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ID # 6991

BS COMPUTER SCIENCE

THEORY OF AUTOMETA

FINAL EXAM
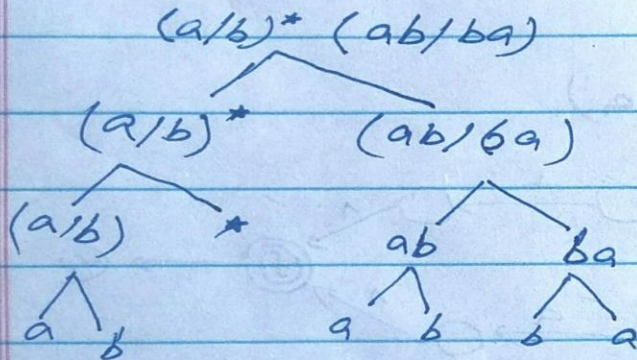
DATE: 24/06/20

Q:NO:1

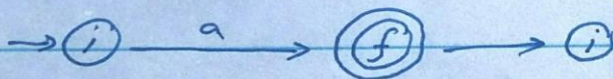Parse the given R.E into its Individual / Atomic Symobls and then design an NFA.
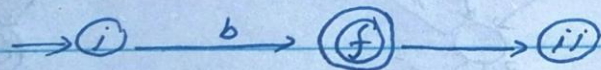
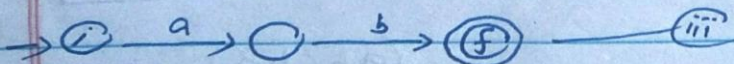$$(a/b)^* (ab/ba)$$

Ans:—

Parsing:—

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

NFA for As a;

NFA for As b;

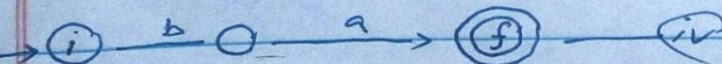NFA For ab;

combining ① & ②

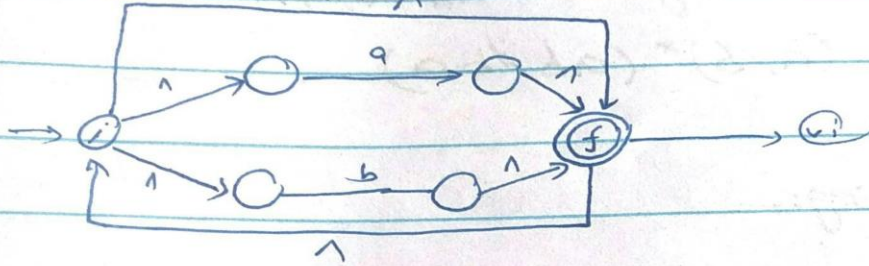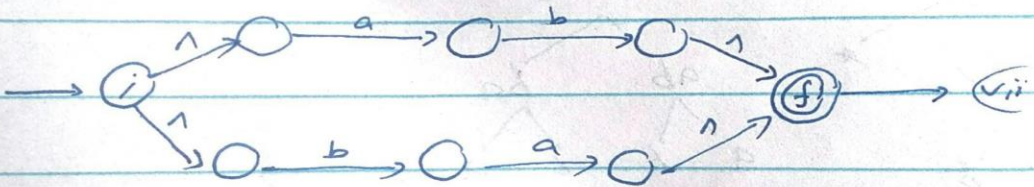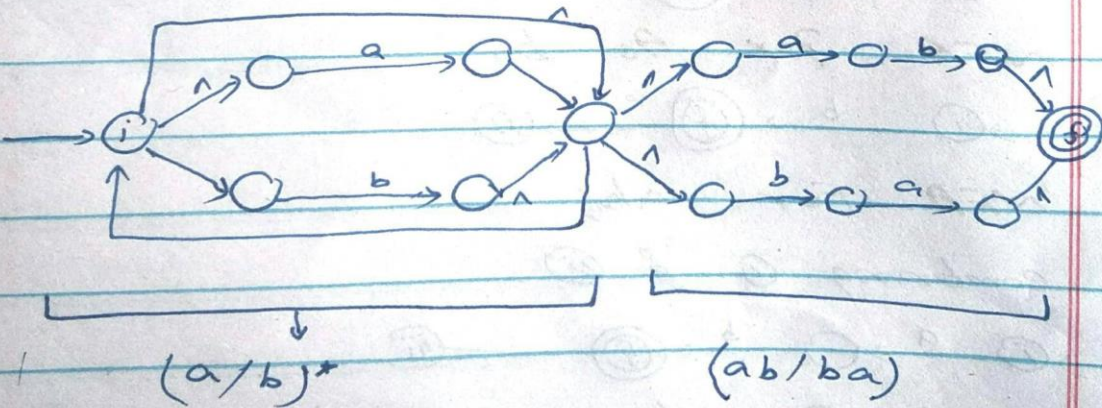

NFA for ba;

NFA for a/b,

NFA for (a/b)*

NFA for (ab/ba)

Major NFA (vi) & (vii)

(a/b)*   (ab/ba)

Q:No:2

Design RE For each Following.

i) RE For All the optional words over $\{a, b\}$.

Ans:—

$\{\Lambda, a, b, aa, ab, ba, bb, aaa\ldots\}$

General combination.

ii) RE For words over $\{a, b\}$ an Even Number of "a"

$b^* a b^* a b^*$

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

iii) RE For all the optional words over $\{a, b\}$ an odd number "a".

Ans:—

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

iv) RE For all the words over $\{a, b\}$ The Last symbol must be "b".

Ans:—

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

v) RE over $\{a, b\}$ first symbol is "b"

$b (a + b)^*$

Q.NO: 3 (a)

Prove that :—

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

Ans:—

For	For
$a^* b^*$	$(a/b)^*$
$a^0 b^0 = 1 = \Lambda$	$(a/b)^0 = \Lambda$
$a^1 b^0 = a$	$(a/b)^1 = a, \text{ or } b \quad a, b$
$a^1 b^1 = ab$	$(a/b)^2 = aa, ab, ba, bb \dots$
$a^0 b^1 = b$	$\vdots$
$a^* b^* = \{\Lambda, a, ab, b, ba \dots\}$	$(a/b)^* = \{\Lambda, a, b, aa, ab \dots\}$

Home prove   that

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

Q:NO: 3 (b)

Derive Language description
For the Following RE.

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 end with any Letter.

ii) (a/b)* b (a/b)(a/b)

L = {a, b} where strings start
with any Letters Followed
by b and end with 'aa', 'ab', ba, or 'bb'.

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

L = {a, b} where Last symbol
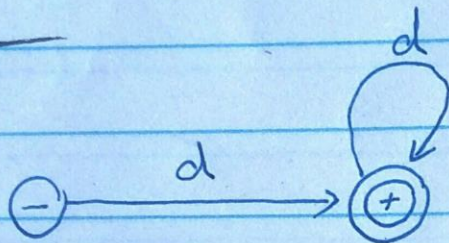must be two 'aa' or two b's
string must end with 'aa' or 'bb'

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

L = {a, b} where First symbol
must be aa or bb string
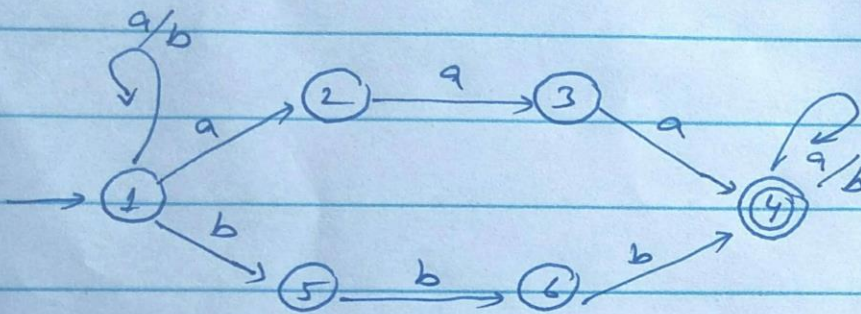must start with 'aa' or 'bb'.

Q:NO: 4 (a)

$(+/-)\ d^{+}$

Ans:—

Q:NO: 4 (b)

Design NFA for the following with out Parsing.

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

$\xi \mathcal{P}R$