

CSE304

Enrol. No. ....

[ET]

END SEMESTER EXAMINATION : APRIL-MAY, 2024

**COMPILER CONSTRUCTION**

Time : 3 Hrs.

Maximum Marks : 60

**Note:** Attempt questions from all sections as directed.

**SECTION - A (24 Marks)**

Attempt any four questions out of five.

Each question carries 06 marks.

1. Write the output of all phases of a compiler for the following statement. Assume a, b and c of type float.

$$a = a + b * c * 2$$

2. Find the FIRST and FOLLOW for the following grammar. Also determine whether the grammar is LL(1) or not?

$$S \rightarrow BDC | DbC | Ca$$

$$A \rightarrow CD | da$$

[  
]  
]  
X

+  
=

P.T.O.

$c \rightarrow h|\epsilon$  $D \rightarrow g|\epsilon$ 

3. Write a Regular expression for the following language:

(i) Accepting all strings which start and end with different letters over the alphabet  $\Sigma = \{a,b\}$

(ii) Accepting all strings in which the number of a's is even over alphabet  $\Sigma = \{a,b\}$

4. Generate the three address code for the following code fragment.

```
while(a > b)
{
    if(c < d)
        x = y + z;
    else
        x = y - z;
}
```

5. Explain the advantages of using a Directed acyclic graph (DAG). Construct a DAG representation of the following:

$$a = b + c \quad c = a + d \quad d = b + c \quad e = d - b \quad a = e + b$$

**SECTION – B (20 Marks)**

*Attempt any two questions out of three.*

*Each question carries 10 marks.*

6. Construct a predictive parsing table (PPT) for the following grammar:

$$E \rightarrow E + T \mid T \quad T \rightarrow id[X] \mid id[] \mid id \quad X \rightarrow E, E \mid E$$

Also Parse the string  $id[id, id]$  using Predictive parsing table.

7. (a) Find the number of Shift/Reduce (SR) and Reduce/Reduce (RR) conflicts in the canonical collection of LR(0) items for the following grammar:

$$\begin{aligned} \textit{Stmts} &\rightarrow \textit{Stmt} \mid \textit{Stmts}; \textit{Stmts} & \textit{Stmt} &\rightarrow \textit{Var} = E \\ \textit{Var} &\rightarrow id[E] \mid id & E &\rightarrow id \mid (E) \end{aligned} \quad (6)$$

- (b) What is the main job of a symbol table? Discuss any one of the methods to implement a symbol table. (4)

8. (a) Discuss the working of the LEX tool with a suitable diagram. (4)
- (b) Discuss the following with respect to code optimization

- (i) Peephole optimization
- (ii) Reduction in strength
- (iii) Code motion

(6)

**SECTION - C****(16 Marks)***(Compulsory)*

9 (a) Consider the grammar:

$$S \rightarrow Aa \mid bAc \mid Bc \mid bBa, \quad A \rightarrow d, \quad B \rightarrow d$$

Prove (or check) that the above grammar is

(i) LR(0) or not ?

(ii) SLR(1) or not ?

(iii) CLR(1) or not ?

(iv) LALR(1) or not ?

(12)

(b) Convert the following Operator precedence Parsing table (OPPT) into an Operator function table (OFT). What are the advantages and disadvantages of OFT over OPPT? (note: , is a comma operator).

a	(	)	,	\$
a	>	>	>	
(	<	<	=	<
)	>	>	>	
,	<	<	>	>
\$	<	<		

(4)

(1000)