# Department of Computer Science and Engineering, SVNIT, Surat. Automata and Formal Languages

## Tutorial 4

## Topic: Context Free Grammar

**1. Which string of terminal is generated by following grammar ?**

S →XY
X →aX | bX | a
Y →Ya | Yb | a

**2. Design a grammar for the language**

$\{ 0^n1^n | n >= 0\} U \{ 1^n0^n | n >= 0\}$

3. **Write CFG that accepts all odd length pallindromes over alphabets {a, b}**.

**4. If the language L= { $a^i b^j c^k$| i, j, k ≥ 0, and i = j or i = k } Write the set of the rules for CFG.**

**5. write a CFG for C-style function prototypes where Σ = {void, int, double, name, (, ), ,, ;}.**

**And derive the following string**

-void name(int name, double name);
-int name();
-int name(double name);

**5. Remove the useless symbol from the given context free grammar:**

S -> aB / bX

A -> Bad / bSX / a

B -> aSB / bBX

X -> SBD / aBx / ad

**6.Remove the null productions from the following grammar**

S -> ABAC

A -> aA / ϵ

B -> bB / ϵ

C -> c

**7.Remove the unit productions from the following grammar**

S -> AB

A -> a

B -> C / b

C -> D

D -> E

E -> a