



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) ϵ 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. $3 \times 5 = 15$

2. Consider the context-free grammar :

$$S \rightarrow SS + \mid SS^* \mid a$$

- Show how the string $aa+a^*$ can be generated by this grammar.
- Construct a parse tree for this string.
- 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

- Syntax tree
- Three-address code
- 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 :

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

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 : 3×5

- a) Cross compiler
- b) Code optimization
- c) Left factoring
- d) Context free grammar
- e) Inherited attributes.

END