

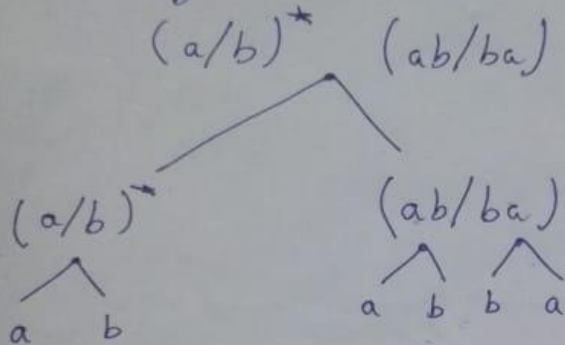
(1)

Name: Shahab-ud-din

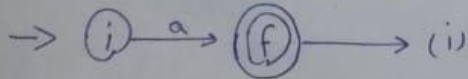
ID:-13791

Q1 Parse the given RE into its individual symbol and then design an NFA.

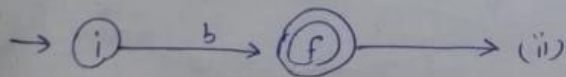
=> Parsing



=> NFA for As a :-

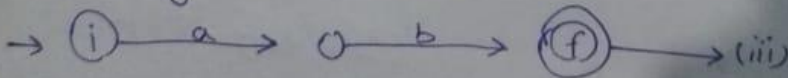


=> NFA for As b :-

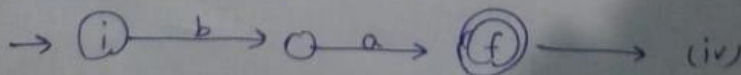


Now NFA for ab :-

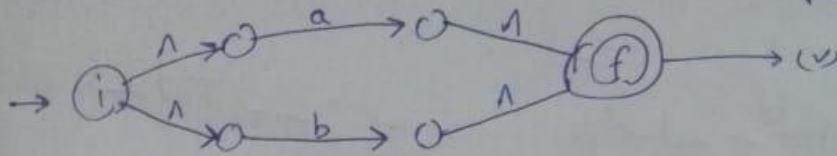
combing (i) and (ii)



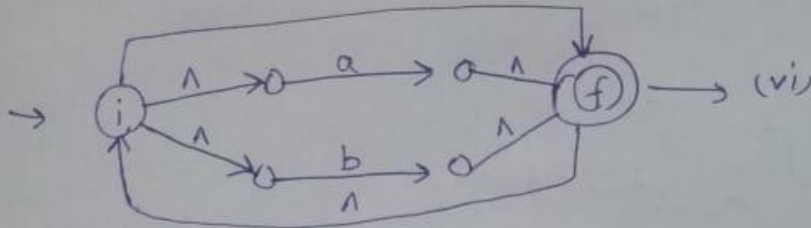
Now NFA for ba :-



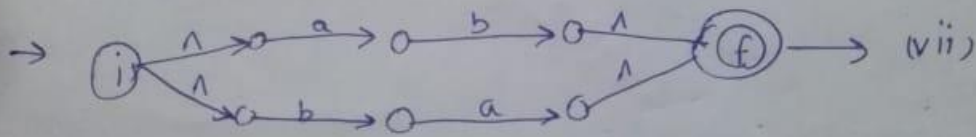
Now NFA for a/b,



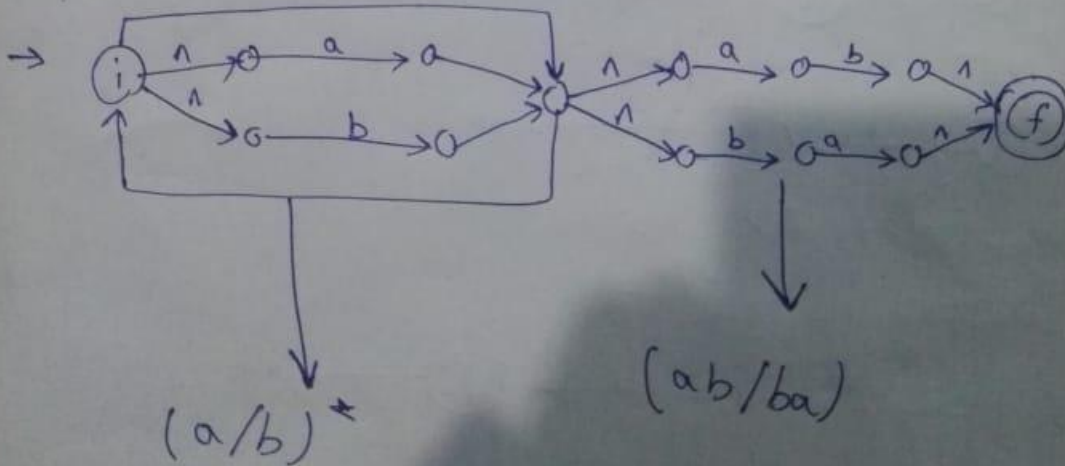
Now NFA for $(a/b)^*$



Now NFA for (ab/ba)
combining (iii) and (iv)



Major NFA (vi) and (vii)



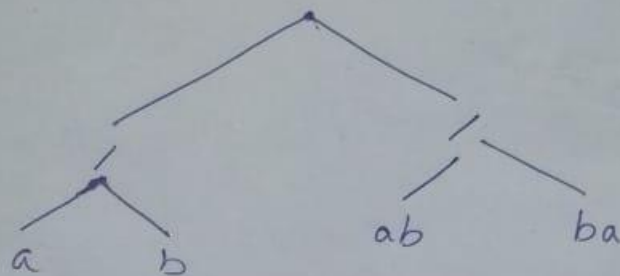
Ans

Page = (3)

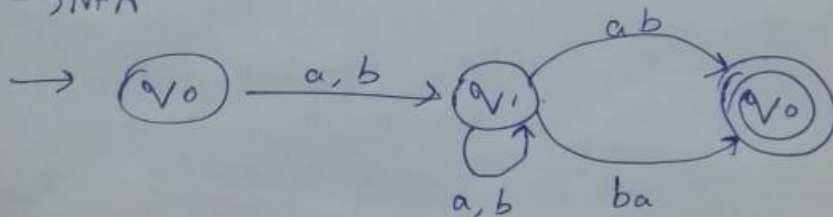
Q1 in Simple

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

Parse Tree



→ NFA



As

Name :- Shahab-ud-din

ID :- 13791

(4) ID:13791

Name:- Shahab-ud-din

Q2 Design RE for each of the following.

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

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

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

Ans: $(aa + b)^*$

(iii) RE for all the optional word over $\{a, b\}$ with an odd Number of "a".

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

(iv) RE for all the optional word over $\{a, b\}$ where Last symbol must be "b".

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

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

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

(5)

Name:- Shahab-ud-din

ID: 13791

Q3 (a) Prove that

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

for

sol: $a^* b^*$

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

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

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

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

$$a^* b^* = \{1, a, ab, b, bc, \dots\} \times 1$$

$$(a/b)^*$$

$$(a/b)^0 = 1$$

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

$$(a/b)^2 = aa, ab, ba, bb, \dots$$

So,

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

Result:-

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

Ans

Name: - Shahab-ud-din

ID: 13791

Q3 (b) Derive language description.

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

Ans: 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 string start with any letter followed by 'b' and end with 'aa' or 'bb' or bb

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

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

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

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

(7)

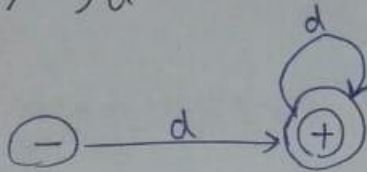
Name:- Shahab-ud-din

ID:- 13791

Q4 Design NFA for the following without Parsing.

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

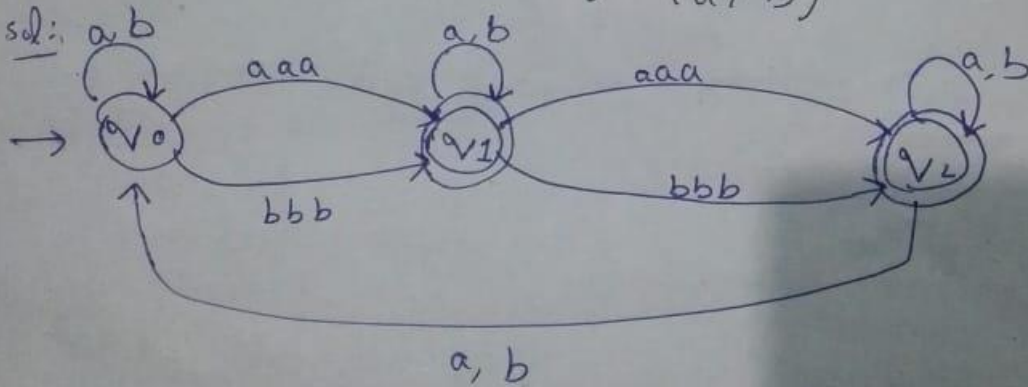
sol:



Ans

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

sol:



Ans