



**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) contex-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 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 ?

$$\text{Consider the grammar } E \rightarrow E + E \mid E * E \mid id$$

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 x 15 = 45

7. Explain the following terms with examples :

3 x 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 → aAc d | BcAe

A → b | ε

B → Cf | d

C → fe

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

10 + 5

9. a) Consider the following Grammar :

1) E → TE'

2) E' → + TE' | ε

3) T → FT'

4) T' → * FT' | ε

5) F → (E) | 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 x 5

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

END