

**SSN COLLEGE OF ENGINEERING, KALAVAKKAM**  
**Department of Computer Science and Engineering**  
**UCS1503 - Theory of Computation**  
**Tutorial**  
**Due Date 08.10.2022**

1. Consider the grammar  $G = (\{S, A\}, \{a, b\}, P, S)$ , where  $P$  consists of  
 $S \rightarrow aAS \mid b$   
 $A \rightarrow SbA \mid ba$   
Write the derivation and draw its equivalent parse tree for  $w = abbbab$
2. If  $G$  is a grammar  $S \rightarrow SbS \mid a$  prove that  $G$  is ambiguous.
3. Consider the grammar  $S \rightarrow aS \mid aSbS \mid \epsilon$ . This grammar is ambiguous. Show that the string  $aab$  has two  
(a) Parse trees (b) Leftmost derivations (c) Rightmost derivations
4. For the grammar  
 $S \rightarrow A1B$   
 $A \rightarrow 0A \mid \epsilon$   
 $B \rightarrow 0B \mid 1B \mid \epsilon$   
Give left most and right most derivation for the string  $00101$ .
5. Construct CFG to generate  $\{a^n b^n \mid n \in \mathbb{Z}^+\}$
6. Consider the alphabet  $\Sigma = \{a, b, (, ), +, *, ., \epsilon\}$ . Construct a context free grammar that generates all strings in  $\Sigma^*$  that are regular expressions over the alphabet  $\{a, b\}$ .