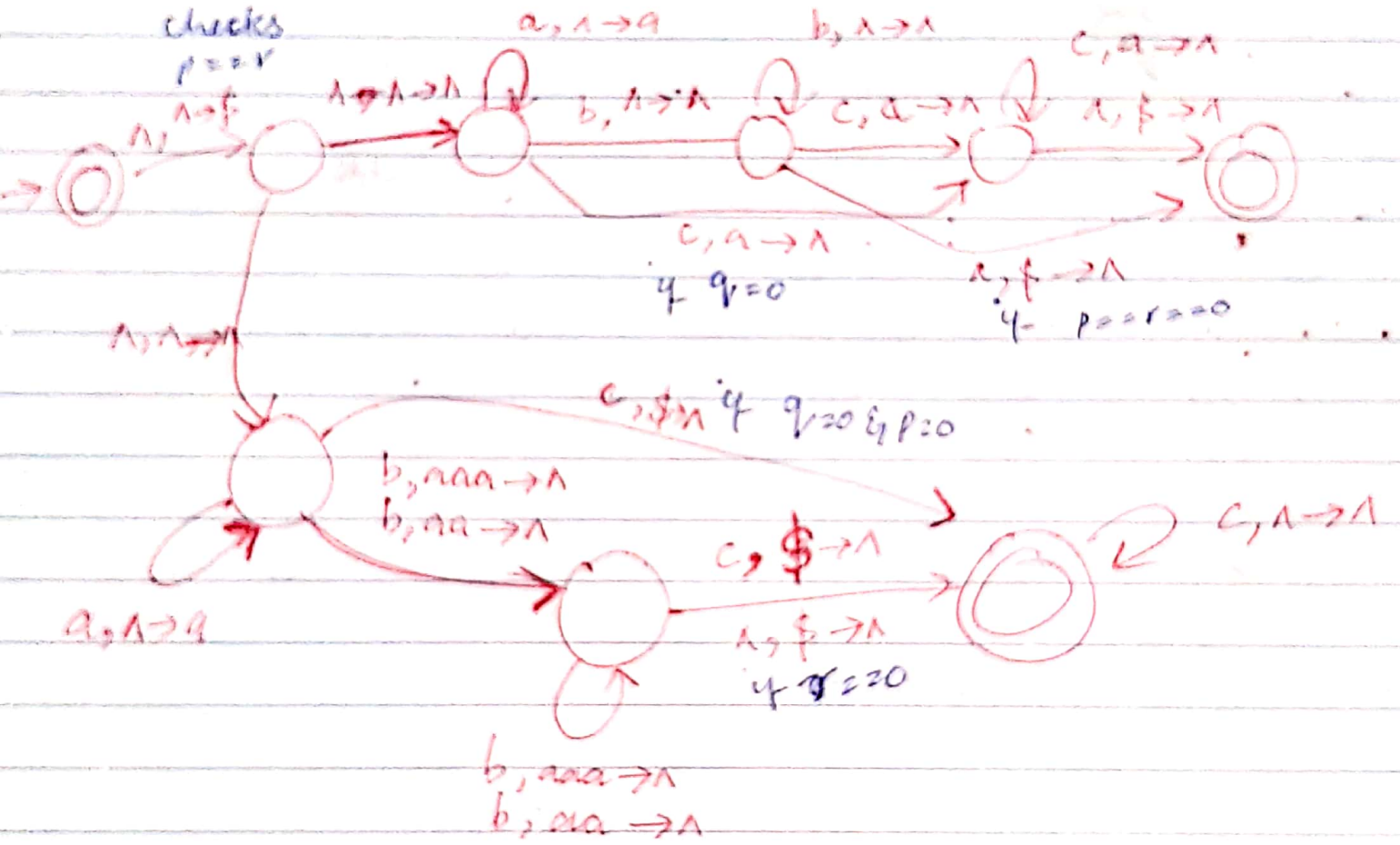
$\{a^p b^q c^r \mid 2p \leq q \leq 3p \text{ or } p = r\}$

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



for every b, there can be 2 or 3 as

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

Foundation for Advancement of Science & Technology

$SX \leftarrow SS_0$ | $MM \leftarrow S, S_0$
$BS \leftarrow S, S_0$ | $AK \leftarrow S, S_0$
$YY \leftarrow S, X, S_0$ | $AS \leftarrow Y$
$YA \leftarrow S, X, S_0$ | $MB \leftarrow M$
$AY \leftarrow S, X, S_0$ | $BA \leftarrow K$
$AA \leftarrow S, X, S_0$
$b \leftarrow S, B, M, S_0$ $\quad a \leftarrow A$

Changing grammar to CNF.

$S_0 \rightarrow S$ (Start Variable was on RHS)

$S \rightarrow \ldots$

" rest is same.

"

"

Removing unit production $S_0 \rightarrow S$.

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

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

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

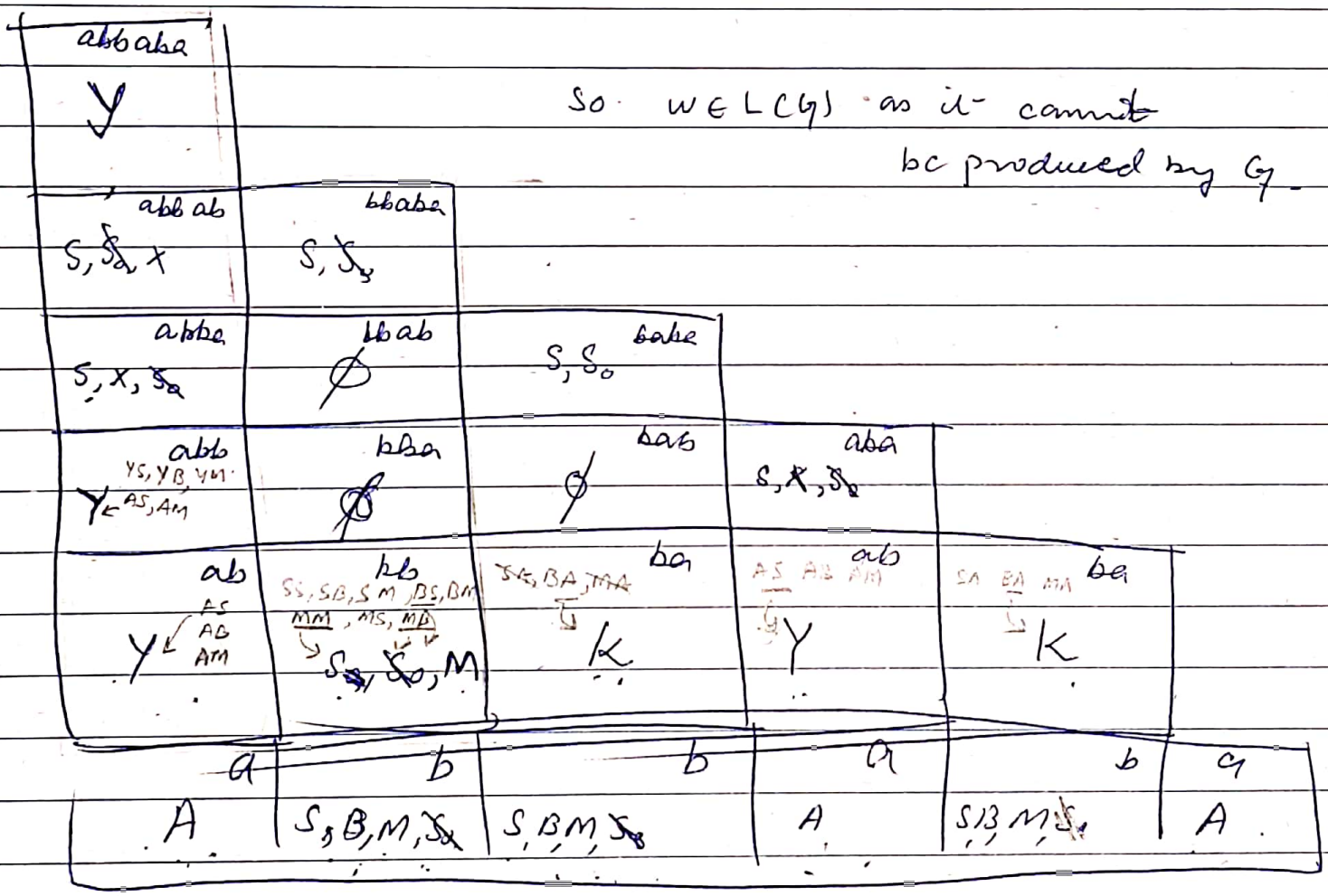
$Y \rightarrow AS$

$A \rightarrow a$

$B \rightarrow b$

$M \rightarrow MB \mid b$

$K \rightarrow BA$



So $w \in L(G)$ as it can be produced by G.