Instantaneous Description of PDA:-

L> Any configuration of PDA can be described by triplet (q, w, α) where,

- q is the current state of PDA
- w is the remaining input
- α is the stack contents.

Conventionally, we show the top of stack at the left of α and bottom at the right end. Such a description by a triplet is called an instantaneous description.

Turnstile Notation:-

'$\vdash$' sign describes the turnstile notation and represents one move.

'$\vdash^*$' sign describes a sequence of moves.

eg. $(q, b, T) \vdash (q, w, \alpha)$

It means while taking a transition from state p to q, the input symbol 'b' is consumed and the top of the stack 'T' is represented by a new string α.

Example A PDA accepting a string over $\{a,b\}$ such that number of a's and number of b's are equal i.e $L = \{w | w \in \{a,b\}^*\}$ and a's & b's are equal.

Soln:- Let P be the PDA given by:

$$Q = \{$$

$$\Sigma = \{a, b\}$$

$$\Gamma = \{a, b, Z_0\}$$

$$Z_0 = Z_0$$

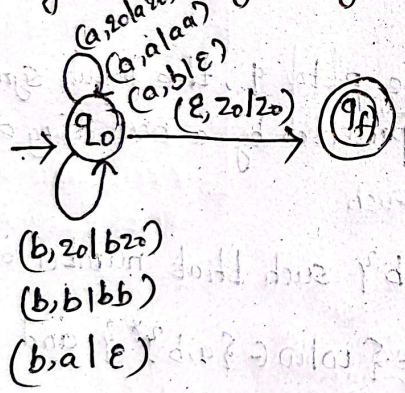
$$q_0 = q_0$$

$$f = q_1$$

Now 'δ' is defined as:

1. $\delta(q_0, a, z_0) \rightarrow (q_0, az_0)$
2. $\delta(q_0, b, z_0) \rightarrow (q_0, bz_0)$
3. $\delta(q_0, a, a) \rightarrow (q_0, aa)$
4. $\delta(q_0, b, b) \rightarrow (q_0, bb)$
5. $\delta(q_0, a, b) \rightarrow (q_0, \varepsilon)$
6. $\delta(q_0, b, a) \rightarrow (q_0, \varepsilon)$
7. $\delta(q_0, \varepsilon, z_0) \rightarrow (q_1, z_0)$ accept

Transition Diagram is given by:



b

Let us trace for input symbol 'w' = aabbbaab

S.No.	State	Unread string	stack	transition used
1.	q_0	aabbbaab	Z_0	Initial Configuration
2.	q_0	abbbaab	aZ_0	1.
3.	q_0	bbbaab	aaZ_0	3.
4.	q_0	bbaab	aZ_0	5.
5.	q_0	baab	Z_0	5.
6.	q_0	aab	bZ_0	2.
7.	q_0	ab	Z_0	5.
8.	q_0	b	aZ_0	1.
9.	q_0	ε	Z_0	6.
10.	q_1	ε	Z_0	7.