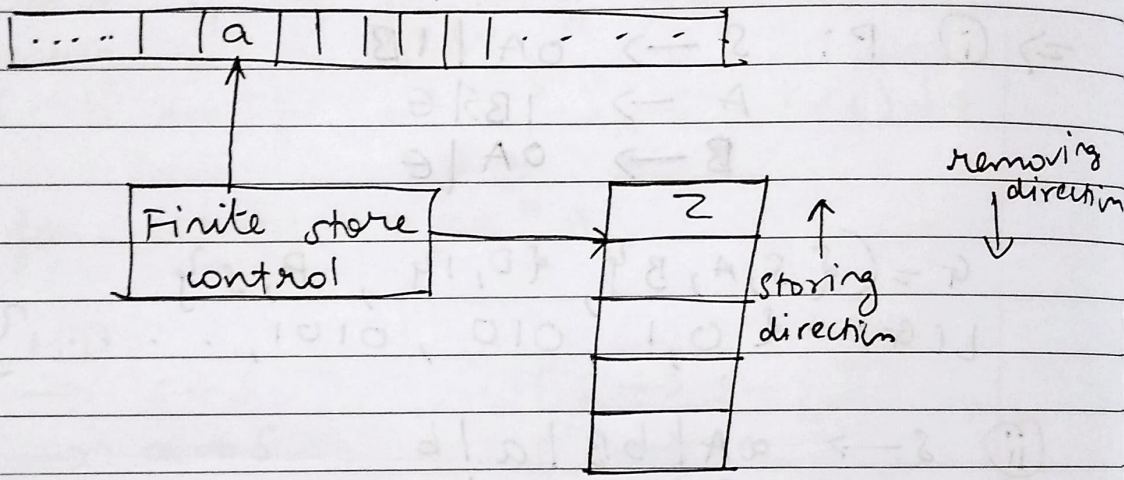
4. Push down Automata

⇒ Push down automata

The type of arrangement where a finite automate has a stack leads to the generation of a pushdown automaton.

⇒ Block diagram of PDA



⇒ Formal definition of PDA

A DPDA is a 7-tuple, namely $(Q, \Sigma, \Gamma, \delta, q_0, Z_0, F)$ where

(i) Q - is a finite non-empty set of states
(ii) Σ - input symbol
(iii) Γ - pushdown symbol
(iv) q_0 - initial state
(v) Σ_0 - initial symbol on pushdown store
(vi) F - final state
(vii) δ - transition function

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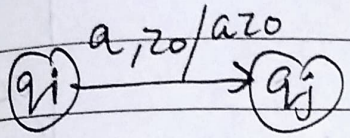
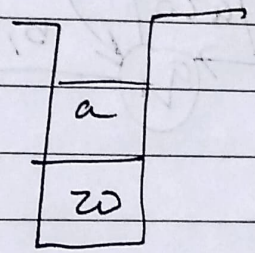
Representation of states

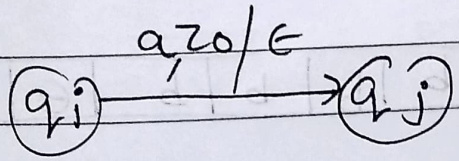
(1) PUSH - one symbol can be inserted into the stack at one time $\delta(q_i, a, z_0) = (q_j, az_0)$

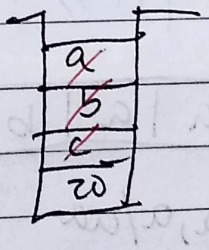
input symbol, top of stack





(2) POP - one symbol can be deleted from the stack at one time $\delta(q_i, a, z_0) = (q_j, \in)$





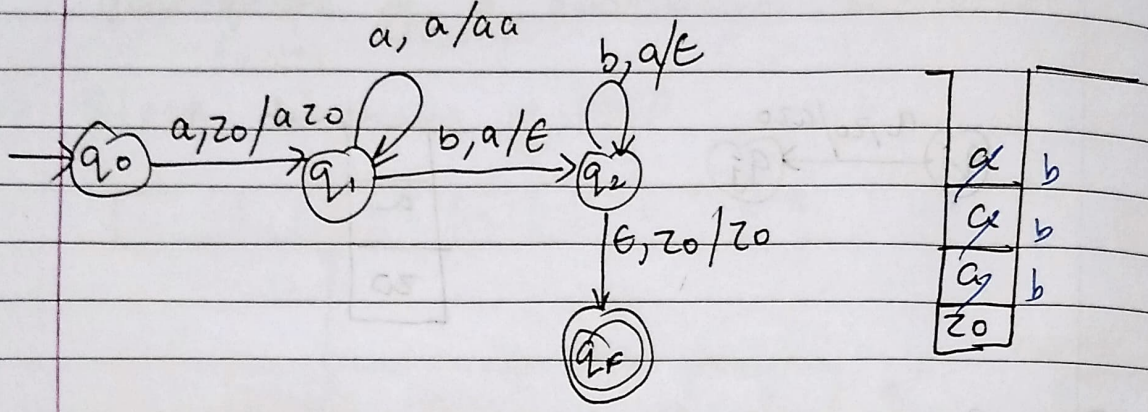
(3) SKIP - It means no stack operation, status of the stack will remain same, before and after the operation.

$\delta(q_i, a, z_0) = (q_j, z_0)$

Q1) Design a deterministic push down automata for $\{a^n b^n \mid n \geq 1\}$

=>

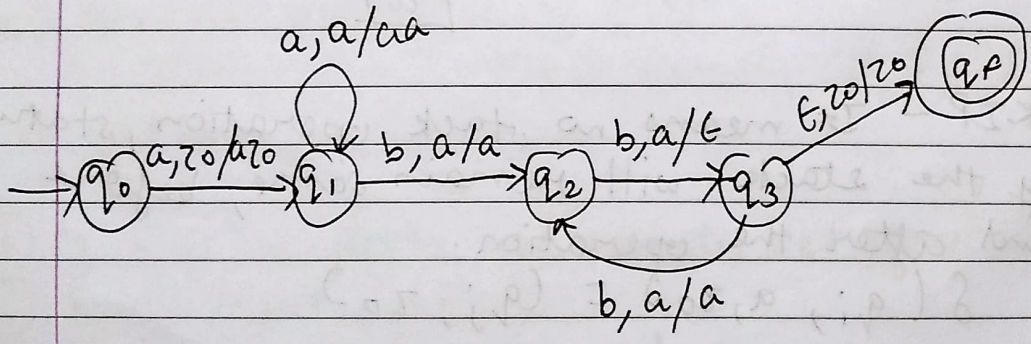
a	a	a	b	b	b	∈	∈



Q2) Design a deterministic PDA for $\{a^n b^{2n} \mid n \geq 1\}$

=>

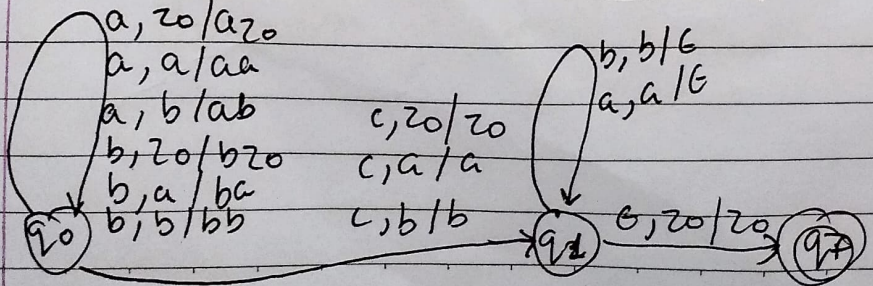
a	a	a	b	b	b	b	b	b	∈	∈



Q3) Design a PDA for $\{wcw^r \mid w \in (a,b)^*\}$

=>

a	b	b	c	b	b	a	∈



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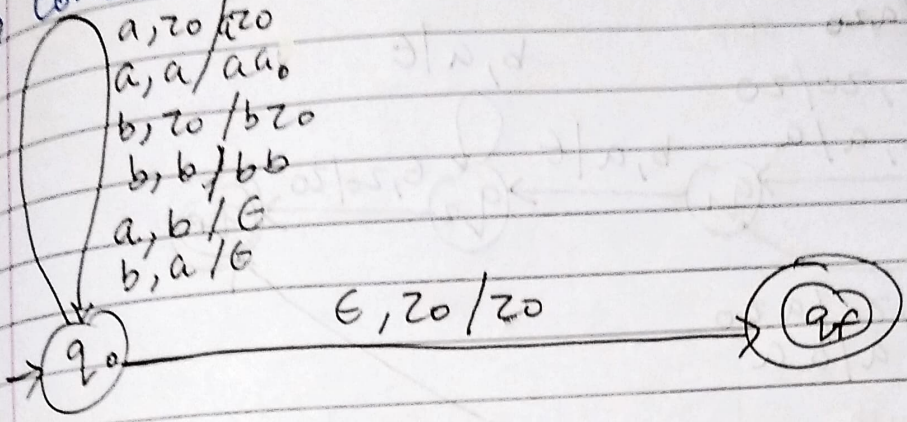
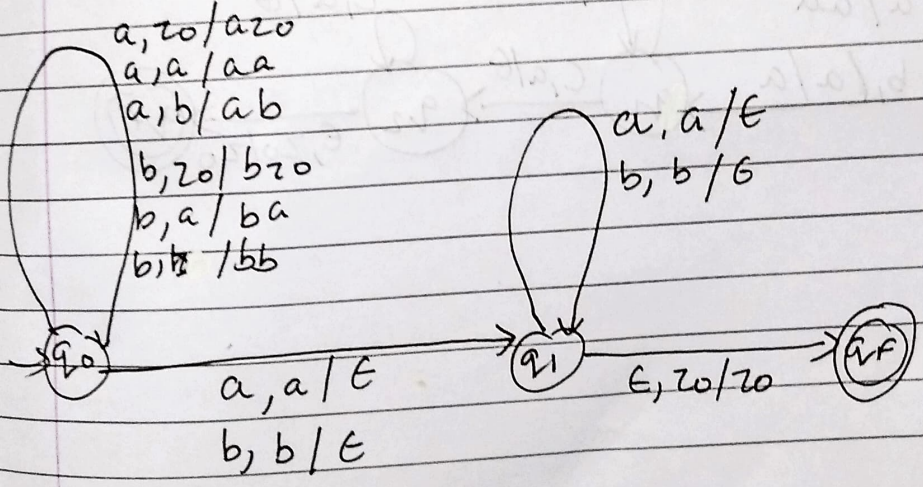
(96) Construct PDA that accepts $L = \{ |w| \; | \; a=b \; | \; w \in (a,b)^* \}$?

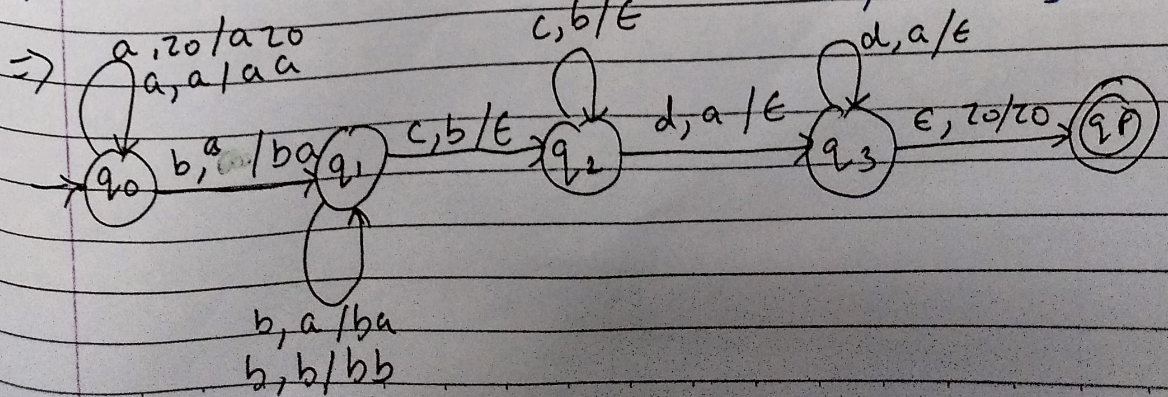


a	b	b	b	a	b	a	a	a	∈

Q5) Construct PDA that accepts language $L = \{ w w^r \; | \; w \in (a,b)^* \}$?



Q7) Design PDA that accepts $L = \{ a^m b^n c^n d^m \; | \; m, n > 0 \}$



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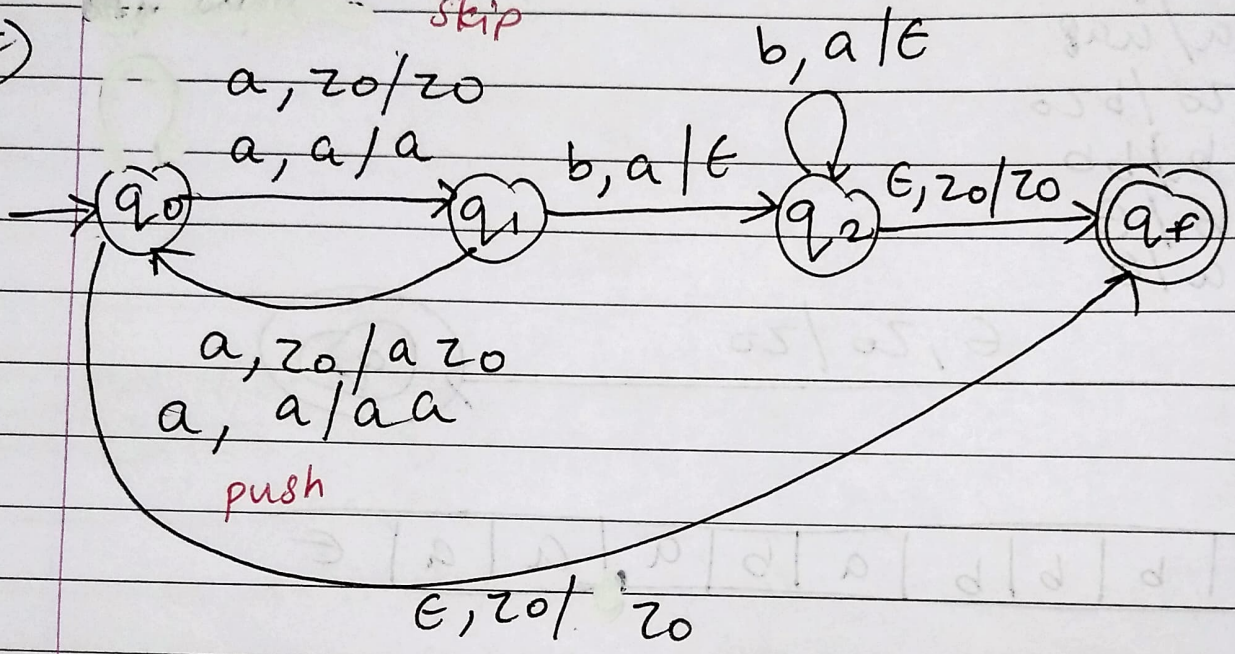
Q8) Design PDA for $L = \{a^{2n} b^n , n \geq 0\}$

⇒



Q9) Design PDA for $L = \{a^n b^m c^n \mid m, n \geq 1\}$

⇒