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10CS63

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. What are the different phases of compiler? Explain each phase with an example. **(10 Marks)**

b. Give the regular expression and transition diagram for the following tokens :
i) Relational operator
ii) Identifier. **(06 Marks)**

c. What is input buffering explain the use of sentinels in recognizing tokens. **(04 Marks)**

2 a. What is Left Recursion? What is Left Factoring? Do Left Recursion and Left Factoring based on the productions in the grammar.

$E \rightarrow E \# | T$
$E \rightarrow E + T | E - T | T$
$T \rightarrow V | V * V | V/V$
$V \rightarrow a | b$ **(10 Marks)**

b. Give the rules for finding First and Follow set of symbols. Find the First and Follow set of symbols for the grammar

$S \rightarrow , GH$ $H \rightarrow KL$
$G \rightarrow a F$ $K \rightarrow m | \varepsilon$
$F \rightarrow b F | \varepsilon$ $L \rightarrow n | \varepsilon$ **(10 Marks)**

3 a. Write the algorithm to construct predictive parsing table. **(04 Marks)**

b. Construct predictive parsing table for the grammar

$S \rightarrow AB | PQx$ $P \rightarrow pP | \varepsilon$
$B \rightarrow bC$ $Q \rightarrow qQ | \varepsilon$
$A \rightarrow x\ y | m$ $C \rightarrow e$ **(10 Marks)**

c. Parse the string x y b e using the parse table. **(06 Marks)**

4 a. What are the two types of conflicts found in shift reduce parser. Explain with example. **(04 Marks)**

b. Construct LR(0) items and SLR parse table for the grammar.

$S \rightarrow a | \uparrow | (T)$
$T \rightarrow T, S | S$ **(10 Marks)**

c. Parse the given string using parse table ($\uparrow$, a). **(06 Marks)**

PART – B

5 a. Consider the grammar

$L \rightarrow En$ $\quad T \rightarrow F$

$E \rightarrow E_1 + T$ $\quad F \rightarrow (E)$

$E \rightarrow T$ $\quad F \rightarrow digit$

$T \rightarrow T_1 * F$

i) Obtain the semantic rules for the above grammar

ii) Obtain the annotated parse tree for the string $(3 + 4) * (5 + 6)_n$. **(10 Marks)**

b. Consider the grammar

$D \rightarrow TL$ $\quad L \rightarrow L_1,id$

$T \rightarrow int$ $\quad L \rightarrow id$

$T \rightarrow float$

i) Obtain the syntax directed definition for the simple type declaration

ii) Obtain Dependency Graph for the string float id_1, id_2, id_3. **(10 Marks)**

6 a. Obtain :

i) Abstract syntax tree

ii) Directed acyclic graph

iii) Quadruples

iv) Triples

v) Indirect triples for the expression

$a + a * (b - c) + (b - c) * d$ **(10 Marks)**

b. Consider the grammar for Boolean expression

$B \rightarrow B_1 \mid\mid MB_2 \mid B_1 \&\& M\, B_2 \mid !B_1 \mid (B) \mid E_1$ Relop $E_2 \mid$ true/false $M \rightarrow \varepsilon$

Relop $\rightarrow > \mid < \mid >= \mid <= \mid == \mid !=$

Obtain the true list and false list using Back Patching for the expression

If $(x < 100 \mid\mid x > 200 \&\& x != y)\ x = 0$ **(06 Marks)**

c. Write the 3 oddr code for the code

```
do
    i = i + 1
while (a[i] < v)
```

(04 Marks)

7 a. What is an Activation Record? Explain the purpose of each field in Activation record. **(08 Marks)**

b. Explain Calling Sequence and Return Sequence in Procedure Activation. **(06 Marks)**

c. What is Garbage collection? List the Design goals for Garbage collector. **(06 Marks)**

8 a. Convert the given code into 3 address code, identify the Leaders and Basic Blocks and construct control flow Graph.

```
for (i = 1; i < n ; i++)
{
  for (J = 0 ; J < n – i ; J ++)
  {
    if (a[J] > a[J + 1])
    {
        temp = a[J] ;
        a[J] = a[J +1] ;
        a[J + 1] = temp ;
    }
  }
}
```

(12 Marks)

b. Explain different issues of code Generator. **(08 Marks)**