Inspiring Excellence

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Subject : Automata And Computability
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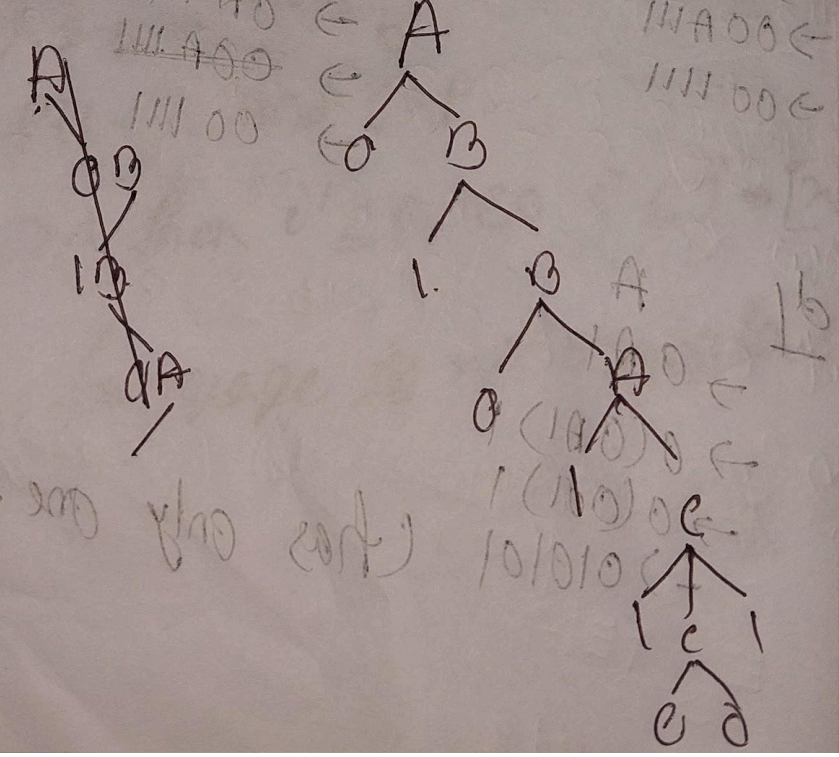
Section : 18

(4) (a)

A
→ 0A
→ 1B
→ 0AA
→ 1C
→ 1C1
→ 1C1
→ 1001C1
→ 1001C1
→ 10011

A
→ 0B
→ 01B
→ 010A
→ 0101C
→ 01011C1
→ 010110C1

(b)



(1)

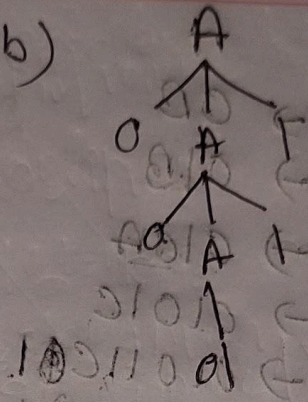
5 (a) A

→ 0A1

→ 00A11

→ 00111

b)



c) another-1

A

→ 0A11

→ 00A111

→ 00 1111

another-2

A

→ A11

→ 0A111

→ ~~00A1111~~

→ 00 1111

d)

A

→ 0A1

→ 0(0A1)1

→ 0(001)1

→ 010101

(has only one parse tree)

e) another - 1

$S \rightarrow 0A \mid 1C$

$A \rightarrow 1S \mid \epsilon$

$C \rightarrow 0S \mid \epsilon$

Q1 Let L is regular & p is the pumping length. $s = a^{p+1} b^p$ so $i = p+1$, $j = p$ and $i > j$ where $s \in L$

Now $s = xyz$ where $|xy| \leq p$, $|y| > 0$

So y consists only a

Now let $y = a^k$, $k > 0$

So, $xy^0z = a^{p+1-k} b^p$

$i' = p+1-k$ and $j = p$

if $k \geq 1$, then $i' \leq p$ so $i' \leq j \Rightarrow [xy^0z \notin L]$

So, the language is not regular.

b/ Let L is a regular language and p is the pumping length where $w = 0^p 1^p 1^p 0^p$

so $a+b = c+d$ and $a+b \neq c+d$ if $2p \rightarrow w \in L$

Split $w = xyz$ where $|xy| \leq p, |y| > 0$

so y consis only of 0s from the first block of 0s. Now, let $y = 0^k$ [$k > 0$]

Pumping i = 2 gives $xy^2z = 0^{p+k} 1^p 1^p 0^p$

Now $a = p+k$, $b = p$ so $a+b = 2p+k$

but $c+d = 2p$ so $a+b \neq c+d$

so the language is not regular.

2/a) Let p will be the pumping length & $s = 0^n$ where $n \geq p$.

Now split $s = xyz$ such that $|xy| \leq p$.

$|y| > 0$. ~~Sentence~~ Since $|xy| \leq p$, y contains only 0s. So $y = 0^k$ where $k = k > 0$.

Pumping $xy^n z = 0^{(p+1)+k}$

But $(p+1)+k$ is not a factorial

So ~~xyz~~ $xy^2z \notin L$ violating rule of pumping lemma ~~re~~ rule