

Final paper

Theory Of Automata

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Question no 1

Parse the given RE into its Individual / Atomic Symbols and then design an NFA.

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

QUESTION:-1

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

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$(a/b)^* \quad ab \quad ba$

$a \quad b \quad b \quad a$

\Rightarrow NFA for a ;

\rightarrow $(i) \xrightarrow{a} (f) \rightarrow (i)$

\Rightarrow NFA for b ;

\rightarrow $(i) \xrightarrow{b} (f) \rightarrow (ii)$

\Rightarrow NFA for ab ;

combining (i) and (ii)

\rightarrow $(i) \xrightarrow{a} (f) \xrightarrow{b} (iii)$

\Rightarrow Now NFA for ba ;

\rightarrow $(i) \xrightarrow{b} (f) \xrightarrow{a} (iv)$

Now, NFA for a/b ;

\rightarrow $(i) \xrightarrow{a} (f) \rightarrow (v)$

\rightarrow Now NFA for $(a/b)^*$

\rightarrow Now NFA for $(a/b/ba)$

combining (iii) and (iv)

\rightarrow $(i) \xrightarrow{a} (f) \xrightarrow{b} (vii)$

Major NFA: (vi) and (vii)

\rightarrow $(i) \xrightarrow{a} (f) \xrightarrow{b} (vii)$

\rightarrow $(i) \xrightarrow{b} (f) \xrightarrow{a} (vii)$

$(a/b)^* \quad (ab/ba)$

Question no 2

Design 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*(ab*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".

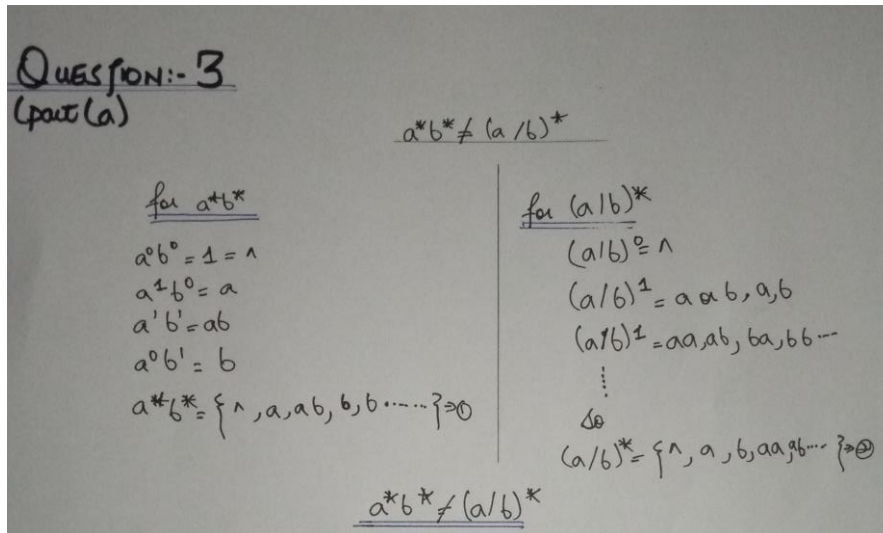
Ans) **(a+b)*b**

v. RE for all the optional words over {a b} where First symbol must be "b".

Ans) **b(a+b)***

Question no 3

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



(b). Derive language descriptions (statements) for the following RE.

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

Ans) Language for these are $\{a,b\}$ which starts with "aa" or "ba" or "bb" followed by b can be end 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"

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

Ans) $L = \{a,b\}$ where last symbol must be two 'a' and two b's

String must end with 'aa' or 'bb'

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

Ans) $L = \{a,b\}$ where first symbol must be 'aa' or 'bb' string must start with 'aa' and 'bb'

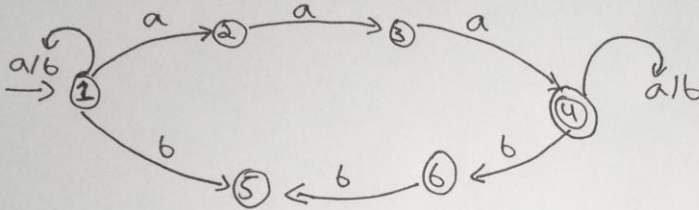
Question no 4

Design NFA for the following without Parsing.

QUESTION:-4

Part: b

$$RE = (a/b)^*(aaa/bbb)(a/b)^*$$



{aaa bbb aaaabb aaabbb}

QUESTION:-4

Part: a

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

