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Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) (09 SCHEME) DEGREE EXAMINATION, APRIL 2015

IT/CS/PTCS 09 602—COMPILER DESIGN

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. State some compiler construction tools.
2. Construct the right most derivation for abab , for the grammar S->aSbS| bSaS| ξ .
3. Eliminate the left recursion in the grammar :

   E -> E + E / E* E / E* / (E)/ a / b / e / S

   S -> aS / bS / e
4. Differentiate between L- attributed and S- attributed definitions.
5. Construct a Directed Acyclic Graph (DAG) for the basic block given below and simplify the three address code using the DAG.

   a = b + c

   b = a – d

   c = b + c

   d = a – d

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Differentiate between a lexeme, token, and pattern. Give example.
7. Write rules for finding First and Follow sets for a given CFG. Find First and Follow sets of the symbols in the following grammar.

   E → TA

   A → + TA/∈

   T → FB

   B → *FB /∈

   F → (E)/id.

Turn over

8. Discuss the problems involved in the top down parsing with example.

9. Discuss the different parameter passing methods with example.

10. Explain the semantic rules for generation intermediate code for declaration statements.

11. Enumerate the issues in the design of a code generator.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. (a) Explain the various phases of compiler. Show the phase by phase translation of the statement minute = seconds/60.

Or

(b) (i) Why it is necessary to group the phases of the compiler ? How will you group the phases of the compiler ?

(3 marks)

(ii) Write a LEX program to recognize the identifiers, keywords and numbers in a language.

(7 marks)

13. (a) Write the algorithm for construction of predictive parser. Using the algorithm construct a predictive parser for the following grammar :—

$S \rightarrow (L) \mid a$

$L \rightarrow L,S \mid S$

Or

(b) Consider the following grammar :—

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

(i) Construct the SLR sets of items and their GOTO functions.

(ii) Construct SLR parsing Table.

(iii) Show the moves of the LR parser for the string aa*a+.

14. (a) Compare and Contrast different storage allocation schemes used in run time environments.

Or

(b) (i) What are synthesized and inherited attributes ? Give example. (3 marks)

(ii) Consider the following grammar :—

$S \rightarrow En;$

$E \rightarrow E_1 + T \mid T$

$T \rightarrow T_1 * F \mid F$

$F \rightarrow (E) \mid id$

(1) Draw an annotated parse tree for the expression: 7*9+5.

(2) Perform the bottom up evaluation and show the result.

(7 marks)

15. (a) Consider the following code fragment given below :—

```
Begin
    For i:=1 to n do
    For j:=1 to n do
        C[i,j] := 0;
    For k:=1 to n do
        C[i, J]:=C[i,J]+A[i,k]*B[k, j];
End
```

Perform the following :

(i) Partition into basic blocks.

(ii) Find the loops in the flow graph.

(iii) Perform code optimization.

Or

(b) What are the functions of code generation? Write a simple code generation algorithm. Show how the code is generated for the statement W: = (A-B) * (A-C-B) + (A-B-C). Assume only two registers are available.

(4 × 10 = 40 marks)