

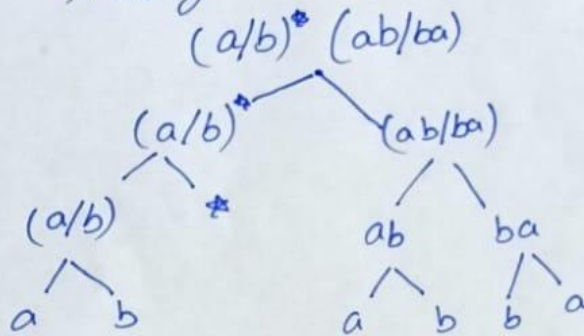
P = 1

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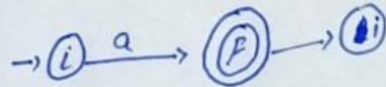
Qno1: Parse the given RE into its Individual/Atomic Symbols and design an NFA

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

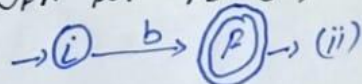
⇒ Parsing



⇒ NFA for AS a;

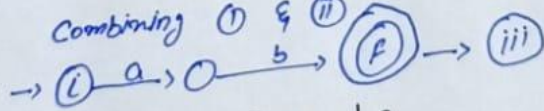


⇒ NFA for AS b;

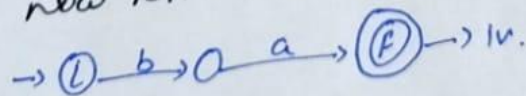


⇒ Now NFA for ~~AS~~ AS a, b

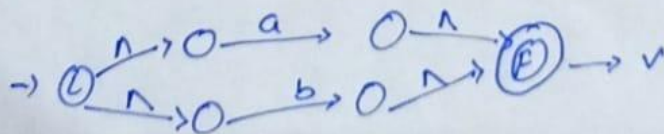
Combining ① & ②



⇒ Now NFA for ba

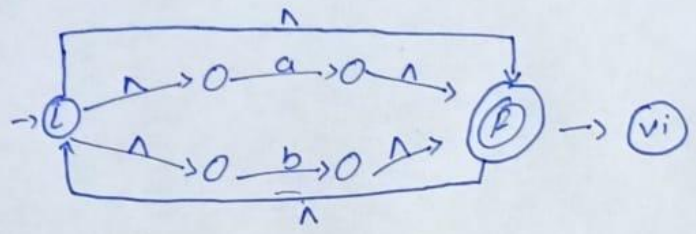


⇒ Now NFA for a/b



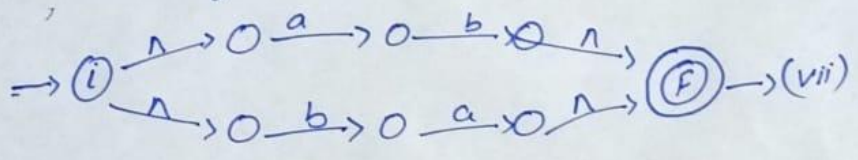
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Now NFA for  $(a/b)^*$

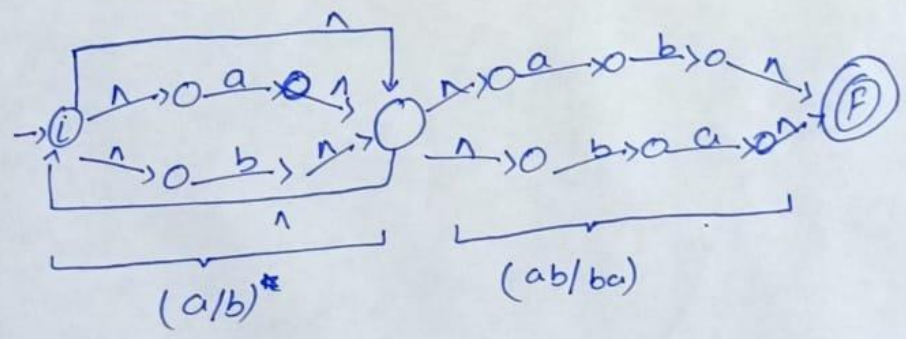


⇒ Now NFA for  $(ab/ba)$

Combining (iii) & (iv)



Major NFA (vi) & (vii)



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Qno: Design RE for each of the following

(i) RE for all optional word over  $\{a, b\}$ .

$$(a/b)^*$$

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

$$b^*(ab^*a)^+b^* \text{ or } (aabb)^*$$

(iii) RE for all optional word over  $\{a, b\}$  with the odd number of 'a'

$$b^*a(b^*ab^*a)^+ \text{ or } (aaab)^*$$

(iv) RE for all optional word over  $\{a, b\}$  where last symbols must be "b"

$$(ab)^*b$$

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

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

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Qno 8 Part (a)

Prove that

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

for  $a^* b^*$

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

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

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

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

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

for  $(a/b)^*$

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

$$(a/b)^1 = a, ab, ba, b$$

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

So

$$(a/b)^* = \{ \Lambda, a, b, aa, bb, \dots \} \rightarrow \infty$$

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

(b) Derive language description for the following RE

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

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

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

$L = \{a, b\}$  where string starts with any letter followed by 'b' and end



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 end with 'aa' or 'ab', 'ba' or 'bb'.

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

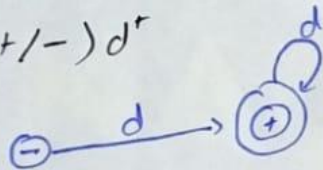
$L = \{ a^n b^n \}$  where last symbols must be two 'a' or two 'b'

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

$L = \{ a^n b^n \}$  where first symbol must be aa or bb string must start with 'aa' or 'bb'

Qno4 Part (a)

$(+/-) d^r$



Part (b)  $(a/b)^* (aaaa/bbbb) (a/b)^*$

