

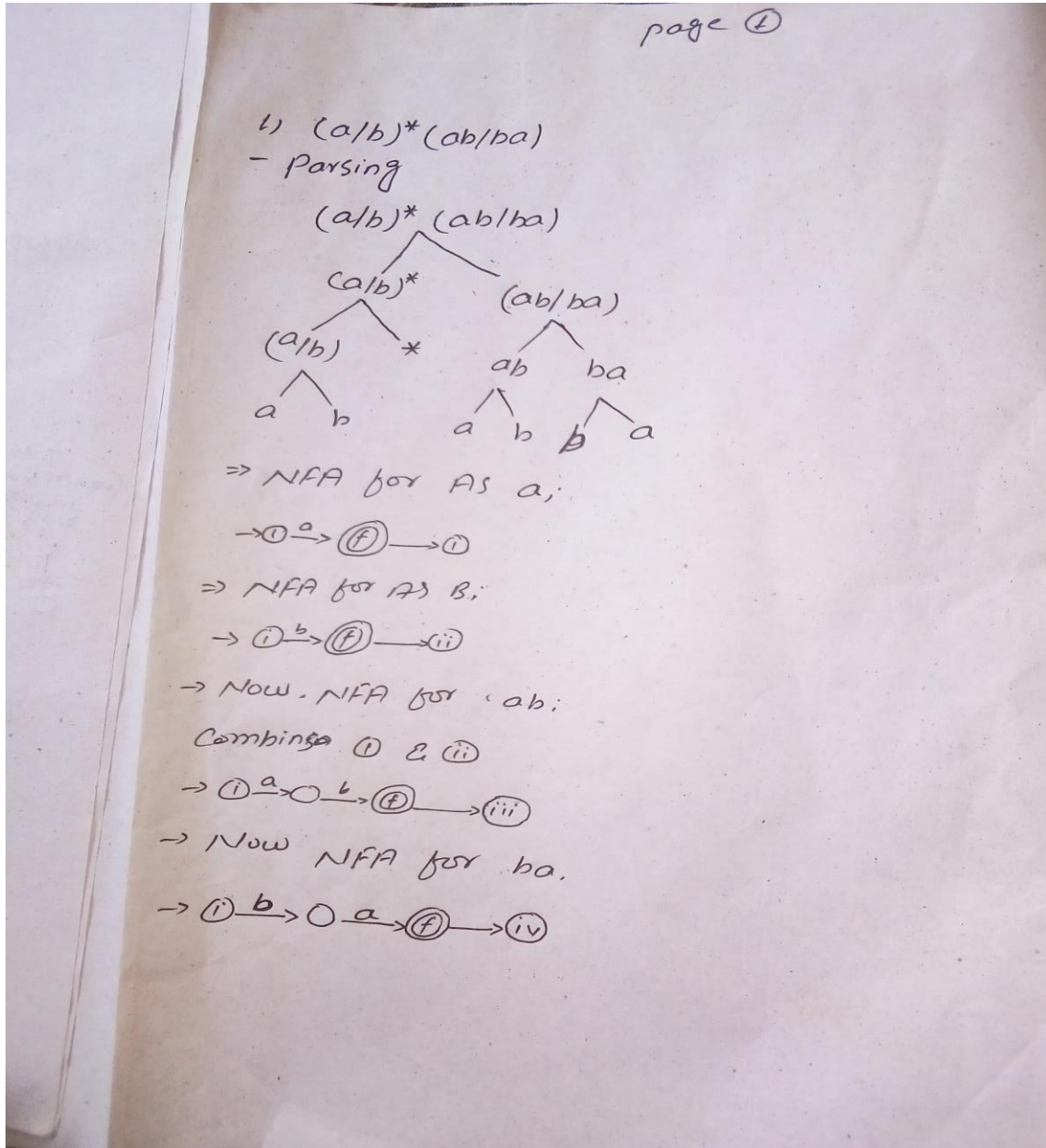
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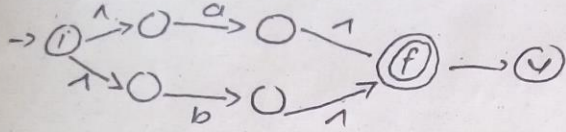
SEMESTER **6th**

Q#1. Parse the given RE into its Individual / Atomic Symbols and then design an NFA.

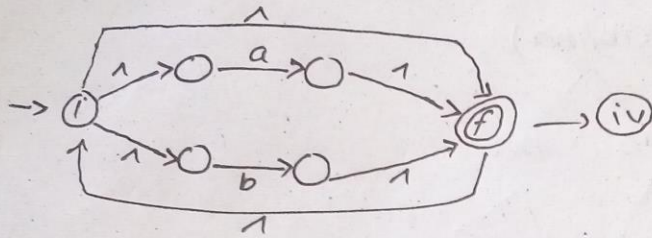
$(a / b)^* (ab / ba)$



Now, NFA for a/b

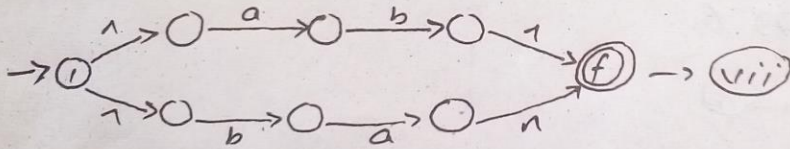


Now NFA for $(a/b)^*$

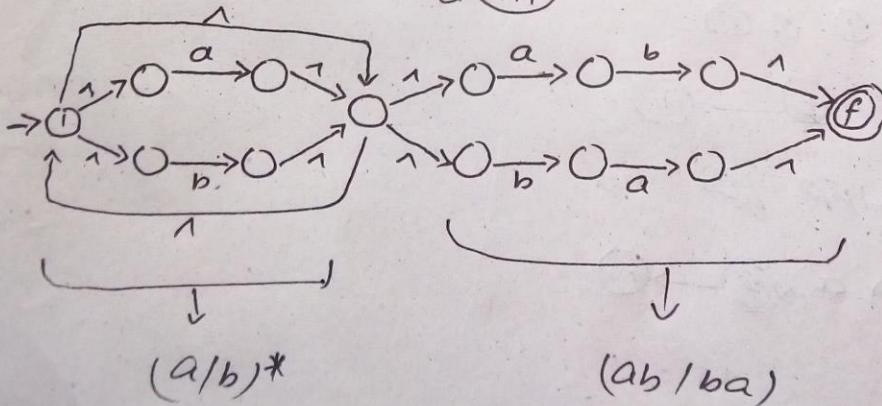


NFA for ab/ba

Combining (ii) & (iv)



major NFA (vi) & (vii)



Q#2. Design RE for each of the following.

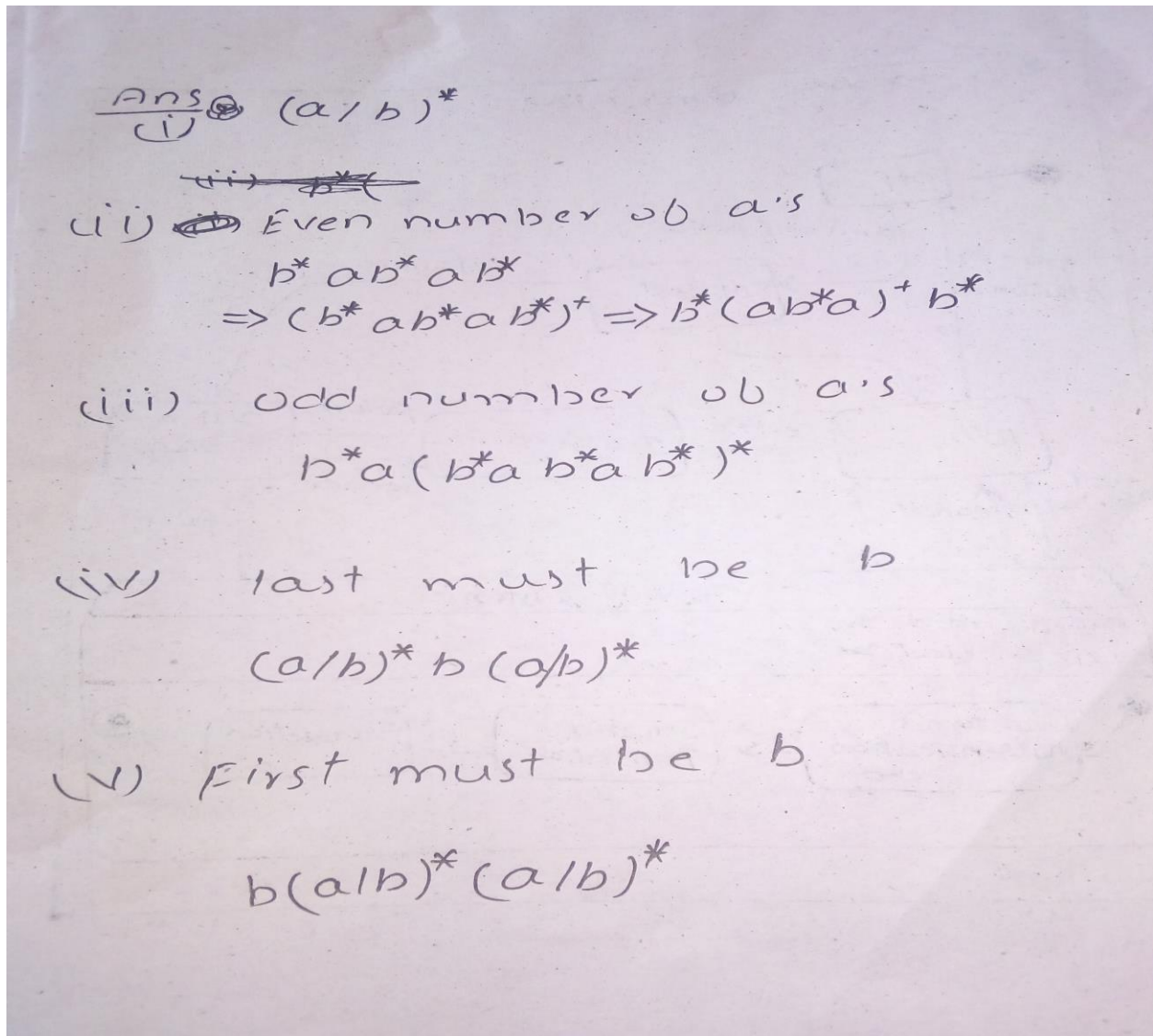
i. RE for all the optional words over {a b}.

ii. RE for all the optional words over {a b} with an Even Number of "a".

iii. RE for all the optional words over {a b} with an Odd Number of "a".

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

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



Q#3. (a). Prove that
 $(a/b)^* \neq a^*b^*$

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

for a^*b^*
 $a^0b^0 = 1 = 1$

$a^1b^0 = a$

$a^2b^1 = ab$

$a^0b^1 = b$

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

for $(a/b)^*$

$(a/b)^0 = 1$

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

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

so

$(a/b)^* = \{1, a, b, aa, ab, \dots\}$ (2)

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

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

(b) .

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

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

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

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

$L = \{a, b\}$ where last symbol must be two a's or two b's
String must end with 'aa' or 'bb'

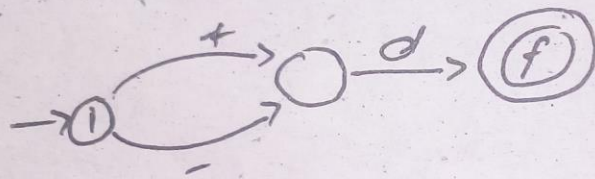
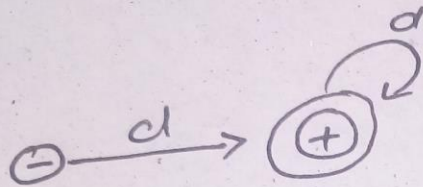
(iv) $(aa/bb)(a/b)^*$

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

Q#4. Design NFA for the following without Parsing.

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

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

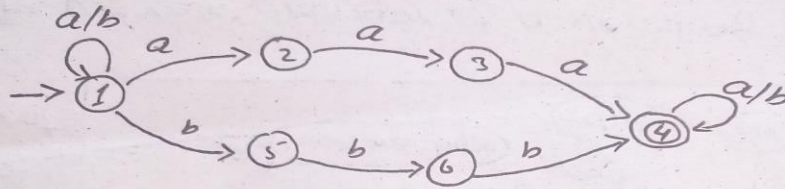


Q#4. Design NFA for the following without Parsing.

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

Ans Part (b)

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



{aaa, bbb aaaabbb aaa bbbb}

