*Name :* .....

*Roll No. :* .....

*Invigilator's Signature :* .....

**CS/B.TECH(CSE)/SEP.SUPPLE/SEM-7/CS-701/2012**

# 2012
# LANGUAGE PROCESSOR

*Time Allotted :* 3 Hours *Full Marks :* 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

## GROUP – A

### ( Multiple Choice Type Questions )

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) If in a syntax tree for the regular expression (a|b)* abb# the leaf nodes are numbered as 1, 2, 3 .....6 from left to right, then the firstpos (root) function returns

   a) { 1, 2, 3, 4}

   b) { 1, 2, 3}

   c) { 1, 2 }

   d) None of these.

ii) Which of the following is not a loop optimization technique ?

a) Induction variable elimination

b) Loop unrolling

c) Loop jamming

d) Loop heading.

iii) The edges in a flow graph whose heads dominate their tails are called

a) Back edges

b) Flow edges

c) Front edges

d) None of these.

iv) Consider the statement :" ft(X>=12)", where if has been misspelled. The error is detected by the compiler in the phase

a) Lexical analysis

b) Syntax analysis

c) Semantic Analysis

d) None of these.

v) YACC builds up

a) SLR parsing table

b) Canonical parsing table

c) LALR parsing table

d) None of these.

vi) Lex is a tool which is used to specify

a) Syntax directed translation

b) Syntax analysis

c) Lexical analysis

d) None of these.

vii) Given a grammar G = ( { S, T}, {, , (, ), ↑, a }, S, P); where P is given by S →↑ , S→ a, S→(T), T→T, S, T→S. Then FOLLOW (S) will contain

a) { $, ), , }

b) { $, (, ) }

c) { $, ( }

d) None of these.

viii) An annotated parse tree is

a) A parse tree with attribute values shown at the parse tree nodes

b) A parse tree with values of only some attributes shown at the parse tree nodes

c) A parse tree without attribute values shown at the parse tree nodes

d) A parse tree with grammar symbols shown at the parse tree nodes.

ix) A dangling reference is a

a) pointer pointing to storage which is still in use

b) pointer pointing to storage which is freed

c) pointer pointing to nothing

d) pointer pointing to uninitialized storage

x) The role of preprocessor is

a) produce output data

b) produce output to compilers

c) produce input to compilers

d) none of these.

## GROUP – B

### ( Short Answer Type Questions )

Answer any *three* of the following. 3 × 5 = 15

2. Generate machine code for the following instruction :

$X = a / -( b * c ) - d$

Assume 3 registers are available.

3. a) What is syntax directed translation ? Explain with examples.

b) What is Peephole optimization ? 3 + 2

4. Translate the arithmetic expression $a = b * - c + b * - c$ into :

   (i) A syntax tree

   (ii) Post-fix notation

   (iii) Quadruples

   (iv) triples

   (v) indirect triples.

5. With the help of a block diagram and an example, show each phase including symbol table and error handler of a compiler.

6. What is an activation record ? Explain clearly the components of an activation record. 2 + 3

## GROUP – C

**( Long Answer Type Questions )**

Answer any *three* of the following. 3 × 15 = 45

7. a) Transform the following grammar so that it will be LL(1), without changing the language :

   S → aAc | bB

   A → Abc | Abd |

   B → f | g

   C → h | i

b) Construct LL(1)parse table for the following grammar :

$S \rightarrow aAC \mid bB$

$A \rightarrow eD$

$D \rightarrow bE \mid \varepsilon$

$E \rightarrow eD \mid dD$

$B \rightarrow f \mid g$

$C \rightarrow h \mid i$ 6 + 9

8. Figure 1. is a simple matrix-multiplication program.

a) Translate the program into three-address statements. Assume the matrix entries as numbers that require 8 bytes, and that matrices are stored in row-major order.

b) Construct the flow graph for the code from (a).

c) Identify the loops in the flow graph from (b). 5 + 5 + 5

```
for(i = 0; i < n; i ++)
        for( j = 0; j < n; j++)
            c [i] [j] = 0.0;
for(i = 0; i < n; i ++)
        for( j = 0; j < n; j ++)
            for( k = 0; k < n; k ++)
                c[i] [j] = c[i] [j] + a[i] [k] * b[k] [j]
```

Figure 1. A matrix-multiplication Algorithm.

9. a) Define an operator grammar.

   b) Given a grammar G = ( { E, T, F }, { id, +, *, (, ) } , P, E); where, P is given by $E \rightarrow E + T \mid T$, $T \rightarrow T*F \mid F$, $F \rightarrow (E) \mid id$.

   Construct the SLR (1) parsing table for G. 2 + 13

10. a) What do you understand by L-attributed definition ? Give example.

   b) Describe with diagram the working process of Lexical Analyser.

   c) Describe LR passing with block diagram. (2 + 3) + 5 + 5

11. Write short notes on any *three* of the following : 3 × 5

   a) YACC

   b) Symbol table management

   c) Back patching

   d) Thompson's construction

   e) Lex

   f) Constant folding and copy propagation.