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06IS662

Sixth Semester B.E. Degree Examination, December 2011
Compiler Design

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Describe in brief, the structure of a compiler, with a neat block diagram, depicting the output of each phase for the expression a = b + c * 50, where a, b and c are reals. **(14 Marks)**

b. Describe the various parameter passing mechanisms for a subroutine. **(06 Marks)**

2 a. Construct a non-recursive predictive parsing table for the following grammar:

$S \rightarrow A$
$A \rightarrow aB \mid Ad$
$B \rightarrow bBC \mid f$
$C \rightarrow g$ **(10 Marks)**

b. What is left recursion? Eliminate left recursion from the following grammar and construct first and following sets for the non-terminals:

$Lp \rightarrow no \mid Op\ Ls$
$Op \rightarrow + 1 - 1 *$
$Ls \rightarrow Ls\ Lp \mid Lp$ **(10 Marks)**

3 a. Obtain SLR parsing table for the following grammar and comment on the

$S \rightarrow AaAb \mid BbBa$
$A \rightarrow \in$, $B \rightarrow \in$, table thus obtained. **(12 Marks)**

b. Is the following grammar SLR(1)? Justify by constructing canonical collection of sets of LR(0) items.

$S \rightarrow CC$
$C \rightarrow cC$
$C \rightarrow d$ **(08 Marks)**

4 a. Construct LR(1) parsing table for the following grammar:

$S \rightarrow AaAb \mid BbBa$
$A \rightarrow \in$
$B \rightarrow \in$ **(12 Marks)**

b. Describe in brief error recovery in Yacc. **(08 Marks)**

PART – B

5 a. Describe the S attributed and L attributed definition. **(06 Marks)**

b. Define syntax directed translation scheme. Obtain the syntax directed definition for simple declaration D consisting of basic type T followed by list L of identifiers where T can be float or int. Also, obtain the dependency graph for float id_1, id_2 id_3 and id_4 statement. **(10 Marks)**

c. Obtain the syntax directed definition to construct syntax tree for expression generated out of the following grammar:

$E \rightarrow E + T \mid E - T \mid T$

$T \rightarrow id \mid num \mid (E)$ **(04 Marks)**

6 a. Write a translation scheme to generate three a address code for a assignment statement containing array references generated out of the following grammar. Also obtain annotated parse tree for C = a + b[i][j], assuming b is 2×3 array of integers, c, a, i, j are integers and assuming width of integer as 4 bytes.

$S \rightarrow id = E ; \mid L = Ej$

$E \rightarrow E_1 + E_2 \mid id \mid L$

$L \rightarrow id [E] \mid L_1 [E]$ **(12 Marks)**

b. Explain the concept of backpatching, with respect to Boolean expressions. **(08 Marks)**

7 a. What is an activation record? Explain the purpose of each item in an activation record. **(08 Marks)**

b. Explain the allocation strategy used to handle local variable length arrays on stack. **(06 Marks)**

c. What is garbage collection? List the performance metrics to be considered while designing garbage collector. **(06 Marks)**

8 a. Explain how DAG representation of basic blocks helps in optimization, with example. **(12 Marks)**

b. Describe the steps used to construct the following:

i) Basic clock from 3 address code

ii) Flow graph from basic blocks. **(08 Marks)**

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