**Q.1 Construct CFG for the following**

1. Alternate sequences of 0 and 1.
2. Do not contain 3 consecutive 1’s
3. CFG equivalent to Regular Expression(0+1)\*1
4. **S-->SS  S--> 0S1   S-->1S0    S-->nul**l   ,which type of Grammar is it ? Generate any valid string using this grammar and  construct a parse tree
5. **CFG for an  b n , where n>=1**
6. **CFG for an  b n , where n>=0**
7. **CFG for an  b 2n , where n>=1**
8. **CFG for an+1  b n , where n>=0**
9. **CFG for an  b n+1 , where n>=0**
10. CFG for (1+01)\* 00 ( 1+ 10) \*
11. CFG for equal number of 0’s and 1’s
12. CFG for all palindromes
13. CFG for parenthesis matching
14. **CFG for an bm ck  where k= n+m**
15. CFG for unequal number of a’s and b’s
16. **CFG for am bn   where m>n**
17. What does the given CFG define?  **S->0S1S | 1S0S|**  ? Explain with example

**Q.2 Design Tuning machine for the following**

1. accepting the Even Palindromes
2. which adds 2 unary numbers . Show simulation
3. two’s complement of a given binary number
4. TM for  **L= {  0n  1n  where n>=1 }**
5. TM  to recognize the language L = {**an bn  an  |  n >=1** }

**Q.3  Let G be the grammar. Find the leftmost derivation, rightmost derivation and parse           tree**

1. for the string  **001222.**

G:  S → 0S | 1A | 2B | ε

          A → 1A | 2B | ε

                    B → 2B | ε

1. Let G be the Grammar. Find Leftmost derivation, Rightmost derivation and

Parse tree for the string **bbaababab**

S → bB┃aA/  ε

A→ b┃bS┃aAA / ε

     B→a┃aS┃bSS /  ε

              iii.   Consider the grammar **S→0S0 | 1S1 | SS | λ**. Given the string **0101101110**,       find  a leftmost derivation and a rightmost derivation with corresponding parse trees.

**Q.4 Design PDA for**

1. for  odd length palindrome, **let ∑ ={ 0,1} ,L= { W X WR  }**
2. PDA that checks the well formedness of parenthesis
3. PDA for  **{ an b2n+1   | n >=1 }**
4. NPDA for Palindromes

**Q.5 Find CNF for the following CFG**

i.      **S→aAbB, A→aA | a, B→bB | b.**

ii.   Write a CFG to generate equal number of 1’s and 0’s **( 0n  = 1n** )   and convert to CNF

        iii. **S –>AB0 A-->001  B-->A1   B–>001**

**iv   S–ABA, A→aA | bA |  λ, B→bB | aA |  λ**

**Q.6 Convert the given grammar Right Linear Grammar to Left Linear Grammar**

**S→bB ,B→bC┃aB┃b C→a**

**Q.7 What is Ambiguous Grammar, find if the following grammar is ambiguous or not?**   **S —> S+S**

**S —>S\*S**

**S —>a**

**S —>b**

**Q.8  .Explain the following**

    i  - Variations of Turing machine

        ii-   Halting Problem

       iii-  Chomskey’s Hierarchy