

## Part-B

20181CSE0621

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FCSE-10

1] CODE:-

```

for( i=1 ; i<n-1 ; i++ )
{
    a = 2 * b;
    c = pow(b, 2);
    if(1)
        printf("Presidency University");
        printf(" Welcomes You");
    }
else {
    printf("VTU University");
    printf(" Welcomes You");
}
    
```

→ Removing Dead Code:- [in the else block]

```

for( i=1 ; i<n-1 ; i++ )
{
    a = 2 * b;
    c = pow(b, 2);
    if(1)
        printf("Presidency University");
        printf(" Welcomes You");
    }
    
```

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Q.2] Valid Lexemes:-

Mark1, @123, Test-1, abc, A123b, A1B2C3,  
\$abc, @dbc.

Consider,  $w \rightarrow$  Set of letters [a|b...|z]  
 $D \rightarrow$  Set of digits [1|2|...]  
 $S \rightarrow$  Set of special characters

Regular Expression:-

$$\Rightarrow (w|D|S)^+ \cdot D^* \cdot w \cdot D^* \cdot w \cdot D^*$$

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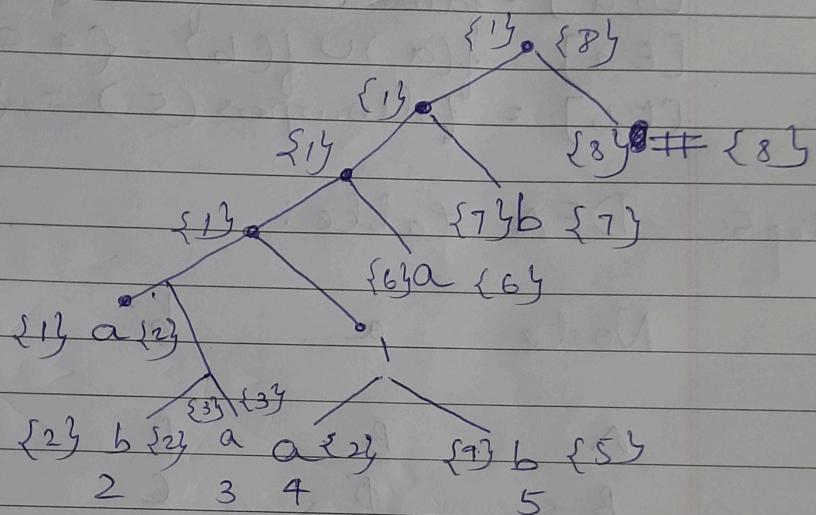
## Part-C

$$1] a(b|a)(a|b)^*ab$$

Step 1: Augmented Regular Expression:

$$a(b|a) \cdot (a|b)^* \cdot a \cdot b \cdot \#$$

Step 2: Syntax tree:



| Step 3: Node | Follow pos |
|--------------|------------|
| 1            | {23}       |
| 2            | {4,5,63}   |
| 3            | {4,5,63}   |
| 4            | {4,5,63}   |
| 5            | {4,5,63}   |
| 6            | {73}       |
| 7            | {83}       |
| 8            | 0.         |

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## Step 4: Transition States:

$$\{1\} \rightarrow A$$

$$[A, a] = B(\tau) = \{2\} \rightarrow B$$

$$[A, b] = \emptyset$$

$$[B, a] = \emptyset$$

$$[B, b] = \text{follows}(2) \rightarrow \{4, 5, 6\} \rightarrow C$$

$$[C, a] = \text{follow}(a) \cup \text{follow}(b) = \{4, 5, 6, 7\} \rightarrow D$$

$$[D, a] = \text{follow}(5) \cup \text{follow}(4) = \{4, 5, 6, 8\} \rightarrow E$$

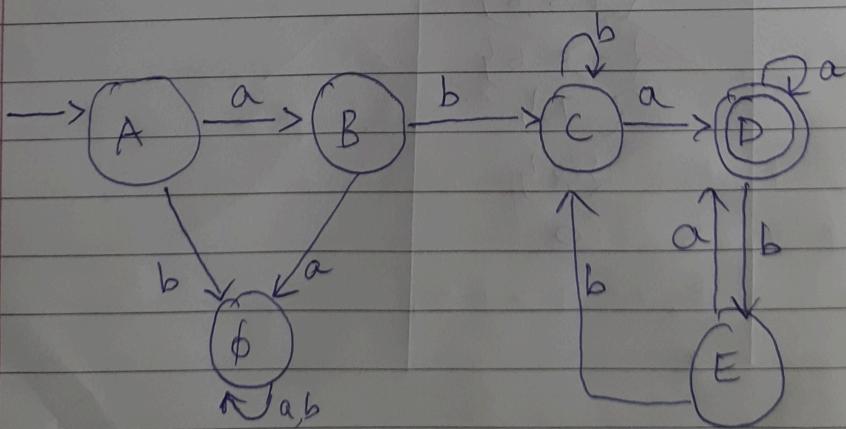
$$[E, a] = f(a) \cup f(b) = \{4, 5, 6, 7\} \rightarrow D$$

$$[E, b] = \text{follows}(5) = \{4, 5, 6\} \rightarrow C$$

## Step 5: DFA Table:

| Node | a           | b           |
|------|-------------|-------------|
| A    | B           | $\emptyset$ |
| B    | $\emptyset$ | C           |
| C    | D           | C           |
| D    | D           | E           |
| E    | D           | C           |

## Step 6: DFA diagram:-



20181CSE0621

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2]  $\text{Var1} = \text{Var2} * \text{Var3} ? \text{Var4} / \text{Var5}$

Given  $\text{var5} = 60$ .

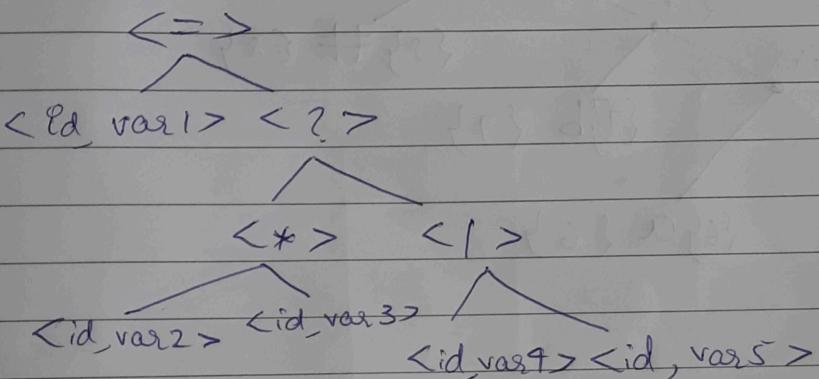
$$\text{Var1} = \text{Var2} * \text{Var3} ? \text{Var4} / 60.$$

## (i) Lexical Analysis:

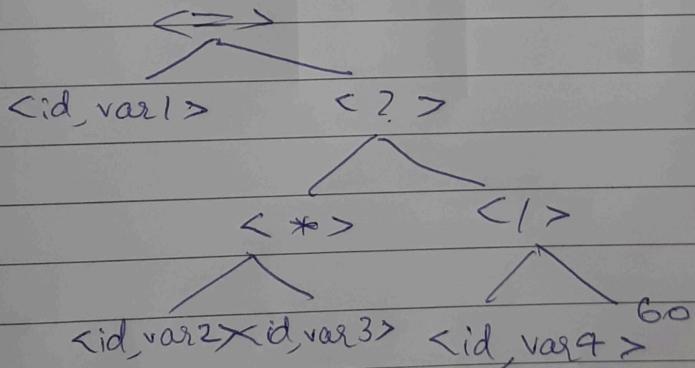
$$<\text{id}, \text{var1}> \Leftrightarrow <\text{id}, \text{var2}> (*) <\text{id}, \text{var3}> <?>$$

$$<\text{id}, \text{var4}> </> <\text{id}, \text{var5}>$$

## (ii) Syntax Analysis:



## (iii) Semantic Analysis:



## (iv) Intermediate code generation:

$$t_1 = \text{var5} = 60$$

$$t_2 = <\text{id}, \text{var4}> * t_1$$

$$\text{id}_1 = t_2$$

(v) Code Optimizer:

$$t_1 = \frac{e_{d_1}}{60}$$

$$e_{d_1} = t_1$$

(vi) Code generation.

LOAD id<sub>1</sub>, R<sub>0</sub>

DIV R<sub>0</sub>, #60

STR R<sub>0</sub>, id<sub>1</sub>