in type expressions.

(10+10)

- 7A. What is a basic block? Give the algorithm to partition the three address statements into basic blocks. Draw the flow graph for the following three address statements.
 - 1) if a > 0 goto L2
 - 2) b ≔ 1
 - 3) goto L1
 - 4) L2: t1 ≔ a 1
 - 5) c: = t1
 - 6) $b \coloneqq d * a$
 - 7) L1: e := b + 1
- 7B. With reference to runtime allocation and de-allocation of activation records, explain the two standard storage allocation strategies.

(12+8)

- 8. Write short notes on:
 - a. Liveness and Next-use information
 - b. Handling Forward References in Assembler Design
 - c. Parser Generators

(6+8+6)

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