

Assignment 3

Q.1 Consider context free grammar $S \rightarrow SS+ | SS* | a$
 string = $aa+aa^*$

1. Given leftmost derivation of ~~the~~ string.

$$S \rightarrow SS^*$$

$$S \rightarrow SS+S^*$$

$$S \rightarrow aS+S^*$$

$$S \rightarrow aa+S^*$$

$$S \rightarrow aa+aa^*$$

2. Give rightmost derivation of string

$$S \rightarrow SS^*$$

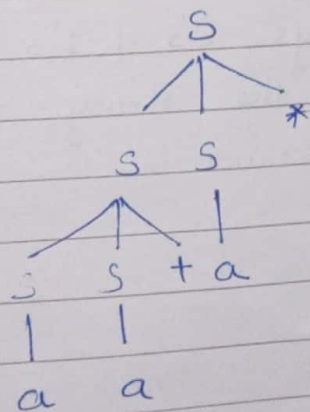
$$S \rightarrow Sa^*$$

$$S \rightarrow SS+a^*$$

$$S \rightarrow Sa^+a^*$$

$$S \rightarrow aa+aa^*$$

3. Give parse tree



4. Is the given grammar is ambiguous or not?

→ Ambiguous grammar means if the grammar can generate the same set of strings using every production rule, but the given grammar is unambiguous, if every production rule in given grammar generates a unique set of string that cannot be generated by other rule.

5. Describe language generated by this grammar

→ All strings with set of postfix expressions consists of addition & multiplication.

Q.2. Design grammar for the following languages:

1. The set of 0's & 1's such that every 0 is immediately followed by at least one 1.

$$S \rightarrow (0^?1)^*$$

2. The set of all strings 0's & 1's that are palindromes, that is the string reads the same backward as forward.

$$S \rightarrow 0S0 \mid 1S1 \mid 0 \mid 1 \mid \epsilon$$

3. The set of all strings of 0's & 1's with equal no. of 0's & 1's

$$S \rightarrow 0S1S \mid 1S0S \mid \epsilon$$

4. The set of 0's & 1's with unequal set of 1's & 0's

$$S \rightarrow 0S1 \mid 1S0 \mid S0 \mid S1 \mid \epsilon$$

5. The set of all strings of 0's & 1's in which ~~all~~ 011 does not appear as a substring.

$$S \rightarrow 1^*(0+1?)^*$$