

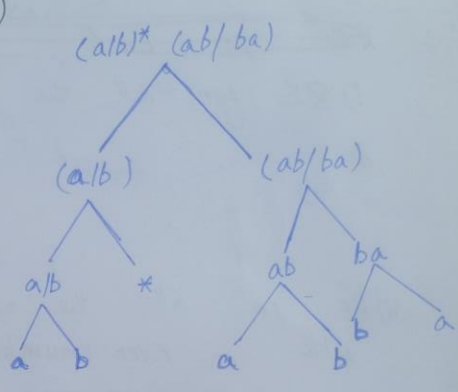
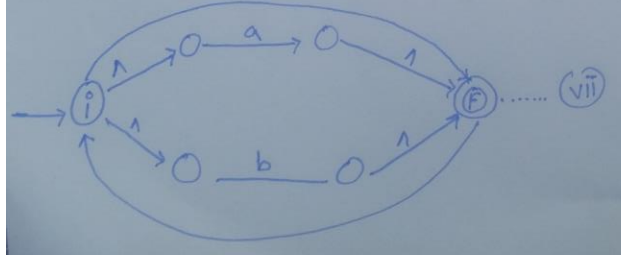
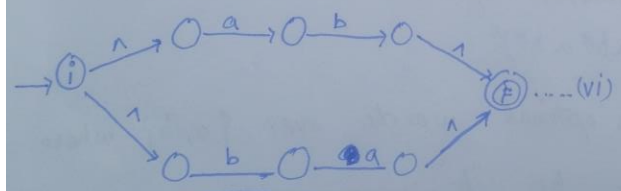
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 Subject : Theory Of Automata
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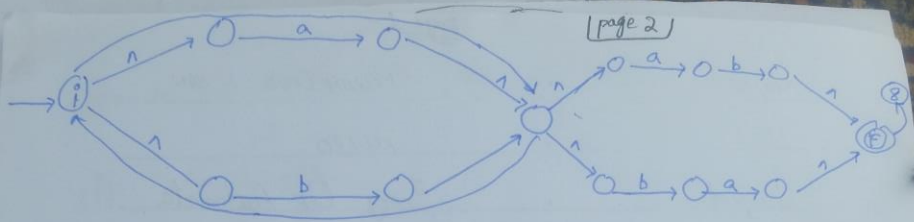
* Q1: Ans $(a/b)^* (ab/ba)$ * * * * *

Parsing

Atomic Symbols:

- ① $a \rightarrow \textcircled{F} \dots (i)$
- ② $b \rightarrow \textcircled{F} \dots (ii)$
- ③ $a \rightarrow \textcircled{O} \rightarrow b \rightarrow \textcircled{F} \dots (iii)$
- ④ $b \rightarrow \textcircled{O} \rightarrow a \rightarrow \textcircled{F} \dots (iv)$
- ⑤ $\begin{matrix} \textcircled{i} \xrightarrow{\wedge} \textcircled{O} \xrightarrow{a} \textcircled{O} \xrightarrow{\wedge} \textcircled{F} \dots (v) \\ \textcircled{i} \xrightarrow{\wedge} \textcircled{O} \xrightarrow{b} \textcircled{O} \xrightarrow{\wedge} \textcircled{F} \end{matrix}$





This is the Final NFA for the given Expression $(a/b)^* (ab/ba)$.

* Q2: RE for Each of the following *

i) RE for all the optional words over $\{a, b\}$.

Ans: $(a/b)^*$

ii) RE for all the optional words over $\{a, b\}$ with an Even number of 'a'.

Ans: $(b^* a b^* a b^*)^*$ OR $b^* (a b^* a)^+ b^*$

iii) RE for all the optional words over $\{a, b\}$ with an Odd Number of 'a'.

Ans: $b^* a (b^* a b^* a b^*)^*$

iv) RE for all the optional words over $\{a, b\}$ where last symbol must be 'b'.

Ans: $(a+b)^* b$

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(v) RE for all the optional words over $\{a, b\}$ where first symbol must be "b".

Ans $b(a+b)^*$

Q3: (a) Prove that $(a/b)^* \neq a^*b^*$

Ans

$(a/b)^*$	}	$a^* b^*$
$(a/b)^0 = 1$		$a^0 b^0 = 1$
$(a/b)^1 = a \text{ or } b, a, b$		$a^1 b^0 = a$
$(a/b)^2 = \{aa, ab, ba, bb\}$		$a^1 b^1 = ab$
$(a/b)^* = \{\epsilon, a, b, aa, ab, \dots\}$		$a^* b^* = \{\epsilon, a, ab, b, ba, \dots\}$

it proves that $(a/b)^* \neq a^*b^*$.

B) (i) $(a/b) b (a/b)^*$

Ans Language for words over $\{a, b\}$ which starts with 'aa' or 'ab' or 'ba' or 'bb' followed by b and ends with any letter.

(ii) $(a/b)^* b (a/b) (a/b)$

Ans $L = \{a, b\}$ where string starts with any letter followed by 'b' and ends with 'aa' or 'ab' or 'ba' or 'bb'

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(iii) $(a/b)^* (aa/bb)$

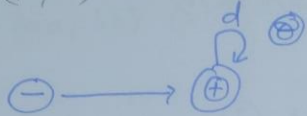
Ans. All the words over $\{a,b\}$ Having at least 2 a's or 2 b's at the end.

(iv) $(aa/bb) (a/b)^*$

Ans. All the words over $\{a,b\}$ having at least 2 a's or 2 b's at the beginning.

Q4. Design NFA for the following without parsing.

(i) $(+/-)d^+$



(ii) $(a/b)^* (aaa/bbb) (a/b)^*$

