H Roll No. .....

TCS–601

B. TECH. (CSE) (SIXTH SEMESTER) END SEMESTER EXAMINATION, 2022

COMPILER DESIGN

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) What is the role of lexical analyzer ? How can we specify the tokens ? Write some operation of regular expression. (CO1)

(b) What are the cousins of compiler ? Discuss briefly. (CO1)

(c) Draw a neat diagram of all the phases of compiler and explain them briefly. (CO1)

P. T. O.

2. (a) Construct a predictive parsing table for the following grammar, where S is a start symbol : (CO2)

$S \rightarrow cAtSB|a$

$B \rightarrow eS \mid \in$

$A \rightarrow b$

(b) Construct LL(1) parsing for the following grammar : (CO2)

$S \rightarrow aB \mid aC \mid Sd \mid Se$

$B \rightarrow bBc \mid f$

$C \rightarrow g$

(c) Construct an LALR(1) parsing table for the following grammar : (CO2)

$S \rightarrow Aa \mid bAf \mid df \mid bda$

$A \rightarrow d$

3. (a) What do you mean by syntax directed definition ? Explain synthesized and inherited attribute in detail. (CO3)

(b) Compare call by value result and call by reference parameter passing mechanism. Can they produce different results ? When ?

(c) Using the following SDTS, construct a parse tree for the given expression : 4 + 8 * 6 – 3, also compute E.val. (CO3)

$E \rightarrow E + E$ {E.val = E.val + E.val}

$E \rightarrow E * E$ {E.val = E.val * E.val}

$E \rightarrow E - E$ {E.val = E.val – E.val}

$E \rightarrow$ id {E.val = id.num}

4. (a) Explain the following categories of intermediate code with example : (CO4)
Three Address Code, Quadruples, Triples

(b) Consider the following switch statement :

(i)
```
switch(i+j)
{
  case 1: a=b + c
  default: p=q + r
  case 2: x=v + w
}
```

(ii)
```
switch(ch)
{
case 1: c=a + b;
        break;
case 2: c=a – b;
        break;
```

write the three address code for the given switch case. (CO4)

P. T. O.

(c) Construct a DAG for the given expression (a – b) + C * (d/e). Also generate the three address code for the same. (CO4)

5. (a) What do you mean by peephole optimization ? What are the characteristics of peephole optimization ? Optimize the following code : (CO5)

```
p=0
i=1
do
    p = p + A[i] * B[i]
    i = i + 1
while (I < = 20).
```

(b) Write short notes on the following : (CO5)

(i) Loop jamming and unrolling

(ii) Identification of common sub-expression and elimination

(iii) Copy Propagation

(iv) Dead code elimination

(c) Write the short notes on LEX and YACC. Write a LEX program to identify the count the number of comment line (single line and multiple line) in a 'C' language program. (CO5)