53 (CS 601) CMDG

2014

COMPILER DESIGN

Paper : CS 601

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* With an example discuss about the different phases of compiler design. 15

   (b) Consider the following grammar

   $$A \rightarrow AA+ \mid AA- \mid a$$

   Show that the string $aa+a-$ will be accepted or rejected by this grammar. 5

2. *(a)* With an example discuss why left recursion should be removed in case of TOP DOWN parsing. 10

(b) Define the terms : 2·5×4

(i) token

(ii) pattern

(iii) lexeme

(iv) handle.

3. Consider the regular expression $(a+b)^* abb$.

(a) Construct an NFA for the above expression. 5

(b) Convert the NFA to its equivalent DFA. 10

(c) Check whether state minimization of your DFA is possible or not. If state minimization is possible construct the minimized DFA. 5

4. (a) Write down the rules for computing the FIRST and FOLLOW of a given grammar. 5

(b) Using the above rules compute FIRST and FOLLOW for the grammar given below

$$S \rightarrow ABCd$$

$$A \rightarrow aBb \mid \in$$

$$B \rightarrow bCc \mid \in$$

$$C \rightarrow cDd \mid \in$$

$$D \rightarrow d.$$

15

5. (a) Construct a predictive parsing table for the following grammar

$$E \rightarrow TE'$$

$$E' \rightarrow +TE' \mid \in$$

$$T \rightarrow FT'$$

$$T' \rightarrow *FT' \mid \in$$

$$F \rightarrow (E) \mid id$$

15

(b) Show that the string $id + id * id$ will be accepted (use your parsing table for solving this). 5

6. Consider the following grammar

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

$$T \rightarrow (E) \mid id$$

(a) Construct the LR (0) items for the above grammar. 10

(b) Construct the SLR parsing table using the above items. 5

(c) Using your parsing table prove that the string $id + id + id\$$ will be accepted. 5

7. Consider the following grammar

$$A \rightarrow ABC \mid a$$

$$B \rightarrow b$$

$$C \rightarrow c$$

(a) Construct the LR (1) items for the above grammar. 10

(b) Write cannonical LR (1) parsing table algorithm. 5

(c) Using the above algorithm create the parsing table for the above grammar. 5

8. Consider the expression

$$((a+b)-((a+b)/(a-b))+(a-b))$$

(a) Create a DAG for the above expression. 5

(b) Generate the three address code for the above graph. 5

(c) Briefly discuss about *any one* of the code optimization techniques. 10
