**SCS 2212 : Automata Theory**

**Tutorial 1 : Preliminaries**

1. **Basis:** If length (w) = 0, then w = 𝜆 and 𝜆​R​ = 𝜆

**Inductive hypothesis**: if 0≤|x|≤ n, then (xR)R = x

**Inductive step**: Suppose |w| = n + 1. Then we can write w = xa, and a ∈ ∑ and

(wR)R = ((xa)R)R (substitution, w=xa)

= (axR)R ( (uv)​R = v​R​u​R​ and a as a string of length 1)

= (xR)RaR

= (xR)Ra

= xa(Inductive hypothesis)

= w (since w =xa)

1. L\* = abaabaaabaa, aaaabaaaa, baaaaabaa

L4 = aaaabaaaa, baaaaabaa

**3.)** L’ = ∑\* -L

**4.)** a. S ⟶ AaA

A ⟶ bA | 𝜆

b. S ⟶ aA

A ⟶ abA | ba |𝜆

c. S ⟶ AaaaA | AaaA | AaA

A ⟶ bA | 𝜆

d. S ⟶ AaaaA

A ⟶ abA | 𝜆

**5.)** S ⟶ aA S ⟶ aA

⟶abS ⟶ abS

⟶ab𝜆 ⟶ abaA

⟶ab ⟶ ababS

⟶ abab𝜆

⟶abab

L(G)={ (ab)n | n>=0}, The language generated by the grammar consists of all string containing (ab)n ,n>=0.

**6.)** S ⟶ Aa

⟶ Ba

⟶ Aaa

⟶ Baa ⟶ Aaaa ⟶ …….

No string can be made with this language

**7.)** S ⟶ aSb | ab | 𝜆

L(G1) ={ 𝜆 ,ab,aabb,aaabb,………. }

S ⟶ aAb | ab

L(G2)= { 𝜆 ,ab,aabb,aaabbb,……………}

Two grammars are equal because generated languages are same.

**8.)** S ⟶ aSb | bSa | SS| a

L(G1) = { a,aa,baa,aab,aaab,baaa,abaab,……….}

S ⟶ aSb | bSa | a

L(G2) = { a,aab,baa,abaab,……..}

Two grammars are not equal because generated languages are different. second language hasn’t {aa,baaa,aaab}.