Assignment -5 24/8/24

1. Derive the string id+id+id

$G = (\{\epsilon\}, \{id\}, P, \{\epsilon\})$

$P = \epsilon \rightarrow \epsilon + \epsilon \mid id$

2. Find the languague for the following production

$S \rightarrow 0S1 \mid \epsilon$

3. $S \rightarrow aB \mid bA$

$A \rightarrow aS \mid bAA \mid a$

$B \rightarrow bS \mid aBB \mid b$

Find LMD

aaabbabbba

4. Prove that Grammar is ambigous or not

$\epsilon \rightarrow \epsilon + \epsilon \mid \epsilon * \epsilon \mid a \mid b$

String $\rightarrow a + a * b$

Answers

3. Given string aaabbabbba

start from $S \rightarrow aB$

aaBB ($\because B \rightarrow aBB$)

aaaBBB ($\because B \rightarrow aBB$)

aaabBB ($\because B \rightarrow b$)

aaabbB ($\because B \rightarrow b$)

aaabbaBB ($\because B \rightarrow aBB$)

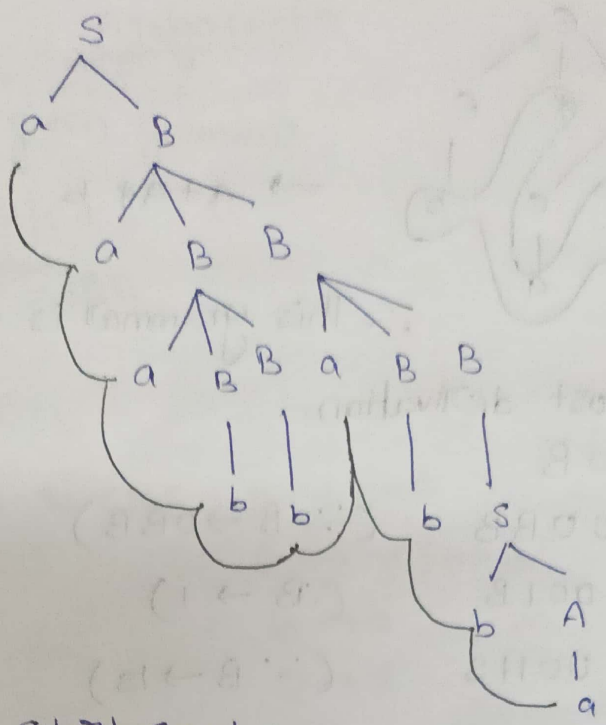
aaabbabB ($\because B \rightarrow b$)

aaabbabbS ($\because B \rightarrow bS$)

aaabbabbbA ($\because S \rightarrow bA$)

aaabbabbba ($\because A \rightarrow a$)

$\therefore$ string is accepted with the given grammar



(2) Start with start symbol ϵ

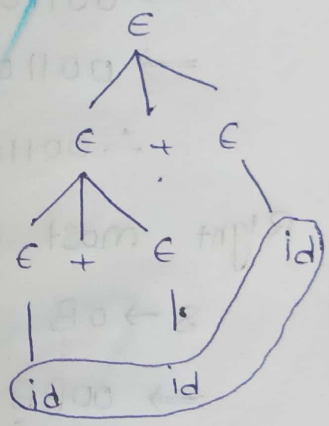
$\epsilon \rightarrow (\epsilon + \epsilon)$

$\epsilon \rightarrow (\epsilon + \epsilon) + \epsilon$

$\epsilon \rightarrow (id + \epsilon) + \epsilon$

$\epsilon \rightarrow (id + id) + \epsilon$

$\epsilon \rightarrow id + id + id$



(2) $G = (\{S\}, \{0, 1\}, \{S \rightarrow 0S1, S \rightarrow \epsilon\}, S)$

S

$S \rightarrow \epsilon$

$S \rightarrow 0S1$

$S \rightarrow 0\epsilon1$

$S \rightarrow 01$

$S \rightarrow 0S1$

$S \rightarrow 00$

$S \rightarrow 00S11$

$S \rightarrow 00\epsilon11$

$S \rightarrow 0011$

S

$S \rightarrow 0S1$

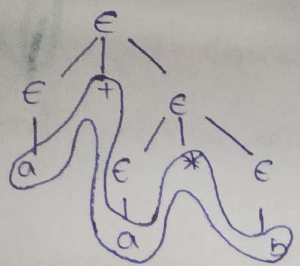
$S \rightarrow 00S11$

$S \rightarrow 000S111$

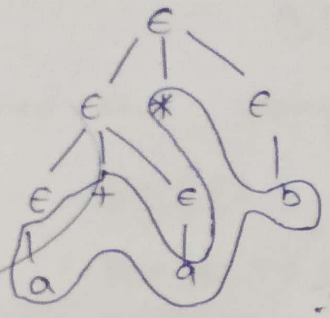
$S \rightarrow 000\epsilon111$

$\therefore$ language $(G) = \{0^n 1^n \mid n \geq 0\}$

4. Given, $\epsilon \rightarrow \epsilon + \epsilon \mid \epsilon * \epsilon \mid a \mid b$



$\therefore a + a * b$



$\Rightarrow a+a*b$

∴ This grammar is ambigoous.

5. left most derivation.

$S \rightarrow 0B$

$\rightarrow 00BB$ ($\because B \rightarrow 0BB$)

$\rightarrow 001B$ ($\because B \rightarrow 1$)

$\Rightarrow 0011S$ ($\because B \rightarrow 1S$)

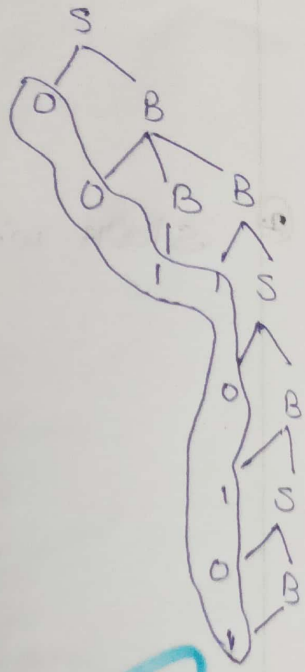
$\Rightarrow 00110B$ ($\because S \rightarrow 0B$)

$\rightarrow 0011010S$ ($\because B \rightarrow 1S$)

$\rightarrow 00110101$ ($\because S \rightarrow 0B$)

$\rightarrow 00110101$ ($\because B \rightarrow 1$)

∴ 00110101



Right most derivation.

$S \rightarrow 0B$ ($\because B \rightarrow 0BB$)

$\rightarrow 00BB$ ($\because B \rightarrow 1S$)

$\Rightarrow 00B1S$ ($\because S \rightarrow 0B$)

$\Rightarrow 00B10B$ ($\because B \rightarrow 1S$)

$\Rightarrow 00B101S$ ($\because S \rightarrow 0B$)

$\Rightarrow 00B1010B$ ($\because B \rightarrow 1$)

$\Rightarrow 00B10101$ ($\because B \rightarrow 1$)

$\Rightarrow 00110101$

∴ 00110101