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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Computer Science and Engineering

Semester End Examination; June - 2017

Compiler Design

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Illustrate the translation of the statement $a = b + c*60$ in a compiler. 10

b. Identify Lexemes of the following code : 5

```
int max (i, j);
int i, j;
{
if (i > j) return (i);
else return( j);
}
```

c. Write transition diagram to recognize relational operators. 5

2 a. Explain the different compiler construction tools. 6

b. Give the block diagram of working of lexical analyzer and explain its role. 4

c. Give regular definitions to recognize unsigned numbers and also give its transition diagram. 10

UNIT - II

3 a. What is the role of syntax analyzer? Explain the different error recovery strategies in syntax analyzer. 10

b. Construct predictive parsing table for the following grammar : 10

$S_1 \rightarrow \$\#$

$S \rightarrow qABC$

$A \rightarrow a / bbD$

$B \rightarrow a / \in$

$C \rightarrow b / \in$

$D \rightarrow c / \in$

4 a. For a given grammar write algorithms to find : 10

i) First( ) ii) Follow( ) iii) Construct predictive parsing table.

b. Consider the context free grammar : 5

$S \rightarrow S(s)S / \in$ and the string $(( ))$

i) Give left most derivation for the string ii) Give right most derivation for the string

iii) Give parse tree for the string iv) Is the grammar ambiguous or unambiguous.

Contd….2

c. Consider the following grammar : 5

$E \rightarrow E+T / T$
$T \rightarrow T*F / F$
$F \rightarrow (E) / id$

Define left recursion and eliminate left recursion from the original grammar.

UNIT - III

5 a. Construct SLR parsing table for the following grammar : 10

$S \rightarrow CC$
$C \rightarrow cC$
$C \rightarrow d$

b. Explain : 10

i) Handle pruning ii) Shift-reduce conflict

iii) Reduce-Reduce conflict iv) Shift-reduce parser.

6 a. Construct Canonical LR( ) set of items for the following grammar : 12

$S \rightarrow Aa / bAc / Bc / bBa$
$A \rightarrow d$
$B \rightarrow d$

b. How error recovery is done is LR parsing? Explain with examples. 8

UNIT - IV

7 a. Write Syntax Directed Definitions (SDD) for the following grammar and hence, construct annotated parse tree for the expression : 10

$(4+3)*(5+6)n$

Grammar:

$L \rightarrow En$
$E \rightarrow E+T$
$E \rightarrow T$
$T \rightarrow T*F$
$T \rightarrow F$
$F \rightarrow (E) / digit$

b. Explain the different dynamic storage allocation techniques. 10

8 a. Briefly explain the different storage allocation strategies. 10

b. Give SDD (Syntax Directed Definitions) with inherited attributes L for the following grammar. Using the above SDD, show annotated parse tree for the expression: 9-5+2 10

Grammar: $E \rightarrow E+T / E-T / T$

$T \rightarrow (E) / num$

Contd....3

UNIT - V

9 a. Explain the different ways of representing 3-address code statements. Represent the following expression in the ways

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

b. Briefly explain the different issues involved in code generation phase. 10

10 a. Construct DAG for the expression :

$((x+y)-((x+y)*(x-y)))+((x+y)*(x-y))$. 5

b. Obtain 3-address code translation for the following if statement :

if $(x<100 \,||\, x>200 \;\&\&\; x!=y)$

$x=10;$ 5

else

$x=20;$

c. What is a Basic block? Given an algorithm to partition three-address instructions into basic block. Also, how do you represent in DAG? 10

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