TEST

(1) Design a CFG to accept the Language described by $(ab)^*a$. Show that your grammar derives ababa. (5)

(2) Design a CFG to accept the language described by $b^n a^* b^n$, $n \geq 0$. Show that your grammar derives baaabb. (5)

(3) What is the language accepted by the following CFG. (5)

$S \rightarrow AS \mid B$
$A \rightarrow aAc \mid Aa \mid \epsilon$
$B \rightarrow bBb \mid \epsilon$

(4) Design the CFG for the following. (15)

a) $a^x 1^y$, where $x = y$
b) $0^x 1^y$, where $x > y$.
c) $0^x 1^y$ where $x = 2y$
d) $0^x 1^y 0^z$, where $z = x + y$.
e) $0^x 1^y 0^z$ where $z = x - y$.

(5) Design a CFG to generate all strings of a's and 1's that include 100. (5)

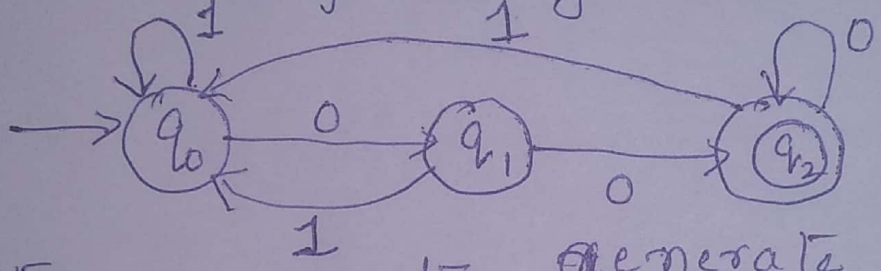
⑥ Design a CFG for accepting following Languages. Assume $\Sigma = \{0, 1\}$ (15)

a) $L = \{ 0^n 1^m 0^{2n} \mid n, m \geq 0 \}$

b) $L = \{ w \mid w \neq \epsilon$ and w start and end with same symbol$\}$

c) All palindromes.

⑦ Consider the following DFA. (10)



Write a CFG to generate the language of the above DFA.

⑧ Consider the following grammar. (5)

$S \rightarrow aS$

$S \rightarrow aSbS$

$S \rightarrow \epsilon$

I claim it is ambiguous. prove it.

⑨ Design a pushdown automata to recognize $L = \{ a^i b^j c^k \mid i, j \geq 0, k = i + j \}$ (10)

First, briefly you have to describe the working of PDA. Then, you have to give Transition diagram. & explain each states

functionality.

(10) Consider the following CFG. (10)

$$S \rightarrow ASA \mid aB$$
$$A \rightarrow B \mid S$$
$$B \rightarrow b \mid \epsilon$$

Put the grammar into CNF form. Complete process should be shown.