

IQRA NATIONAL UNIVERSITY
PESHAWAR

SUBMITTED BY SHARIQ

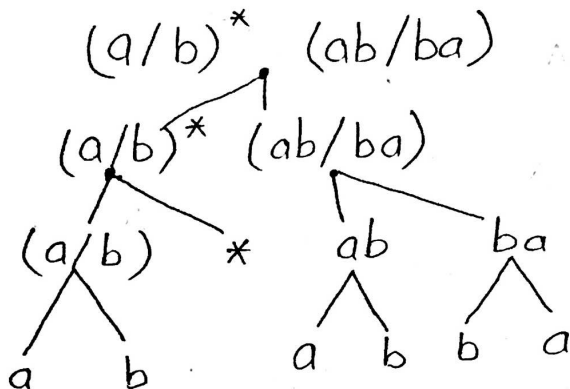
SUBMITTED TO SIR ADIL

ID 13698

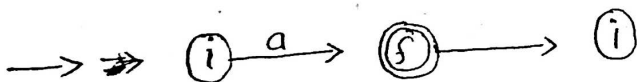
DEPT CS.

Q1:- $(a/b)^* (ab/ba)$

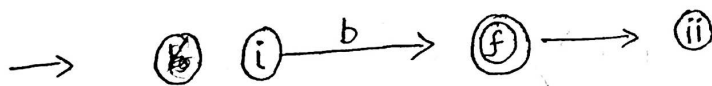
\Rightarrow Parsing



\Rightarrow NFA For As a ;

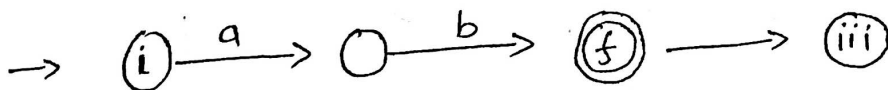


\Rightarrow NFA For As b ;

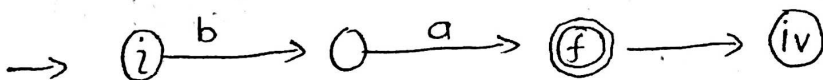


Now NFA For ab ;

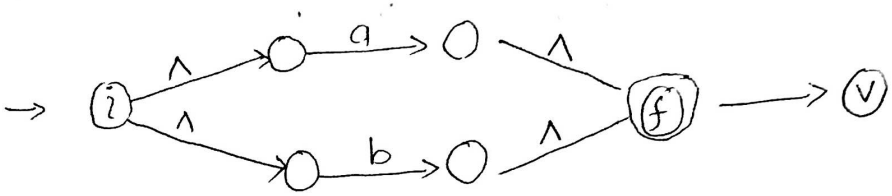
Comining ① and ②



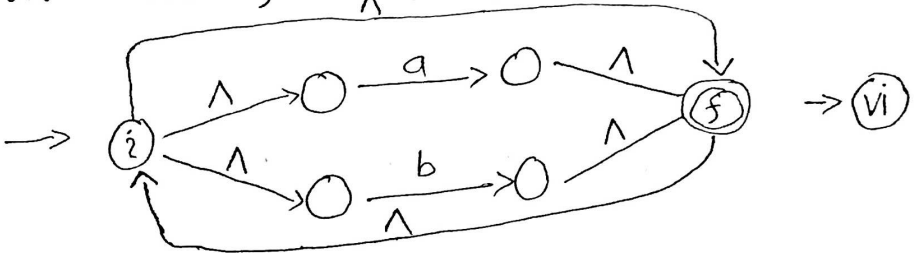
Now NFA For ba ;



Now NFA for a/b ,

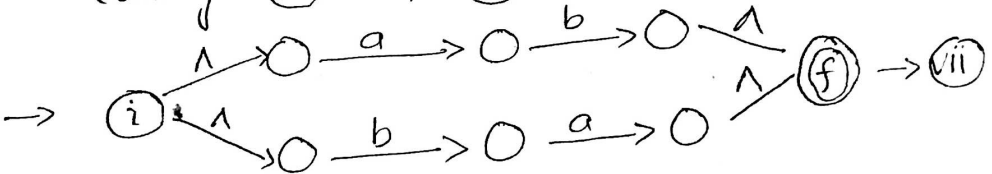


Now NFA for $\Lambda (a/b)^*$

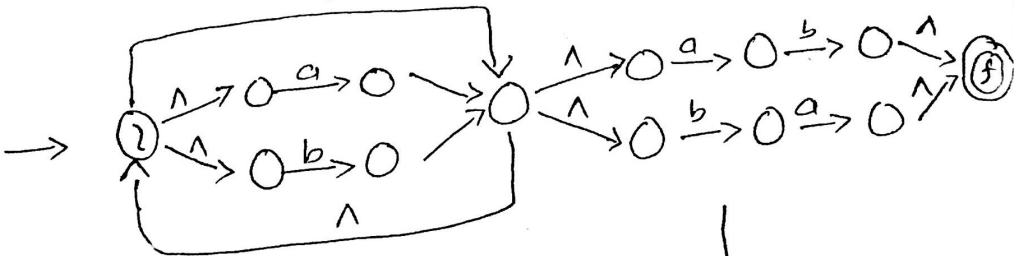


Now NFA for $(a\emptyset b / ba)$

Coming \textcircled{iii} \cup \textcircled{iv}



Major NFA Λ \textcircled{vi} \cup \textcircled{vii}



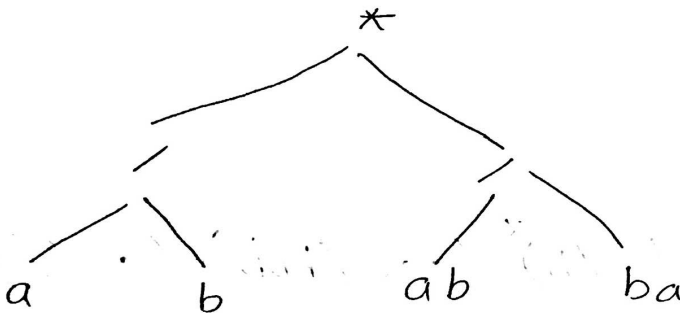
$(a/b)^*$

$(a\emptyset b / ba)$

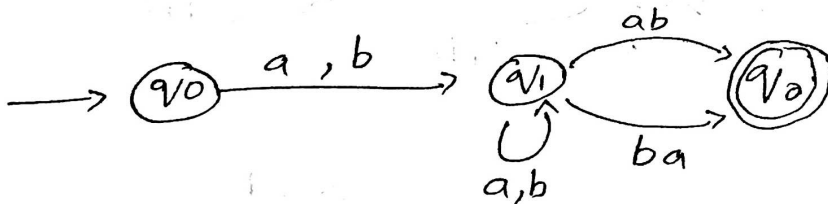
Q1 ~~on~~ ~~se~~ in simple

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

Parse Tree



→ NFA



Q2:- Regular Expression

① RE for word over $\{a, b\}$

Solution:-

$$(a+b)^*$$

② $\{a, b\}$ with even number of a

Solution:

$$(aa + b)^*$$

③ $\{a, b\}$ with odd number of "a"

Solution:

$$(aaa + b)^*$$

or

$$b^* a (b^* a b^* a b^*)^*$$

④ $\{a, b\}$ where last word must be b

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

⑤ $\{a, b\}$ where first word is b

Sol:

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

Q3 (a) Prove that

$$a^* b^* \neq (a/b)^*$$

for

$$a^* b^*$$

$$a^0 b^0 = 1 = \Lambda$$

$$a^1 b^0 = a$$

$$a^1 b^1 = ab$$

$$a^0 b^1 = b$$

$$a^* b^* = \{\Lambda, a, ab, b, ba, \dots\}$$

for

$$(a/b)^*$$

$$(a/b)^0 = \Lambda$$

$$(a/b)^1 = a \text{ or } b, a, b$$

$$(a/b)^1 = aa, ab, ba, bb, \dots$$

$$\textcircled{1} (a/b)^* = \{\Lambda, a, b, aa, ab, \dots\}$$

So from the final

result we conclude that

$$a^* b^* \neq (a/b)^*$$

Q3 (b) Derive language description

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

language for word over $\{a, b\}$ which start with 'aa' or 'ba' followed by b and end with any letter.

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

$L = \{a, b\}$ where letter string start with any letter followed by 'b' and end with "aa" or "ba" or bb

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

$L \{a, b\}$ where last word must be two 'a's or two 'b's

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

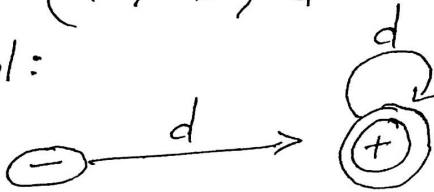
$L = \{a, b\}$ where first symbol must be aa bb

String must start with 'aa' or 'bb'

Q4: NFA

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

Sol:



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

Solution:

