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Surprise Test

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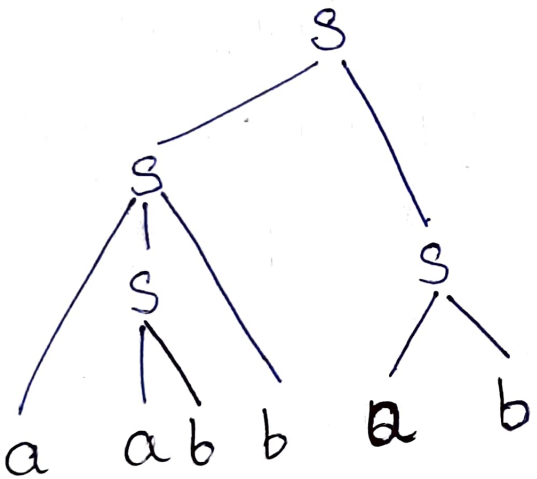
Question 1

Derivation tree for the given string for Given CFG will be:

CFG: $S \longrightarrow SS \mid aSb \mid ab$

Then the tree is constructed in a bottom up fashion.



Question (3)

(a)

$S_1 \longrightarrow +T \mid T$ ($+T$: α, T: β)

$T \longrightarrow T +F \mid F$ ($+F$: α, F: β)

$S_1 \longrightarrow TS_1'$

$T \longrightarrow FT'$

$S_1' \longrightarrow +TS_1' \mid \varepsilon$

$T' \longrightarrow *FT' \mid \varepsilon$

∵ Grammar after eliminating left recursion

$S \longrightarrow S_1\$$

$S_1 \longrightarrow TS_1'$

$S_1' \longrightarrow +TS_1' \mid \varepsilon$

$T \longrightarrow FT'$

$T' \longrightarrow *FT' \mid \varepsilon$

$F \longrightarrow [S_1] \mid a$.

(b)

working – String Generation	Production used
$S \longrightarrow S_1\$$	$S \longrightarrow S_1\$$

(b) converting to GNF

$S \rightarrow S_1 S_1''$

$S_1'' \rightarrow T\$$

$S_1 \rightarrow TS_1'$

$S_1' \rightarrow (+T)\, S_1' \mid \varepsilon$

$T \rightarrow F(T')$

$T' \rightarrow (*F)\, T' \mid \varepsilon$

$F \rightarrow FS\, F_1 \mid a$

$F_1 \rightarrow$ [illegible]

$\delta(q_0, \epsilon, Z) \longrightarrow (q_1, SZ)$

$\delta(q_1, \epsilon, S) \longrightarrow (q_1, S_1 S_1'')$

$\delta(q_1, \$, S_1'') \longrightarrow \delta(q_1, \epsilon)$

$\delta(q_1, \epsilon, S) \longrightarrow (q_1, TS_1')$

$\delta(q_1, +, S_1') \longrightarrow (q_1, TS_1'), q$

$\delta(q_1, \epsilon, S_1') \longrightarrow (q_1, \epsilon)$

$\delta(q_1, \epsilon, T) \longrightarrow (q_1, FT')$

$\delta(q_1, *, T') \longrightarrow (q_1, FT')$

$\delta(q_1, E, T') \longrightarrow (q_1, \epsilon)$

$\delta(q_1, E, F) \longrightarrow (q_1, S, F_1)$

$\delta(q_1, a, F) \longrightarrow (q_1, E)$

$\delta(q_1,], F_1) \longrightarrow (q_1, E)$