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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 : (06 Marks)
 - i) Relational operation
 - ii) Unsigned number.

- 2
 - a. Define Left recursion and Left factoring and apply the same for the Grammar (06 Marks)

$$E \rightarrow E * T / T \quad ; \quad T \rightarrow id + T / id$$
 - b. Given the Grammar (10 Marks)

$$S \rightarrow XS \mid dS \mid \epsilon$$

$$X \rightarrow Y \mid Zb \mid aY$$

$$Y \rightarrow cZ$$

$$Z \rightarrow e$$
 - 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 (04 Marks)

$$S \rightarrow |AB| \in$$

$$A \rightarrow |AC|OC$$

$$B \rightarrow OS$$

$$C \rightarrow 1$$
 is LL(1) without constructing any table.

- 3
 - a. What is handle pruning? Explain with the help of the grammar (04 Marks)

$$S \rightarrow (L) \mid a$$

$$L \rightarrow L, S \mid S$$
 and input string (a , (a , a)).
 - b. Explain the conflicts that may occur during shift reduce parsing , consider dangling – else grammar. (04 Marks)
 - c. Given the grammar (12 Marks)

$$S \rightarrow (S) S \mid \epsilon$$
 or can be written as

$$S \rightarrow (S) S$$

$$S \rightarrow \epsilon$$
 - i) Find LR(0) items
 - ii) Construct SLR(1) parsing table and show the parsing steps for the input () () \$.

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

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

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

$$F \rightarrow (E) \mid digit.$$

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

**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 id1 , id2 , id3 ,` (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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