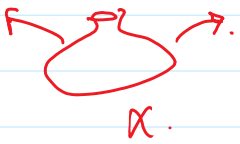
lecture 20:-

CONTEXT FREE GRAMMAR.

→ Terminals:- they can not be replaced.

→ Non Terminals:- They can be replaced.

Context Free Language.



GRAMMAR.

Terminal:- {a}.

R1 S → aS

R2. S → λ.

L = {λ, a, aa, aaa, ---}.
= a*.

"λ" S → λ R2.

"a" S → aS —R1.
a.λ →R2.
a

"aa" S → aS. —R1
→ aaS —R1
→ aa.λ. —R2
→ aa.

a*.

Terminal = {a}.

GRAMMAR.

Ex for a*.

R1 S → SS.

R2 S → a

R3. S → λ.

Multiple ways for generating the same language.

R2

λ R3.

"aaa" $S \to SS$ R1.

$S \to SSS$ R1.

$S \to aSS$ R2

$\to aaS$ R3.

$\to aaa$ R3.

"aaaa" $S \to SS$ —

$\to SSS$ —

$\to SSSS$ —

$\to aaaa$ —

Ex. $(a+b)^*$. Grammar.

R1 $S \to aS$.

R2 $S \to bS$.

R3. $S \to \lambda$.

"λ" $S \to \lambda$. R3.

"a" $S \to aS$. R1.

$\to a\cdot\lambda$ R3.

$\to a$.

"b" $S \to bS$ — R1.

$S \to b\cdot\lambda$ — R3.

b.

"aabba".

$S \to aS$ R1.

$S \to aaS$ R1

$S \to aabS$ R2.

$\to aabbS$ "

$\to aabbaS$ R1.

$aabbbah$ R3.

$aabba$.

Ex $(a+b)^+$. R1. $S \to aS$

R2 $S \to bS$.

R3 $S \to a$

R4. $S \rightarrow b$.

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

$L = \{a, aa, ba, aaa, aba, baa, bba\}$

R1 $S \rightarrow aS$
R2 $S \rightarrow bS$.
R3 $S \rightarrow a$

aba.

$S \rightarrow aS$
$\rightarrow abS$.
$\rightarrow aba$.

GRAMMAR. $(a+b)^*aa(a+b)^*$ $L = \{aa, aaa, aab, aaab, aaba, aabb, aaaa, baa, aaaa, abaa, baaa, bb.aa.$

R1 $S \rightarrow XaaX$.

R2 $X \rightarrow aX$.
R3 $X \rightarrow bX$.
R4. $X \rightarrow \lambda$.

aa aa.

$S \rightarrow XaaX$.
$\rightarrow \lambda aaX$.
$\rightarrow aaaX$.
$\rightarrow aaaaX$.
$\rightarrow aaaa.\lambda$
$\rightarrow aaaa$.