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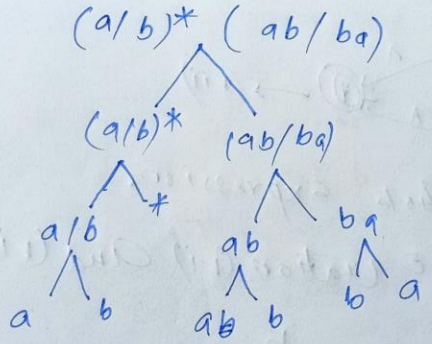
ID # 14146

Subject Theory of Automata.

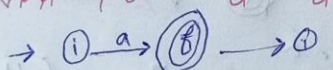
Q1: Parse the Given RE into its Individuals OR Atomic Symbols and then design an NFA ?

$(a/b)^* (ab/ba)$.

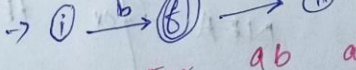
Ans:



=> NFA For a as;

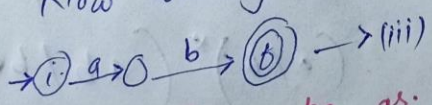


=> NFA For b bs;

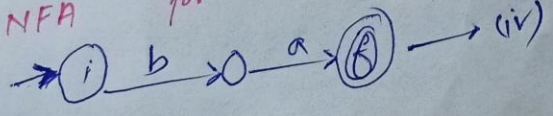


=> NFA For ab as;

Now combing eq (i) and eq (ii).



=> NFA for ba as;



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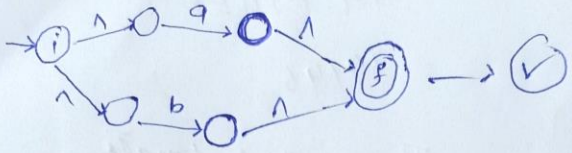
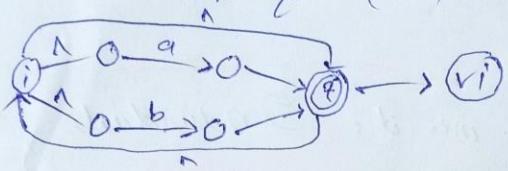
⇒ Now NFA for a/b;

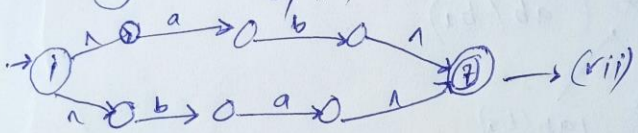


⇒ Now NFA for (a/b)*



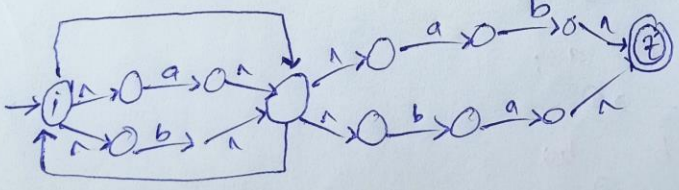
⇒ NFA for (ab/ba)

Combing (iii) Eq (iv)



⇒ NFA for whole expression.

By combining Equation (vi) and (vii).



⇒ This is the Final NFA for the Given Expression

(a/b)* (ab/ba)

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Q2: Design RE for each of the following. (3)

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

(iii) RE for all the optional words over {ab} with in Odd Number of "a"

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

(iv) RE for all the optional words over ({a b} where Last Symbol Must be "b"

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

(v) RE for all optional words words over {a b} where First Symbol Must be "b".

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

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Q3: A): Prove that $(a|b)^* \neq a^* b^*$ (4)

Ans: $(a|b)^*$

$(a|b)^0 = 1$

$(a|b)^1 = a$ or b, a, b.

$(a|b)^2 = \{aa, ab, ba, bb\}$

$(a|b)^* = \{\wedge, a, b, aa, ab \ldots\}$

$a^* b^*$

$a^0 b^0 = 1$

$a^1 b^1 = ab$

$a^* b^* = \{\wedge, a, ab, b, b \ldots\}$

Hence it is prove that $(a|b^*)$ is Not Equal to $a^* b^*$.

(B) :→ Q3: (i) $(a|b)(a|b)\, b\, (a|b)^*$

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: The Language $L = \{a, b\}$ where Strings Starts with any letter followed by "b" and ends with "aa" or "ab" or "ba" or "bb".

(iii) $(a|b)^*\, (aa|bb)$

Ans: Language $L = \{a, b\}$ where Last Symbol must be two "aa" or two b's. String must end with "aa" or "bb".

(iv): $(aa|bb)\, (a|b)^*$.

Ans: Language $L = \{a, b\}$ where first Symbol must be aa or bb String must start with "aa" or "bb".

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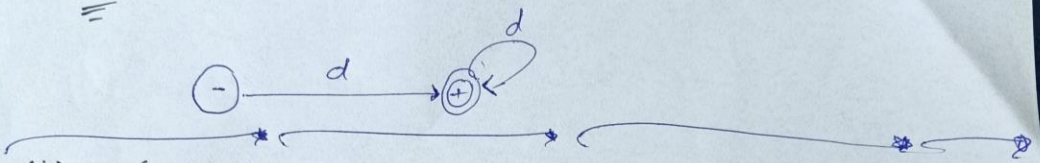
Q4: Design NFA For The following without Parsing? (5)

(i) (+/-) d+.

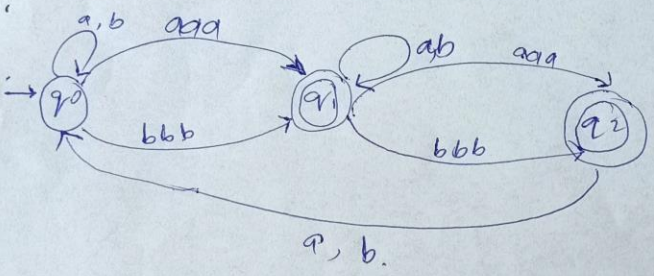
(ii) (a/b)*(aaa/bbb)(a/b)*

Ans:



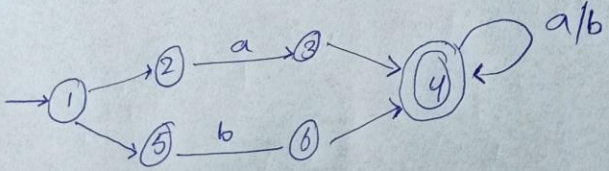
(ii): (a/b)*(aaa/bbb)(a/b)*

Ans:



(iii) (a/b)* (aaa/bbb)(a/b)*.

Ans:



{ aaa, bbb, aaaa bb aaa bbb... }

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