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M-190146

B.Tech. EXAMINATION, 2019

Semester VI (CBS)

COMPILER DESIGN

CS-603

Time : 3 Hours *Maximum Marks : 60*

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section A, B, C and D, while Section E is compulsory.

Section A

1. (a) Explain the concept of bootstrapping with an illustrative example. **5**

(b) Construct a DFA accepting the language $(a|b)^*abb$. **5**

2. (a) Explain in detail the role of lexical analyzer during compilation. **5**

(b) What are the different types of compilers ? Explain them in detail. **5**

Section B

3. (a) Consider the following grammar :

$E \rightarrow E + E \mid E * E \mid (E) \mid -E \mid \mathbf{id}$

Construct leftmost and rightmost derivations (if exist) for the sentence **id + id * id**. Further construct the corresponding parse trees for the sentence. **5**

(b) Explain operator precedence parsing algorithm in detail. **5**

4. (a) Explain recursive descent parsing in detail with an illustrative example. **5**

(b) Consider the following grammar :

$E \rightarrow E + T \mid T$

$T \rightarrow T * F \mid F$

$F \rightarrow (E) \mid \mathbf{id}$

Construct predictive parsing table for the above grammar. **5**

Section C

5. (a) Explain the dead code elimination technique with an illustrative example. **5**

   (b) Discuss in detail various principle source of optimizations with illustrative examples. **5**

6. Explain global data flow analysis with necessary equations. **10**

Section D

7. Write a short note on code generation from DAG. **10**

8. (a) Discuss about register allocation and assignment. **5**

   (b) In the context of peephole optimization, explain the elimination of redundant code optimization technique. **5**

Section E

(Compulsory Question)

9. (a) Give the format of a symbol table.

   (b) Write a regular expression over alphabet $\{a, b\}$ consisting of a least one a and at least one b. Explain your answer.

   (c) Discuss the properties of LR parser.

   (d) What are the benefits of intermediate code generation ?

   (e) Evaluate the following postfix expression using a stack :

   1 3 2 * + 4 –

   Show all the steps.

   (f) Differentiate between LR and LALR parser.

   (g) What are the applications of DAGs ?

   (h) Discuss the limitations of recursive descent parser.

   (i) Differentiate between shift-reduce and operator precedence parser.

   (j) What is a machine independent code optimization ? **2×10=20**

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