

## Assignment No. 5

Name : Shivam Tawari

Roll no : A-58

Subject : TOC

Q.1.

$$\rightarrow L = \{a^n / 2^n\}$$

From pumping lemma there exists a  $p$  such that every  $w \in L$  such that  $|w| > p$  can be represented as  $xyz$  with  $|y| \neq 0$  &  $|xy| \leq p$

For pumping lemma  $a^{p+k} / 2^p$  must also be in  $L$  but, it is not of right form. Hence, language is not regular.

Q.2.

$$\rightarrow E = E + E \mid E * E \mid (E) \mid id$$

$$E \rightarrow E + E$$

$$E \rightarrow E * E$$

$$\rightarrow id + E$$

$$\rightarrow E + E * E$$

$$\rightarrow id + E * E$$

$$\rightarrow E + E * id$$

$$\rightarrow id + id * E$$

$$\rightarrow E + id * id$$

$$\rightarrow id + id * id$$

$$\rightarrow id + id * id$$

Hence, we showed that  $id + id * id$  can be generated.

Q.3.  $S \rightarrow A, B / a$

$A \rightarrow \epsilon A / \epsilon$

$B \rightarrow \epsilon B / \epsilon B / \epsilon$

$\therefore W = 00101$

$S \rightarrow A / B$  (left most derivation)

$\rightarrow \epsilon A, B$  (using  $A \rightarrow \epsilon A$ )

$\rightarrow \epsilon \epsilon A, B$  (using  $A \rightarrow \epsilon$ )

$\rightarrow \epsilon \epsilon 1 \epsilon B$  (using  $B \rightarrow \epsilon B$ )

$\rightarrow \epsilon \epsilon 1 0 1 B$  (using  $B \rightarrow \epsilon B$ )

$\rightarrow \epsilon \epsilon 1 0 1$  (using  $B \rightarrow \epsilon$ )

$\therefore$  Right most derivation

$S \rightarrow A, B$

$\rightarrow A \epsilon B$  (using  $A \rightarrow \epsilon B$ )

$\rightarrow A \epsilon 1 B$  (using  $B \rightarrow \epsilon B$ )

$\rightarrow A \epsilon$  (using  $B \rightarrow \epsilon$ )

Q.4.

$\rightarrow$  ①  $S \rightarrow asb / aAb$

②  $A \rightarrow bAa$

③  $A \rightarrow ba$

①  $S \rightarrow asb$

$S \rightarrow aaAabb$

$S \rightarrow aabaabb$

$S \rightarrow aAb$

$S \rightarrow abAab$

$S \rightarrow abbaaab$

②  $S \rightarrow asb$

$S \rightarrow aaAabb$

$S \rightarrow aabaabb$

$S \rightarrow aabbbaabb$

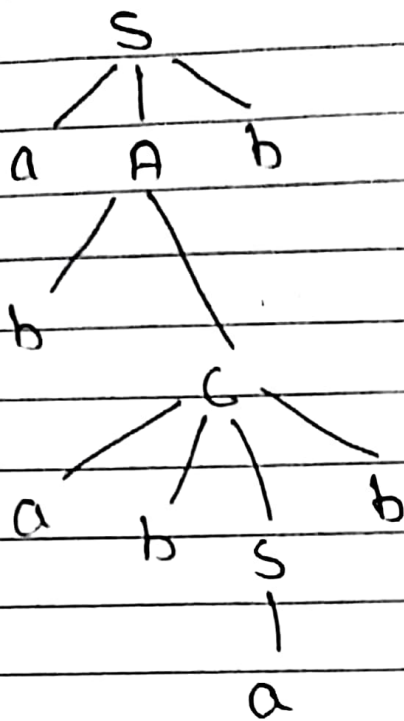
③  $S \rightarrow aAb$

$S \rightarrow abab$

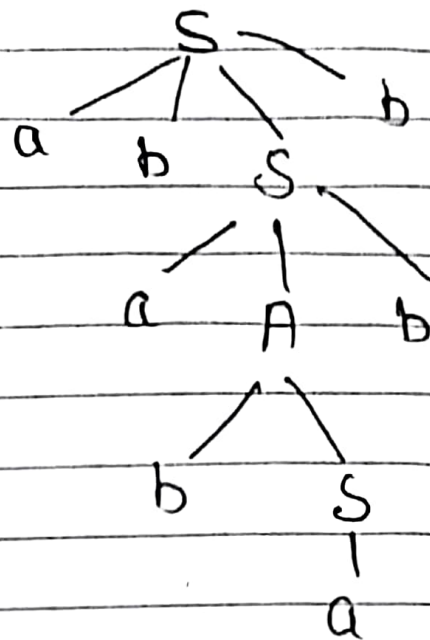
$\therefore L(G) = \{aabaabb, aabbbaabb, abbaaab, abab\}$

Q.5.

$w = abababb$



parse tree 1



parse tree 2

Since, the existence of 2 parse tree it exist for same grammar hence it is ~~at~~ ambiguous.