Assignment 5 – CS 301 - Theory of Automata – Fall 2020

Due: Friday, November 20, 2020 (online – 11 PM)

Late submission of Assignment 5 is not allowed under any condition. You need to make sure of any electricity or net issues in your area. Emails that electricity or internet went off at the last minute will not be entertained in any case.

If any assignment is deemed to be copied from any other student or internet, you may be awarded an F in this course.

[Total marks = 60]

1. [40 = 4 * 10]
   Give PDAs for the following languages. Do not convert into CFGs and then convert to PDA. Also determine whether the PDA is an NPDA or DPDA.
   a. $A = \{ a^i b^j c^k \mid i, j, k \geq 0, \text{ and } i = j \text{ or } j = k \}$
   b. $B = \{ a^i b^j c^k \mid i, j, k \geq 0 \text{ and } i = j + k \}$
   c. $C = \{ w \in \{a, b\}^* \mid \text{number of a's and number of b's are equal} \}$
   d. $D = \{a^{2n} b^{3n} \mid n > 0\}$

2. [20 = 2 * 10] For the following CFGs, draw the PDA

a. $S \rightarrow aTXb$ $T \rightarrow XTS \mid \varepsilon$ $X \rightarrow a \mid b$	$S \rightarrow aAA$ $A \rightarrow aS \mid bS \mid a$