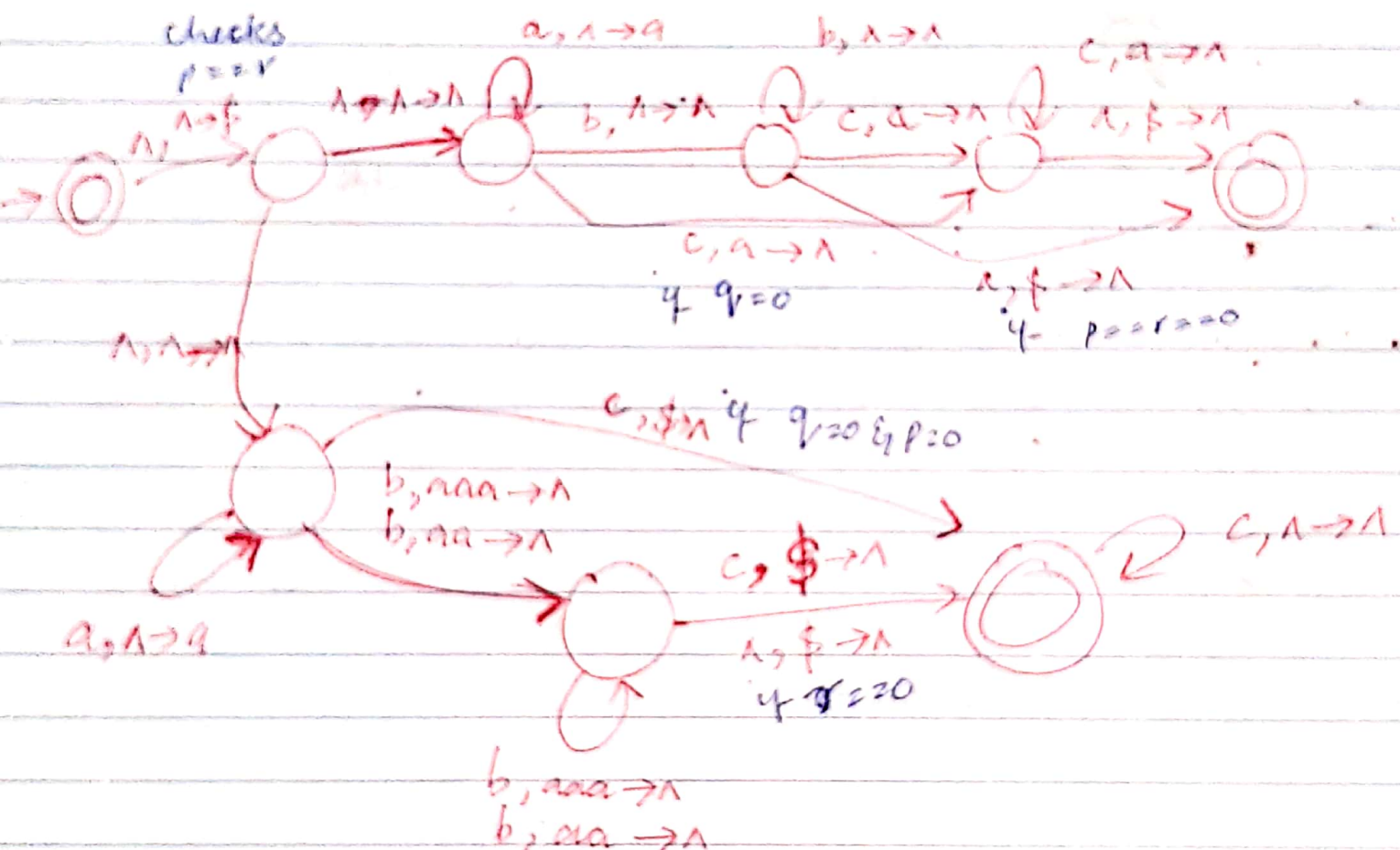


$\{a^p b^q c^r \mid 2p \leq q \leq 3p \text{ or } p=0\}$

it will have an NPDA, one branch will check condition 1 and other will check condition 2



for every b, there can be 2 or 3 as



checks $2p \leq q \leq 3p$

$Sx \leftarrow Ss_0$
 $BS \leftarrow Ss_0$
 $Yy \leftarrow S, X, s_0$
 $YA \leftarrow S, X, s_0$
 $AY \leftarrow S, X, s_0$
 $AA \leftarrow S, X, s_0$

$MM \leftarrow S, s_0$
 $AK \leftarrow S, s_0$
 $AS \leftarrow Y$
 $MB \leftarrow M$
 $BA \leftarrow K$



$b \leftarrow S, B, M, s_0$ $a \leftarrow A$

Changing grammar to CNF.

$S_0 \rightarrow S$

$S \rightarrow \dots$

"

"

"

Start
Variable
was on RHS
rest is same

Removing unit production $S_0 \rightarrow S$

$S_0 \rightarrow SX / BS / b / YY / YA / AY / AA / MM / AK$

$S \rightarrow SX / BS / b / YY / YA / AY / AA / MM / AK$

$X \rightarrow YY / YA / AY / AA$

$Y \rightarrow AS$

$A \rightarrow a$

$B \rightarrow b$

$M \rightarrow MB / b$

$K \rightarrow BA$

So we LCP as it cannot
be produced by G.

abbaba Y					
abbab S, S ₀ , X	bbaba S, S ₀				
abba S, X, S ₀	bbab Ø	bahe S, S ₀			
abb YS, YB, YM Y ← AS, AM	bbab Ø	bab Ø	aba S, X, S ₀		
ab AS AB AM Y ←	bb SS, SB, SM, BS, BM MM, MS, MB S, S ₀ , M	ba SK, BA, MA K	ab AS, AB, AM Y	ba SA, BA, MA K	
a	b	b	a	b	a
A	S, B, M, S ₀	S, B, M, S ₀	A	S, B, M, S ₀	A