CSE331: Automata & Computability
Assignment 5: CNF and CYK
Total Marks - 30

1. **[3*5 = 15 Points]** Consider the given grammars below. Convert each of them to its equivalent Chomsky Normal Form (CNF). State each step clearly.
   a. S → AACD
      A → aAb | ac | **ε**
      C → aC | a
      D → aDa | bDb | d | **ε**

   b. S → XSB | **ε**
      X → pXS | p
      B → SbS | X | bb

   c. S → aAa | bBb | **ε**
      A → C | a
      B → C | b
      C → CD | **ε**
      D → A | B | ab

2. **[3*5 = 15 Points]** Consider the given grammars below. For each below, find out if the given **CFG** accepts the given string **w** using CYK Algorithm. You must show the triangular table.
   a. S → XY |YY
      X → ZZ |XY |x
      Y → YY |ZX |y
      Z → YX |XX |y

      String, w: xxyy

   b. S → XY |YZ
      X → YX |x
      Y → ZZ|y
      Z → XY |x

      String, w: xxyxy

   c. S → XY |SS|a
      X → YS |ZT| b

      Y → TT|b

      Z → TR |a|b

      T → a

      R → SS

      String, w: abaab