Abolurin Sodeeq
17/SCI01/001
CSC 304

i

$S \longrightarrow aS \longrightarrow a\lambda \longrightarrow a$

$S \longrightarrow aS \longrightarrow abS \longrightarrow ab\lambda \longrightarrow ab$

$S \longrightarrow bS \longrightarrow b\lambda \longrightarrow b$

$S \longrightarrow bS \longrightarrow baS \longrightarrow ba\lambda \longrightarrow ba$

$S \longrightarrow aS \longrightarrow abS \longrightarrow abaS \longrightarrow aba\lambda \longrightarrow aba$

$S \longrightarrow bS \longrightarrow baS \longrightarrow baaS \longrightarrow baa\lambda \rightarrow baa$

$[\lambda, a, ab, b, ba, aba, baa \ldots]$

$(a^n b^m / n \geq 0, m > 0)$

ii

$S \longrightarrow aAb \longrightarrow aab$

$S \longrightarrow aAb \longrightarrow aaAb \longrightarrow aaab$

$S \longrightarrow aBb \longrightarrow abb$

$S \longrightarrow aBb \longrightarrow abBb \longrightarrow abbb$

$S \longrightarrow aSb \longrightarrow aaAb \longrightarrow aaaAb \longrightarrow aaaab$

$S \longrightarrow aSb \longrightarrow aaBb \longrightarrow aabBb \longrightarrow aabb$

$[aab, aaab, abb, abbb, aaaab, aabbb, \ldots,]$

$(a^{n+1} b^m / n \geq 0, m \geq 0)$

iii

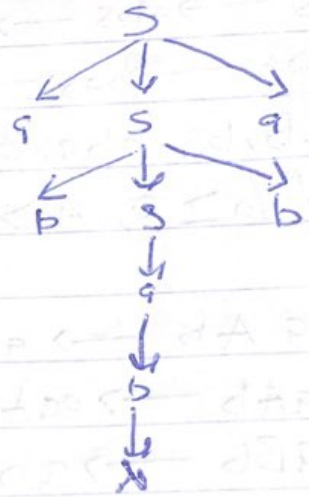
$S \longrightarrow AS \longrightarrow aS \longrightarrow a\lambda \longrightarrow a$

$S \longrightarrow BS \longrightarrow bS \longrightarrow b\lambda \longrightarrow b$

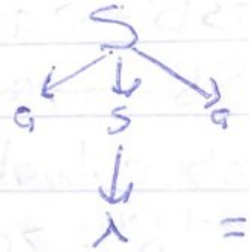
$S \to AS \to aS \to ABS \to abS \to ab\lambda \to ab$

$S \to BS \to bS \to bAS \to baS \to ba\lambda \to ba$

2 $S \to aSa \mid bSb \mid a \mid b \mid \lambda$

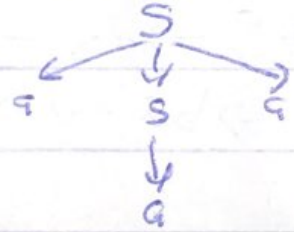


a $S \to aSa \to a\lambda a$



$= aa$

b $S \to aSa \to aaa$

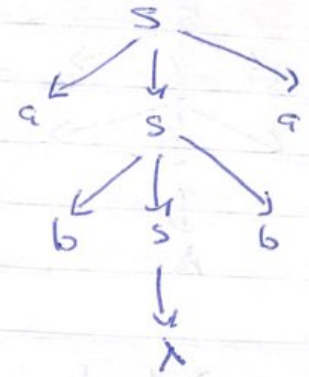


$= aaa$

$\lambda \to ab$

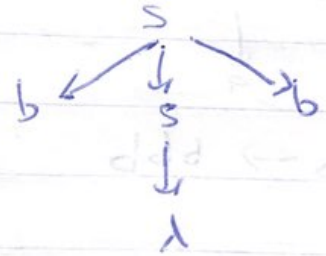
$\lambda \to ba$

c $S \longrightarrow aSa \longrightarrow abSba \longrightarrow ab\lambda ba \longrightarrow abba$



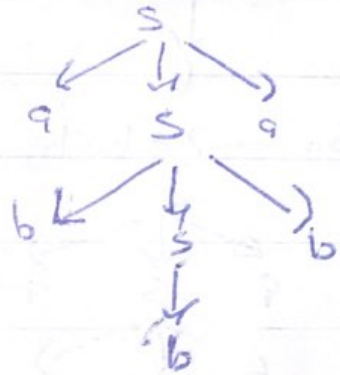
$= abba$

d $S \longrightarrow bSb \longrightarrow b\lambda b \longrightarrow bb$



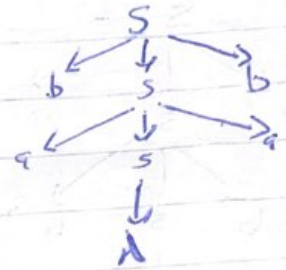
$= bb$

e $S \longrightarrow aSa \longrightarrow abSba \longrightarrow abbba$



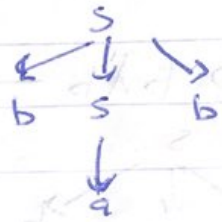
$= abba$

f $S \to bSb \to baSab \to ba\lambda ab \to baab$



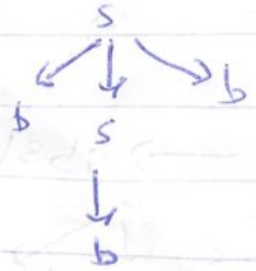
$= baab$

g $S \to bSb \to bab$



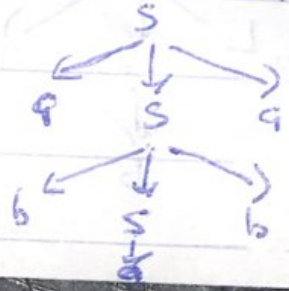
$= bab$

h $S \to bSb \to bbb$



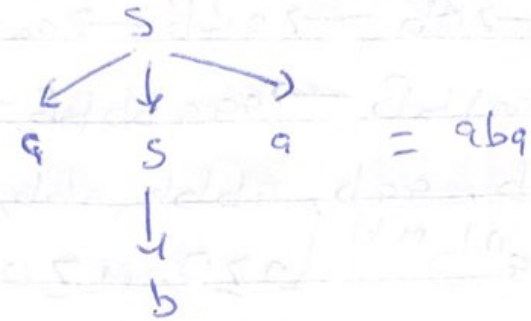
$= bbb$

i $S \to aSa \to abSba \to ababa$



$= ababa$

2 $S \longrightarrow aSa \longrightarrow aba$



$= \{\lambda, aa, aaa, abba, bb, bab, bbb, ababa, abbba, baab, aba, \ldots\}$

3 $\Sigma = \{0, 1\}$

$G = (V = \{S\}; \Sigma = \{0, 1\}; S, R)$ where R

$S \longrightarrow 0|11|1S1|0S0|1S0|0S1$

The purse; 01, 1001001

4 $S \longrightarrow Ab, A \longrightarrow aA \mid bA \mid \lambda$

Solution

$S \longrightarrow aAb \longrightarrow a\lambda b \longrightarrow ab$

$S \longrightarrow aAb \longrightarrow aaAb \longrightarrow aa\lambda b \longrightarrow aab$

$S \longrightarrow aAb \longrightarrow abAb \longrightarrow ab\lambda b \longrightarrow abb$

$S \longrightarrow aAb \longrightarrow aaAb \longrightarrow aabAb \longrightarrow aab\lambda b \longrightarrow aabb$

$S \longrightarrow aAb \longrightarrow abAb \longrightarrow abaAb \longrightarrow aba\lambda b \longrightarrow abab$

$S \rightarrow AB \rightarrow aAb \rightarrow aab$

$S \rightarrow AB \rightarrow aAB \rightarrow aaAB \rightarrow aaabB \rightarrow aaab$

$\rightarrow aaabbB \rightarrow aaabbbB \rightarrow aaabbbb$

$\{ab, aab, abbb, abb, aaabbbb, \ldots\}$

$\{a^n b^{m+1} \mid n \geq 0, m \geq 0\}$