



**ENGINEERING & MANAGEMENT EXAMINATIONS, DECEMBER - 2008**  
**LANGUAGE PROCESSOR**  
**SEMESTER - 7**

Time : 3 Hours ]

[ Full Marks : 70

**GROUP - A****( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following : 10 × 1 = 10
- i) Which data structure is mainly used during shift-reduce parsing ?
- a) Stack b) Queue
- c) Array d) Pointer.
- ii) If all productions in a grammar  $G - (V, T, S, P)$  are of the form  $A \rightarrow xB$  or  $A \rightarrow x$ ,  $A, B \in V$  and  $x \in T^*$ , then it is called
- a) context-sensitive grammar b) non-linear grammar
- c) right-linear grammar d) left-linear grammar.
- iii) The edges in a flow graph whose heads dominate their tails are called
- a) Back edges b) Front edges
- c) Flow edges d) None of these.
- iv) The regular expression  $0^* (10^*)^*$  denotes the same set as
- a)  $(1^*0)^*1^*$  b)  $0 + (0 + 10')^*$
- c)  $(0 + 1)^*10(0 + 1)^*$  d) none of these.
- v) If  $x$  is a terminal, then  $FIRST(x)$  is
- a)  $\epsilon$  b)  $\{x\}$
- c)  $x^*$  d) none of these.



vi) The role of preprocessor is

- a) produce output data
- b) produce output to compilers
- c) produce input to compilers
- d) none of these.

vii) Which of the following is not true about dynamic type checking ?

- a) It increases the cost of execution
- b) Type checking is done during the execution
- c) All the type errors are detected
- d) None of these.

viii) 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.

ix) Which of the following is not a loop optimization ?

- a) Loop unrolling
- b) Loop jamming
- c) Loop heading
- d) Induction variable elimination.

x) If a grammar is LALR (1) then it is necessarily

- a) LL ( 1 )
- b) SLR ( 1 )
- c) LR ( 1 )
- d) None of these.



## GROUP - B

## ( Short Answer Type Questions )

Answer any three of the following.

3 x 5 = 15

2. Consider the context-free grammar :

$$S \rightarrow SS + \mid SS^* \mid a$$
a) Show how the string  $aa+a^*$  can be generated by this grammar.

b) Construct a parse tree for this string.

c) What language is generated by this grammar ?

2 + 2 + 1

3. Consider the following left-linear grammar :

$$S \rightarrow Sab \mid Aa$$

$$A \rightarrow Abb \mid bb$$

Find out an equivalent right-linear grammar.

4. Translate the arithmetic expression  $a^* - (b + c)$  into

a) Syntax tree

b) Three-address code

c) Postfix notation.

2 + 2 + 1

5. Give the NFA for the following Regular Expression. Then find a DFA for the same language.

$$(a \mid b)^* abb$$

2 + 3

6. What is a handle ?

Consider the grammar  $E \rightarrow E + E \mid E * E \mid id$ Find the handles of the right sentential forms of reduction for the string  $id + id * id$ .

1 + 4



## GROUP - C

## ( Long Answer Type Questions )

Answer any *three* of the following questions.

3 × 15 = 45

7. Explain the following terms with examples :

3 × 5

- a) Quadruples
- b) Triples
- c) Indirected triples

ex : a : = - b \* ( c + d | b ) - ( e \* f )

8. Design a LL (1) parsing table for the following grammar :

 $S \rightarrow aAc d \mid BcAe$  $A \rightarrow b \mid \epsilon$  $B \rightarrow Cf \mid d$  $C \rightarrow fe$ 

With the help of the parsing table show how the string "fefcbe" is parsed.

10 + 5

9. a) Consider the following Grammar :

1)  $E \rightarrow TE'$ 2)  $E' \rightarrow + TE' \mid \epsilon$ 3)  $T \rightarrow FT'$ 4)  $T' \rightarrow * FT' \mid \epsilon$ 5)  $F \rightarrow (E) \mid id$ 

i) Obtain the FIRST and FOLLOW sets for the above grammar.

ii) Construct a Predictive Parsing table for the above grammar.

b) Explain the predictive Parser's action by describing the moves it would make on an input  $id + id * id\$$ .

10 + 5



10. a) What is Peephole optimization ?
- b) What is an activation record ? When and why are those records used ? List different fields of an activation record and state the purpose of those fields.
- c) Construct the DAG for the following basic block :
- d := b \* c
- e := a + b
- b := b \* c
- a := e - d
- $3 + (2 + 2 + 4) + 4$

11. a) What do you understand by terminal table and literal table ?
- b) Consider some interblock code optimization without any data-flow analysis by treating each extended basic block as if it is a basic block. Give algorithms to do the following optimization within an extended basic block. In each case, indicate what effect on other extended basic blocks a change within one extended basic block can have.
- i) Common sub-expression elimination
- ii) Constant folding
- iii) Copy propagation
- $(3 + 3) + (3 + 3 + 3)$

12. Write short notes on any three of the following :
- $3 \times 5$
- a) Cross compiler
- b) Code optimization
- c) Left factoring
- d) Context free grammar
- e) Inherited attributes.

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END