53 (IT 603) CPDG

2017

COMPILER DESIGN

Paper : IT 603

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1. *(a)* With a neat diagram, explain the different phases of compilation. 10

   (b) Explain input buffering strategy, used in lexical analysis phase. 10

2. *(a)* Write the transition diagram for an unsigned number. 4

   (b) Show that the following grammar is ambiguous : $E \rightarrow E + E / E * E | (E) | id$. Write an unambiguous grammar for the same. 6

(c) Write a recursive descent parser for the grammar : $S \rightarrow cAd$, $A \rightarrow ab/a$ and for the input '*cad*' trace the parser. 10

3. (a) Construct the predictive parse table for the following grammar : 10

$$S \rightarrow a \mid \uparrow \mid (T)$$
$$T \rightarrow T, S \mid S$$

(b) Explain the working of a shift reduce parser. 5

(c) Explain handle pruning. Explain the same for the grammar

$E \rightarrow E+E \mid E*E \mid (E) \mid id$ and the input string is $id1+id2*id3$. 5

4. (a) Consider the following grammar : 10

$$S \rightarrow AS \mid b$$
$$A \rightarrow SA \mid a$$

Construct the SLR parse table for the grammar. Show the actions of the parser, for the input string "*abab*".

(b) Construct the CLR parse table for the following grammar : 10

$$S \rightarrow CC$$
$$C \rightarrow cC \mid d$$

5. (a) Explain the following with an example : 9

(i) Quadruples

(ii) Triples

(iii) Indirect triples

(b) Write an algorithm for the unification of a pair of nodes in a type graph. 6

(c) Explain syntax directed translation of switch statements. 5

6. (a) What is an activation record ? Explain its possible structure. 8

(b) Explain the design goals for garbage collector. 6

(c) Explain the desirable properties of memory manager. 6

7. *(a)* Generate the intermediate code for the statement : 8

sum = $A[i, j] + B[i, j]$. Construct DAG and simplify the code.

(b) What is next use information ? Write an algorithm to determine the liveness and next use info for each statement in a basic block. Apply the same for the following basic block : 12

3. $T1 = Add(A) - 4$
4. $T2 = 4 * i$
5. $T3 = T1[T2]$
6. $Sum = Sum + T3$
7. $I = I + 1$
8. *If* $I \leq 20$ *go to* 3