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CS/IT-701

B. E. (Seventh Semester) EXAMINATION, June, 2007

(Common for CS & IT Engg.)

COMPILER DESIGN

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any five questions. All questions carry equal marks.

1. (a) Draw and explain various phases of compiler. 10
(b) What is LEX ? Describe auxiliary definitions and translation rules for LEX with suitable example. 10
2. (a) Give a mathematical definition of E-closure of set of states. 6
(b) Use Thompson's construction to convert regular expression $(aa|b)^*(a|bb)^*$ into an NFA and convert NFA to DFA using subset construction. 14
3. Consider the following grammar : 20
 $\text{texp} \rightarrow \text{atom} | \text{list}$
 $\text{atom} \rightarrow \text{number} | \text{identifier}$
 $\text{list} \rightarrow (\text{texp-seg})$
 $\text{texp-seg} \rightarrow \text{texp}, \text{texp-seg} | \text{texp}$
(i) Left factor this grammar.

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- (ii) Construct first and follow sets for the non-terminals of resulting grammar.
 - (iii) Show that resulting grammar is LL(1).
 - (iv) Construct LL(1) parsing table for resulting grammar.
4. (a) Show that a left recursive grammar cannot be LL(1). 6
(b) Describe operator precedence parsing algorithm. 8
(c) Compare top down and bottom up parsing techniques. 6
(a) Write top down translation scheme to produce quadruples for Boolean expression. 7
(b) Using translation scheme, translate the following segment of codes to quadruples. : 7
 while $(A < C \text{ and } B < D)$ do
 if $A = 1$ then $C := C + 1$
 else while $A \leq D$ do $A := A + 2$
(c) Write quadruples, triples and indirect triples for expression : 6
 $-(a + b) * (c + d) - (a + b + c)$
 6. (a) Differentiate between static and dynamic binding. 6
(b) Explain in brief the various data structures that can be used in symbol table management. 14
 7. (a) Explain application of DAG's. Construct DAG for the following basic block : 10
 $D := B * C$
 $E := A + B$
 $B := B * C$
 $A := E - D$
(b) Explain heuristic addressing algorithm for DAG. 10
 8. Write short notes on any four of the following : 5 each
(i) Bootstrapping
(ii) Peephole optimization
(iii) YACC
(iv) Error recovery procedure in LL and LR parsers
(v) Types of grammar