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10CS63

Sixth Semester B.E. Degree Examination, Jan./Feb. 2021
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. List the phases of a Compiler. Describe the a analysis part and synthesis part of the compiler. **(05 Marks)**

b. Write a note on Compiler Construction tools. **(05 Marks)**

c. Draw the transition diagram for relation operators in C : $<, >, <=, >=, ==, !=$. **(05 Marks)**

d. Explain the concept of Input buffering scheme. **(05 Marks)**

2 a. Enlist the error recovery strategies in parser and briefly explain any three recovery strategies in parser. **(06 Marks)**

b. Construct FIRST and FOLLOW set for the following grammar :

$D \rightarrow T\ id\ ;\ D \mid \in$

$T \rightarrow BC \mid Struct\ id\ \{D\}$

$B \rightarrow int \mid float \mid char$

$C \rightarrow [num]\ C \mid \in.$ **(06 Marks)**

c. Write down the algorithm for construction of predictive parsing table and also construction the parsing table for the given grammar.

$E \rightarrow T\ E'\ \ E' \rightarrow +\ T\ E' \mid \in\ \ T \rightarrow id \mid (E).$ **(08 Marks)**

3 a. Construct LR(0) automaton using CLOSURE and GOTO functions for the grammar given below. Check whether the grammar is in SLR. Justify your answer.

$S \rightarrow L = R \mid R$

$S \rightarrow *R \mid id$

$R \rightarrow L.$ **(08 Marks)**

b. Figure out different types of conflicts occur during shift reduce parsing. Discuss the situations in which these conflicts occur. **(04 Marks)**

c. Write down the algorithms for constructing SLR parsing table and LR parsing for the given input. **(08 Marks)**

4 a. What are the limitations of SLR parser? How do you overcome these limitations? Write down the method to calculate look ahead token for canonical items. **(06 Marks)**

b. Construct the canonical LR(1) items and the GOTO graph as well as canonical LR(1) parsing table for the following grammar $S \rightarrow (S)\ S \mid \in$. **(10 Marks)**

c. Build LALR automaton or parsing table for the grammar given in Q4(b). **(04 Marks)**

PART – B

5 a. Explain the concept of Syntax directed definition and translation. Define synthesized and inherited attributes. Mention the types of attributes used in bottom up and top down parsers. **(08 Marks)**

b. Write down the Syntax directed definition for simple calculator. Construct annotated parse tree and the Syntax tree for the input string 5 * 6 + 2 * 7. **(06 Marks)**

c. Give semantic rules for declaration of data types and Syntax directed translation for the same using the given grammar.
$T \rightarrow B\ C \quad B \rightarrow int \mid float$
$C \rightarrow [num]\ C \mid \in$. **(06 Marks)**

6 a. Demonstrate the concept of three address code, quadruples. Translate the arithmetic expression f = a – (b + c) * d into i) Quadruples ii) Triples iii) Indirect triples. **(08 Marks)**

b. Describe the Syntax directed translation for switch statement. **(08 Marks)**

c. Justify the role of control statements in programming language. Write down the Syntax directed definition for flow of control statements. **(04 Marks)**

7 a. Describe the structure of activation record with neat diagram. **(05 Marks)**

b. List out the functions and properties of memory manager, a subsystem of heap management. **(05 Marks)**

c. Mention the steps involved in calling a function and returning from a function with the diagram. **(05 Marks)**

d. Using the below given code for finding n^{th} Fibonacci number, build activation tree for finding 5^{th} Fibonacci number. **(05 Marks)**

```
int fib (int n)
        {if (n < 2) return 1;
         else return (fib (n-1) + fib (n-2));}.
```

8 a. For the following program **(10 Marks)**

```
For I = 1 to 10 do
For J = 1 to 10 do
      A[I, J] = 0
  For I = 1 to 10 do
      A = [I, I] = 1.
```

b. Explain the concept of dead code elimination and finding local common sub expressions with examples. **(10 Marks)**

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