Question-4
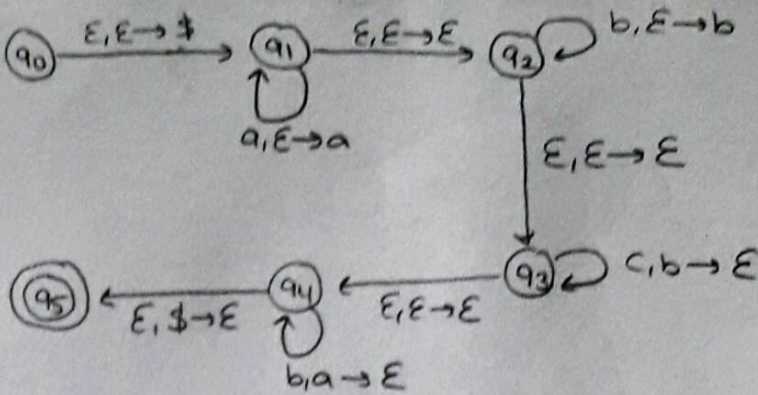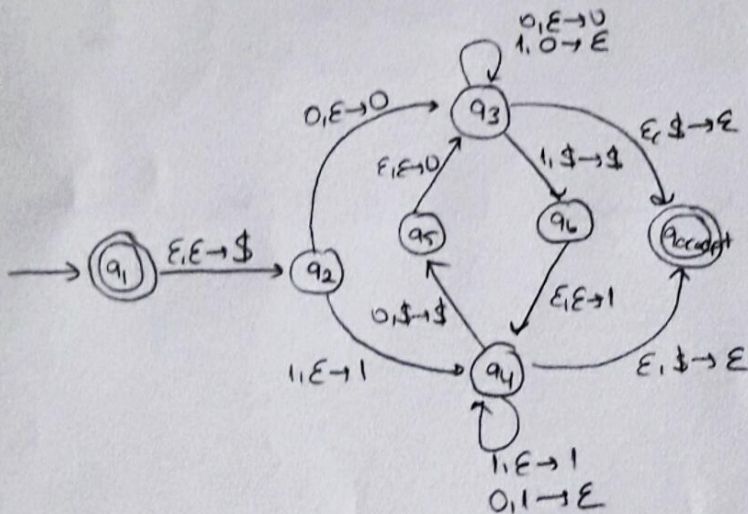
Give a PDA that generates the language $L = \{a^n b^m c^m b^n \mid n, m \geq 0\}$ over $\Sigma = \{a, b, c\}$

Solution:

State diagram:
- $q_0 \xrightarrow{\varepsilon, \varepsilon \to \$} q_1$
- $q_1 \xrightarrow{\varepsilon, \varepsilon \to \varepsilon} q_2$
- q_1 self-loop: $a, \varepsilon \to a$
- q_2 self-loop: $b, \varepsilon \to b$
- $q_2 \xrightarrow{\varepsilon, \varepsilon \to \varepsilon} q_3$
- q_3 self-loop: $c, b \to \varepsilon$
- $q_3 \xrightarrow{\varepsilon, \varepsilon \to \varepsilon} q_4$
- q_4 self-loop: $b, a \to \varepsilon$
- $q_4 \xrightarrow{\varepsilon, \$ \to \varepsilon} q_5$ (accept)

Question-5

What is the language recognized by the following PDA?

State diagram:
- $q_1 \xrightarrow{\varepsilon, \varepsilon \to \$} q_2$
- $q_2 \xrightarrow{0, \varepsilon \to 0} q_3$
- q_3 self-loop: $0, \varepsilon \to 0$; $1, 0 \to \varepsilon$
- $q_3 \xrightarrow{1, \$ \to \$} q_6$
- $q_3 \xrightarrow{1, \varepsilon \to 0} q_5$ (reverse: $F, \varepsilon \to 0$)
- $q_5 \xrightarrow{0, \$ \to \$} q_2$
- $q_2 \xrightarrow{1, \varepsilon \to 1} q_4$
- q_4 self-loop: $1, \varepsilon \to 1$; $0, 1 \to \varepsilon$
- $q_4 \xrightarrow{\varepsilon, \varepsilon \to 1} q_6$ / $q_6 \xrightarrow{\varepsilon, \$ \to \varepsilon}$ Accept
- $q_6 \xrightarrow{\varepsilon, \$ \to \varepsilon} q_4$
- $q_6 \xrightarrow{\varepsilon, \$ \to \varepsilon}$ Accept

Solution:

$\Sigma = \{0, 1\}$ made of strings that contains equal number's of 0's and 1's.

$q_3 \to$ more 0's than 1's arrived, Stack contains 0's.

$q_4 \to$ more 1's than 0's arrived, Stack contains 1's.