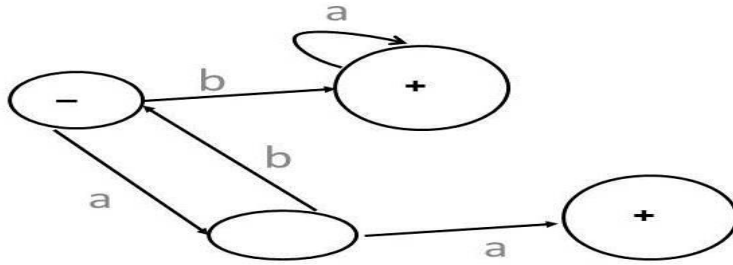


3.1 Write the regular expression for the following NFA

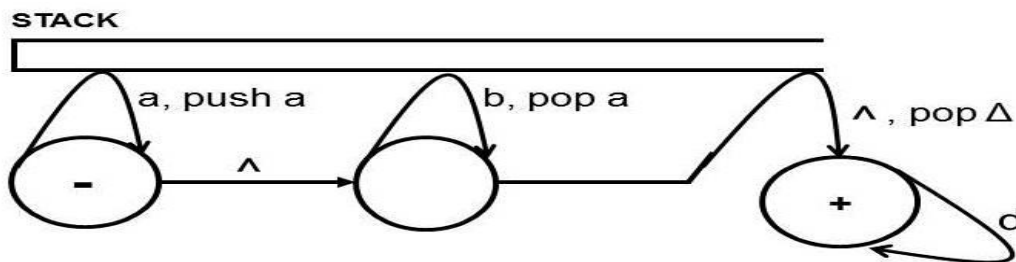


Answer: $(ab)^*ba^* + (ab)^*aa$

3.2 Write a CFG for $L2 = \{ a^n b^n d^* : \text{where } n \geq 0 \}$

Answer:
 $S \rightarrow XD$
 $X \rightarrow aXb \mid \wedge$
 $D \rightarrow dD \mid \wedge$

3.3 Draw a One-Stack Automaton or a Pushdown Automaton for $L3 = \{ a^n b^n d^* : \text{where } n \geq 0 \}$



3.4 Write a CFG for $L4 = \{ d^* a^n c d b^n d^* : \text{where } n > 0 \}$

Answer:
 $S \rightarrow DXD$
 $X \rightarrow aXb \mid acdb$
 $D \rightarrow dD \mid \wedge$

3.5 Write a CFG for $L5 = \{ d^* a^n c d b^n d^* : \text{where } n > 1 \}$

Answer:
 $S \rightarrow DXD$
 $X \rightarrow aXb \mid aacdbb$
 $D \rightarrow dD \mid \wedge$

3.6 Write a CFG for $L6 = \{ d^* a^n c d b^n d c d^* : \text{where } n > 1 \}$

Answer:
 $S \rightarrow DXdcD$
 $X \rightarrow aXb \mid aacdbb$
 $D \rightarrow dD \mid \wedge$