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)* Consider the following instruction

$$a = b + c/d - e$$

With a clear diagram discuss the outputs of the different phases of compiler. 15

(b) Discuss the differences between syntax and semantics. 5

2. *(a)* What is left recursion ? With an example discuss the procedure to remove left recursion from a grammar. 2+8

(b) With an example discuss how to remove left factoring from a grammar. 5

(c) Consider the following grammar

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

check whether the grammar is ambiguous or not. 5

3. (a) Construct an NFA for $(a|b)^* abb$. 5

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

(c) Minimize the states of the above mentioned DFA. 5

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

(b) Consider the augmented grammar

$$E' \rightarrow E$$
$$E \rightarrow E+T \mid T$$
$$T \rightarrow T*F \mid F$$
$$F \rightarrow (E) \mid id$$

Construct the $LR(0)$ items for the above mentioned grammar. 15

5. Consider the following augmented grammar

$S' \rightarrow S$

$S \rightarrow CC$

$C \rightarrow cC \mid d$

(a) Construct the set of $LR(1)$ items. 10

(b) Design a canonical $LR(1)$ parsing table for the above problem. 10

6. *(a)* Construct the DAG for the following expression

$$x+((x-y)*Z)+(x-y)+(x-z)$$ 5

(b) Create three address code for the above mentioned problem. 5

(c) Briefly discuss about quadruples and triples. (2·5+2·5)

(d) Write a lex program to identify the strings accepted by the grammar $(a \mid b)^* c$. 5

7. *(a)* Consider the following intermediate code

1) $i = 1$
2) $j = 1$
3) $t1 = 10 * i$
4) $t2 = t1 + j$
5) $t3 = 8 * t2$
6) $t4 = t3 - 88$
7) $a[t4] = 0 \cdot 0$
8) $j = j + 1$
9) if $j <= 100$ goto (3)
10) $i = i + 1$
11) if $i <= 100$ goto (2)
12) $i = 1$
13) $t5 = i - 1$
14) $t6 = 88 * t5$
15) $a[t6] = 1 \cdot 0$
16) $i = i + 1$
17) if $i <= 100$ goto (13)

Find out the basic blocks and create the flow graph for the above problem. 7+3

(b) Briefly discuss about *any one* code optimization technique. 10
