B. Tech Odd Semester Examination, February, 2023

Computer Science & Engineering

(5th Semester)

Course No.: CSECC-28

(Compiler Design)

Full Marks: 50

Pass Marks: 25

Time: 2 hours

Note:
1. Attempt any five questions.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the right margin indicate full marks for the question.
6. All the mathematical symbols and abbreviations have their usual meanings.

1. Let us consider a grammar

$$expr \longrightarrow \texttt{const}\ expr\_tail$$

$$expr\_tail \longrightarrow \texttt{-}\ \texttt{const}\ expr\_tail \mid \epsilon$$

If the grammar uses inherited attributes then write the attribute rule of the above grammar. For the input expression 9-4-3 construct an annotated parse three of the above inherited attribute grammar 5+5

2. (a) What is loop invariant code motion? Do the loop invariant code motion of the following code:

(i)

```
for( i = 0; i<= 2 ; ++i )
if( denom != 0 )
array[i] += (numer/denom);
```

(ii)

```
inti = 0;
while (i< n)
{
x = y + z;
a[i] = 6 * i + x * x;
++i;
}
```

(b) Define basic block. Write the use of basic blocks in code optimization 1+2+32+2

3. Translate the following executable statement of the C program main( ) 5+5

```
{
        inti;
        int a[10]
        i=1
        while(i<=10){
            a[i]=0; i=i+1;
           }
}
```

Into a (i) Syntax tree (ii) Three address code

4. Write short notes on the following:

(a) S-attributed definitions.

(b) L-attributed definitions.

(c) Dependency graph. 3+4+3

5. (a) What is the use of Symbol table in compilation process? List out various attributes stored in the symbol table.

(b) Explain different schemes of storing name attribute in symbol table. 1+45

6. (a) What is DAG? Construct the DAG for the following statements

```
t8 = d + e
t6 = a + b
t5 = t6 - c
t4 = t5 * t8
t3 = t4 - e
t2 = t6 + t4
t1 = t2 * t3
```

(b) What are the legal evaluation orders and names for the values at the nodesfor the DAG of problem (a). 2+44

7. Consider the following grammar and construct the SLR parsing table

$E \rightarrow E + T \mid T$

$T \rightarrow TF \mid F$

$F \rightarrow F^* \mid a \mid b$ 10

8. Write algorithm for constructing canonical LR parsing table. 10

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