H Roll No. .....

TCS–601/TIT–601

B. TECH. (CSE/IT)
(SIXTH SEMESTER)
END SEMESTER EXAMINATION, 2018

COMPILER DESIGN

Time : Three Hours

Maximum Marks : 100

Note : (i) This question paper contains five questions with alternative choice.

(ii) All questions are compulsory.

(iii) Instructions on how to attempt a question are mentioned against it.

(iv) Each part carries **ten** marks. Total marks assigned to each question are **twenty.**

1. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

   (a) What is input buffering method ? What is the reason for using two buffers in buffer pair method ? What is advantages of sentinel method over buffer pair in reference of time complexity ?

   (4 + 3 + 3 = 10)

(b) Show the output after all seven phase of compilation for the following C-code and construct target assembly code :

$a = p/q - (r + t) * u/2$

(1 + 2 + 1 + 2 + 1 + 2 + 1 = 10)

(c) What do you mean by cross-compiler ? A Fortran compiler is given it provides the object code for Sun machine run on Sun machines. Another Fortran compiler that provides object code for Sparc machine written in Fortran language. Construct the cross-compiler for Fortran that run on Sparc machines. (4 + 6 = 10)

2. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) What is operator precedence grammar ? Write down rules for Operator precedence parsing and explain with suitable example. (2 + 4 + 4 = 10)

(b) Design CLR parsing table for the following grammar, then parse string (id) + id : (7 + 3 = 10)

E - > E + T | T T - > (E) | id

(c) Eliminate left recursion/left factoring (if required) from grammar and then

construct unambiguous-predictive parser table :

A - > (B) | a B - > B, A | A

and then parse the string ((a, a), a, (a)). (3 + 4 + 3 = 10)

3. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Define Syntax Directed Definition (SDD). Explain rules of S-attributed and L-attributed SDD with the help of example. (2 + 4 + 4 = 10)

(b) Give the semantic rules for the following Grammar and then construct a-notated parse tree for input string $id_1 + (id_2 + id_3) * id_4$: ($id_1 = 2$, $id_2 = 4$, $id_3 = 6$ and $id_4 = 5$).

E - - > E + T | T

T - - > T*F|F F - - > (E) id

(4 + 6 = 10)

(c) (i) Explain run time memory allocation for any C-program. 5

(ii) Explain Activation Record and Activation Tree. (3 + 2 = 5)

4. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) (I) Write down semantic rules for Assignment statements. 5

(II) Give the semantic rules for following grammar : (3 + 2 = 5)

(i) S - > if (B) then S_1 else S_2

(ii) S - > while (B) then S_1

(b) Explain the following with help of example : (3 + 3 + 4 = 10)

(i) Triples

(ii) Quadruples

(iii) DAG

(c) Translate the following line of code into three address code, then construct Basic Block and Flow Graph :

```
while (n > 0)
        {if (i > j || j = = 5 && j < k)
                p ++;
        else
                r ++;
        n - -;)
```

5. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) What is peephole optimization ? Discuss the different situations with example where peephole optimizations take place. (4 + 6 = 10)

(b) (i) Explain register allocation and assignment strategy. 5

(ii) Design Lex-Yacc Code addition and multiplication of integer constant (digits) using the following grammar : E --> E + E | E * E | (E) | digits where digits = [0 – 9] +. 5

(c) (i) Translate the following line of code into intermediate code. 4

(ii) Construct basic block and flow graph 3

(iii) Find dominators of each block : 3

```
m = 10;
while (m ! = 0)
        {if (a > 0);
                p++;
        else
                q ++;
        m - -;
        }
```