USN | | | | | | | | | | |

10CS63

Sixth Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
Complier Design

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1 a. Explain the various phases of complier. Show the translations for an assignment statement. Position = initial + rate * 60. clearly indicate the output of each phase. (12 Marks)

b. Write the regular definition for an unsigned number. Also write the transition diagram. (06 Marks)

c. What is printed by the following C code?

```
# define a (x + 1)
  int x = 2 ;
  void b( ) {int x  =1; printf("%d \n", a)'}
  void c( ){printf("%d \n", a); }
  void main( ) {b( ) ; c( );}.
```

(02 Marks)

2 a. Describe an algorithm used for eliminating the left recursion. Eliminate left recursion from the grammar :

$S \rightarrow Aa \mid b \qquad A \rightarrow Ac \mid Sd \mid a.$ (06 Marks)

b. Show that the following grammar is ambiguous :

$E \rightarrow E + E \mid E * E \mid (E) \mid id.$ Write an equivalent unambiguous grammar for the same. (06 Marks)

c. What are the key problems in top down parse? Write a recursive descent parser for the grammar :

$S \rightarrow cAd \quad A \rightarrow ab \mid a.$ (08 Marks)

3 a. Given the grammer :

$S \rightarrow aABb$

$A \rightarrow c \mid \in$

$B \rightarrow d \mid \in$

i) Compute FIRST and FOLLOW sets

ii) Construct the predictive parsing table

iii) Show the moves made by predictive parser on the input ; acdb. (10 Marks)

b. Explain with a neat diagram, the model of a table driven predictive parser. (05 Marks)

c. What is handle pruning? Give a bottom – up parse for the input : aaa * a++ and grammar :

$S \rightarrow SS + \mid SS * \mid a.$ (05 Marks)

4 a. Given the grammar :

$S \rightarrow CC$

$C \rightarrow cC \mid d$

i) Obtain the sets of canonical collection of sets of valid LR(0) items

ii) Design SLR parsing table. (10 Marks)

b. Write an algorithm used to compute LR (1) sets of items. (06 Marks)

c. Write a note on the parser Generator – Yacc. (04 Marks)

PART – B

5 a. Explain the concept of syntax – directed definition. (05 Ma

The SDD to translate binary integer number into decimal is shown below :

Productions	Semantic rules
$BN \rightarrow L$	BN.val= L. val
$L \rightarrow L_1 B$	L. val =2 $\times L_1$.val + B. val
$L \rightarrow B$	L. val = B .val
$B \rightarrow 0$	B. val = 0
$B \rightarrow 1$	B. val = 1

Construct the parse tree and annotated parse tree for the input string : 11001. (05 Marks)

c. Give a SDT for desktop calculator and show its parser stack implementation. (10 Marks)

6 a. Translate the arithmetic expression : a + - (b + c) into quadruples, triples and indirect triples. (06 Marks)

b. Give a semantic action for : $S \rightarrow$ if (B) S_1 else S_2 (06 Marks)

c. Develop SDD to produce directed acyclic graph for an expression. Show the steps for constructing the directed acyclic graph for the expression : a + a * (b – c) + (b – c) * d. (08 Marks)

7 a. Describe the general structure of activation record. Explain the purpose of each field in the activation record. (08 Marks)

b. A C – code to compute Fibonacci numbers recursively is shown below :

```
int f(int n)
 { int t, s ;
   if(n <= 2) return 1 ;
   s = f(n -1) ;
   t = f(n -2) ;
   return (s + t);
 }
```

i) Draw the activation tree for the call : f(5)

ii) What is the largest number of activation records that ever appear together on the stack? (06 Marks)

c. Explain the performance metrics to be considered while designing a garbage collector. (06 Marks)

8 a. Discuss the issues in the design of a code generator. (10 Marks)

b. Write three address code and construct the basic blocks for the following program segment.

```
sum = 0 ;
for(i = 0; i <= 10 : i ++)
   sum = sum +a[i] ;
```

(05 Marks)

Give the code generation process for operations. (05 Marks)

* * * * *