

Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH (CSE)/SEM-7/CS-701/2012-13

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) Which data structure is mainly used during Shift-Reduce parsing ?

- | | |
|----------|-------------|
| a) Stack | b) Queue |
| c) Array | d) Pointer. |

ii) If x is a terminal, then $FIRST(x)$ is

- | | |
|---------------|-------------------|
| a) ϵ | b) $\{x\}$ |
| c) x^* | d) none of these. |

- iii) Which of the following is not an intermediate code form ?
- a) Postfix Notation
 - b) Syntax Trees
 - c) Three-Address Codes
 - d) Quadruples.
- iv) Which one of the following errors will not be detected by the compiler ?
- a) Lexical error
 - b) Syntactic error
 - c) Semantic error
 - d) Logical error
- v) A basic block can be analyzed by
- a) DAG
 - b) Flow graph
 - c) Graph with Cycles
 - d) none of these.
- vi) A Top down parser generates
- a) left-most derivation
 - b) right-most derivation
 - c) left-most derivation in reverse
 - d) right-most derivation in reverse.
- vii) YACC builds up
- a) SLR parsing table
 - b) LALR parsing table
 - c) Canonical LR parsing table
 - d) none of these.
- viii) If the attributes of the parent node depends on its children, then its attributes are called
- a) TAC
 - b) synthesized
 - c) inherited
 - d) directed.

- ix) Which is used to keep track of currently active activations ?
- a) Control stack
 - b) Activation
 - c) Execution
 - d) Symbol.
- x) Optimization(s) connected with $x := x + 0$ is/are
- a) Peephole and algebraic
 - b) Reduction in strength and algebraic
 - c) Peephole only
 - d) Loop and peephole.

GROUP B

(Short Answer Type Questions)

Answer any *three* of the following $3 \times 5 = 15$

2. What is a cross-compiler ? Create a cross-compiler for SML (Sensor Mark-up Language) using Java compiler, written in ATOM-450, producing code in ATOM-450 and a SML language producing code for XML written in Java.
3. Define regular expression. Write the regular expression over alphabet $\{ a, b, c \}$ containing at least one 'a' and at least one 'b'. What is dead state ? Explain with suitable example.
4. Define grammar. What do you mean by ambiguity in grammar ? Illustrate with suitable example. What is the necessity to generate parse tree ?

5. Distinguish between interpreter and compiler. How does lexical analyzer help in the process of compilation ? Consider the following statement and find the number of tokens with type and value as applicable :

```
void main ( )  
{  
    int x;  
    x = 3;  
}
```

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

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Apply all the phases of compiler and show the corresponding output in every phase for the following code of the source program :

```
while (y ≥ 0) y = y - 3;
```

- b) What do you mean by passes of compiler ? Explain advantages and disadvantages of one-pass and two-pass over each other. $10 + 5$
8. a) Define LL(1) grammar. Consider the following grammar :

$$S \rightarrow AaAb \mid BbBa$$
$$A \rightarrow \epsilon$$
$$B \rightarrow \epsilon$$

Test whether the grammar is LL(1) or not and construct a predictive parsing table for it.

- b) Consider the following Context Free Grammar (CFG) G and reduce the grammar by removing all unit productions. Show each step of removal.

$$S \rightarrow AB$$

$$A \rightarrow a$$

$$B \rightarrow C \mid b$$

$$C \rightarrow D$$

$$D \rightarrow E$$

$$E \rightarrow a$$

- c) Consider the following grammar G . Show that the grammar is ambiguous by constructing two different leftmost derivations for the sentence 'abab'.

$$S \rightarrow aSbS \mid bSaS \mid \varepsilon \qquad 10 + 2 + 3$$

9. a) Consider the following grammar G . Alternate the production so that it may free from backtracking.

Statement \rightarrow if Expression then Statement else Statement

Statement \rightarrow if Expression then Statement

- b) What is left-recursion ? Illustrate with suitable example. Consider the following grammar G . Find out the left recursion and remove it :

$$S \rightarrow Bb \mid a$$

$$B \rightarrow Bc \mid Sd \mid e$$

- c) What is Operator Precedence Parsing ? Discuss about the advantage and disadvantage of Operator Precedence Parsing. Consider the following grammar :

$$E \rightarrow TA$$

$$A \rightarrow +TA \mid \varepsilon$$

$$T \rightarrow FB$$

$$B \rightarrow *FB \mid \varepsilon$$

$$F \rightarrow id$$

Test whether this grammar is Operator Precedence Grammar or not and show how the string $w = id + id * id + id$ will be processed by this grammar.

$$3 + 4 + 8$$

10. a) Distinguish between quadruples, triples and indirect triples for the expression.

$$x = y * -z + y * -z$$

- b) Translate the expression $a * -(b + c / d)$ into

- i) Syntax tree
- ii) Post-f x notation
- iii) 3-address code.

- c) While the three-address code for the following C program :

```
main ( )
{
    int x = 1;
    int y[20];
    while (x ≤ 20)
        a[x] = 0;
}
```

$$5 + 5 + 5$$

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

- a) Chomsky classification of grammar
- b) Symbol table
- c) LEX
- d) YACC
- e) Handle pruning.

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